

Table 1. Summary of twenty studies describing antimicrobial stewardship strategies in the Middle East

Study	Country	Design	Setting (No. of patients)	Evaluated component	Comparator	Outcome	Recommendations
Amer et al. 2013	Saudi Arabia	Comparative, historically controlled study using prospective audit with feedback	Hospital (73)	Appropriateness of prescribing the empirical antibiotic therapy	Pre/post antimicrobial stewardship programme implementation	Appropriateness improved from 30.6% to 100% (P < 0.05)	Continuous higher administration support Multidisciplinary team approach Continuous use of supplemental strategies, including education, guidelines, antimicrobial order forms, dose optimization and cycling
Dib et al. 2009	Saudi Arabia	Prospective chart audit (point prevalence survey) with educational intervention	Hospital (74)	Appropriateness of antibiotic use and effect of educational intervention on its utilization	Compliance with CDC-adapted criteria and the hospital control practices	Significant improvement in use post-intervention Compliance with guidelines improved from 21% pre-intervention to 85% post-intervention (P = 0.0001)	Emphasis on importance of active strategies, including chart audit, physician's feedback and educational efforts to decrease inappropriate antibiotic usage
Al-Tawfiq et al. 2015	Saudi Arabia	Selective and restrictive reporting of tested antimicrobial susceptibilities for key pathogens in an antimicrobial stewardship initiative, including an educational intervention before the launch of the reporting initiative	Hospital	Effect of educational intervention (change in cascade and restrictive reporting) in enhancing antimicrobial stewardship programmes and utilization of antimicrobial and clinical prescribing patterns by physicians	Compliance with local antibiograms (tracking antibiotic susceptibilities), pharmacokinetic factors and IDSA recommendations	Increased susceptibility rates to some antibiotics with reduced rates of C. difficile infection from 0.11 to 0.07 per 1000 patient days	Encouragement of use of active strategies such as restrictive reporting to further influence clinical prescribing and to permit laboratory-based contribution towards implementation of an antimicrobial stewardship programme Ongoing support from physicians is ultimately needed and they must be provided with educational interventions, including seminars, ward visits, telephone teaching and after-hours discussion
Al-Momany et al. 2009	Jordan	Prospective evaluation of patients' medical files	Hospital (236)	Degree of adherence for antimicrobial prophylaxis practice in cardiac surgery	Compliance with international guidelines	Adherence is far from optimal and inappropriate administration of antibiotics in terms of choice (1%), duration (39.4%), dose (27.9%) and dosing interval (13%)	Developing local hospital guidelines Giving the pharmacist a central role in the administration, monitoring and intervention of antimicrobial prophylaxis