



FOCUS ON RESEARCH

SYSTEMATIC REVIEW AND META-ANALYSIS OF INTERVENTIONS TO IMPROVE ANTIBIOTIC PRESCRIBING PRACTICES FOR HOSPITAL INPATIENTS

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Aim To estimate the effectiveness and safety of interventions to improve antibiotic prescribing to hospital inpatients and investigate the effect of two intervention functions: restriction and enablement.

Project Outline/Methodology We searched the literature up to December 2014. We included randomised controlled trials (RCTs) and non-randomised studies (NRS) about professional or structural interventions. Two authors independently extracted data. We performed meta-analysis of RCTs and NRS.

Restriction was defined as "Using rules to reduce the opportunity to engage in the target behaviour (or increase the target behaviour by reducing the opportunity to engage in competing behaviours)"

Enablement was defined as "Increasing means/reducing barriers to increase capability or opportunity"

Key Results We identified 221 studies with 170 (77%) that contributed to meta-analysis or identification of unintended consequences (49 RCT, 121 NRS).

In 29 RCTs compliance with desired practice increased by 15% (95% CI 14-16%) from baseline 54%. In 14 RCTs duration of all antibiotic treatment decreased by -1.95 days (95% CI -2.22 to -1.67) from baseline 11.0 days. NRS showed that interventions were effective in routine clinical practice, with 70% of interventions being hospital wide compared with 31% for RCTs.

There was no increase in mortality (95%CI -1 to 0%) in 29 RCTs. Interventions were associated with significant reduction in length of stay by -1.12 days (95% CI -1.54 to -0.70) in 15 RCTs. However one RCT and six NRS raised concerns about unintended consequences of restrictive interventions. These were delay in treatment and breakdown in trust between infection specialists and clinical teams.

Both enablement and restriction were independently associated with increased effect and enablement enhanced the effect of restrictive interventions.

Enabling interventions that included feedback were more effective than those that did not.

Impact on microbial outcomes was assessed in 20 NRS of planned interventions. These were associated with a large reduction in *C difficile* infection (median -48.6%) but smaller reductions in colonisation or infection with resistant gram negative bacteria (median -12.9%) and resistant gram positive bacteria (median -19.3%).

Conclusions We have found high quality evidence that interventions are effective in reducing excessive antibiotic treatment safely, without increase in mortality and with reduction in length of stay. However, more research is required on unintended consequences of restrictive interventions

Enablement consistently increased the effect of interventions, including those with restriction. Although feedback further increased intervention effect, it was used in only a minority of enabling interventions.

What does this study add to the field? This is the first systematic review to apply standardised definitions of intervention functions and behaviour change techniques to antimicrobial stewardship interventions.

Implications for Practice or Policy Interventions were successful in safely reducing unnecessary antibiotic use in hospitals, despite the fact the majority did not use the most effective behaviour change techniques. Consequently effective dissemination of the review results could have considerable health service and policy impact.

Where to next? Craig Ramsay is leading a proposal to the EU Joint Programming Initiative on Antimicrobial Resistance for a transnational working group on improving design and reporting of antimicrobial stewardship interventions.

The British Society for Antimicrobial Chemotherapy has identified professional behaviour change as their top priority for e-learning. Results from this review will be disseminated through resources that will be available by December 2016

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