Evidence assessment: Summary of a systematic review

Who is this summary for?

This evidence assessment is meant for clinicians, administrators of health facilities and decision makers.

Interventions to improve antibiotic prescribing practices for hospital inpatients

Key findings

- Antibiotic resistance is a major public health problem caused by innapropriate use of antibiotics
- Restrictive methods (limiting the use of anitbiotics) and persuasive methods (*advising/educating physicians on the use of antibiotics*) methods can improve prescription practices, and lead to a reduced number of infections in hospitals, deaths and length of stay.
- Restrictive methods have a larger effect than persuasive methods.
- The studies included in this review were conducted in multiple countries, and the applicability of the interventions tested is broad.

Background

Antibiotic resistance is a serious problem for individual patients and health care systems. Illnesses caused by resistant bacteria are more difficult to treat and lead to higher rates of morbidity and mortality, and longer hospital stays. Up to 50% of antibiotic use in hospitals may be inappropriate.

Question

What types of interventions can improve prescribing of antibiotics to hospital inpatients?

Prescription of antibiotics in Cameroon: The prescription of antibiotics in Cameroon is not always governed by standardized protocols. Due to the limited availability and use of culture and sensitivity (identifying which medication will work best), many antibiotics are used inappropriately. This is aggravated by their over-the-counter availability. In addition, it is unclear how well recommended guidelines on antibiotic use are respected in Cameroon.

Table 1: Summary of the systematic review		
	What the review authors searched for	**What the review authors found**
Studies	Randomized and Controlled Clinical Trials (RCT/CCT); controlled Before and After studies (CBA) and Interrupted Time series (ITS) on antibiotic prescribing to hospital inpatients.	66 studies were included in the review. 43 were ITSs, 13 were RCTs, 6 were CBAs, 2 were CCTs, 1 was a Cluster CCT and 1 was a Cluster RCT.
Participants	Health care professionals who prescribe antibiotics to hospital inpatients receiving acute care.	The interventions identified were delivered to pharmacists in 22 studies, a specialist physician in 17 studies, a multi-disciplinary antimicrobial management team in 11 studies, change in antibiotic policy in 7 studies, physicians in the targeted department in 4 studies, by computer in 4 studies and written feedback in 2 studies.
Interventions	A: Persuasive interventions: 1. Dissemination of educational materials in printed form or via educational meetings; 2. Reminders; 3. Audit and feedback; 4. Educational outreach (academic detailing or review and recommend change). B: Restrictive interventions: 1. Compulsory order form - prescribers had to complete a form with clinical details to justify use of the restricted antibiotics; 2. Expert approval - the prescription for a restricted antibiotic had to be approved by third party 3. Restriction by removal - for example by removing restricted antibiotics from drug cupboards; 4. Review and make change - a reviewer changed the prescription C: Structural interventions: Health system changes	Persuasive interventions: Educational outreach (22 interventions); dissemination of educational material (6 interventions); reminders (8 interventions); audit and feedback (9 interventions). Restrictive interventions: Compulsory order forms (5 studies); expert approval (9 studies); removal by restriction (8 studies); review and make change (4 studies). Structural interventions (8 studies)
Controls	No controls specified	No controls specified
Outcomes	• Antibiotic prescribing process measures (decision to treat, choice of drug, dose, route or duration of treatment); Clinical outcome measures (mortality, length of hospital stay); Microbial outcome measure (colonization or infection with Clostridium difficile or antibiotic-resistant bacteria).	Fifty-two studies provided data about drug outcomes, 14 about clinical outcomes and 16 about microbiological outcomes. Fifty one studies provided interpretable data about only one outcome: drugs only in 38 studies, clinical only in three studies and microbiological only in 10 studies. Fifteen studies provided data about more than one outcome: drugs plus clinical in nine studies, drugs plus microbiological in four studies, clinical plus microbiological in one study. Only one study provided data about all three outcomes. A fourth outcome ("Financial") is restricted to studies that provided information about the cost of developing or implementing the intervention in addition to savings arising from the intervention.
Date of the most recent search: 3 February 2009		
Limitations: This is a good quality systematic review with only minor limitations related to the included studies. The meta-regression of this review was limited by the small number of comparable studies. Long term effects were not covered.		
Citation: Davey P, Brown E, Charani E, Fenelon L, Gould IM, Holmes A, Ramsay CR, Wiffen PJ, Wilcox M. Interventions to improve antibiotic prescribing practices for hospital inpatients. Cochrane Database of Systematic Reviews 2013, Issue 4. Art. No.: CD003543. DOI: 10.1002/14651858.CD003543.pub3.		

Summary of findings:

Patient or population: Healthcare professionals
Settings: Secondary care (inpatients in acute, not long term care only)
Intervention: Any intended to improve antibiotic prescribing
Comparison: Usual care

Outcomes	Effect measure (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)
Restrictive versus Persuasive interventions			
Appropriate prescribing of antibiotics	32% difference in effect size (restrictive-persuasive) at one month 95% CI 2 to 61% No significant difference at 6, 12 or 24 months	53 comparisons from 40 studies (all ITS) in 46 hospitals	Low ⊕⊕00 Indirect comparison between studies that provide data about effect of either persuasive or restrictive interventions
Microbial outcomes	53% difference in effect size (restrictive-persuasive) at 6 months 95% CI 31 to 75% No significant difference at 12 or 24 months	20 comparisons from 14 studies (all ITS) in 14 hospitals	Low ⊕⊕00 Indirect comparison between studies that provide data about effect of either persuasive or restrictive interventions
Patient outcomes	Risk of mortality for intervention versus control 0.92 (95% CI 0.81 to 1.06)	11 comparisons from 11 studies (7 RCT, 3 cluster-RCT, 1 cluster CCT) in 20 hospitals with 9,817 patients	Moderate ⊕⊕⊕0 High risk of bias especially around study design
	Difference (in days) in length of stay for intervention versus control -0.04 days (95% CI - 0.34 to 0. 25)	6 comparisons from 6 studies (4 RCT, 2 cluster-RCT) in 8 hospitals with 8,071 patients	Very Low ⊕000 Studies are very heterogeneous and have high risk of bias
Interventions intended to increase effective antibiotic prescribing for pneumonia			
Patient outcomes	Risk of mortality for intervention versus control 0.89 (95% CI 0.82 to 0.97)	4 comparisons from 4 studies (3 CBA, 1 RCT) in 104 hospitals with 22,526 patients	Low ⊕⊕00 High risk of bias especially around study design

Abbreviations
CBA: controlled before and after; CCT: controlled clinical trial; CI: confidence interval; ITS: interrupted time series; RCT: randomized controlled trial

Applicability

Forty two studies were from the USA. The remaining 24 studies were from 10 countries: Australia (2), Brazil (1), Canada (4), Colombia (1), France (2), Netherlands (2), Norway (1), Spain (1), Thailand (2) and the United Kingdom (8). Even though none of these studies was conducted in Africa, some of these interventions can easily be applied in low resource settings.

Conclusions

A wide variety of interventions has been shown to be successful in changing antibiotic prescribing to hospital inpatients. Restrictive methods are more effective than persuasive methods.

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