

Appendix 4 – literature list of included studies

Abel SR, Guba EA. Evaluation of an imipenem/cilastatin target drug program. DICP. 1991;25(4):348-50.

Achong MR, Wood J, Theal HK, Goldberg R, Thompson DA. Changes in hospital antibiotic therapy after a quality-of-use study. Lancet. 1977;2(8048):1118-22.

Aiken AM, Wanyoro AK, Mwangi J, Juma F, Mugoya IK, Scott JA. Changing use of surgical antibiotic prophylaxis in Thika Hospital, Kenya: a quality improvement intervention with an interrupted time series design. PLoS ONE. 2013;8(11):e78942.

Akter SF, Heller RD, Smith AJ, Milly AF. Impact of a training intervention on use of antimicrobials in teaching hospitals. J Infect Dev Ctries. 2009;3(6):447-51.

Al mohajer M, Matthias KR, Nix DE. Improving the knowledge of students and physicians regarding appropriate use of antibiotics for respiratory infections through an online educational module. Am J Infect Control. 2017;45(1):e15-e17.

Alawi MM, Darwesh BM. A stepwise introduction of a successful antimicrobial stewardship program. Experience from a tertiary care university hospital in Western, Saudi Arabia. Saudi Med J. 2016;37(12):1350-1358.

Al-somai N, Al-muhur M, Quteimat O, Hamzah N. The impact of clinical pharmacist and ID intervention in rationalization of antimicrobial use. Saudi Pharm J. 2014;22(6):516-21.

Albrich WC, Dusemund F, Bucher B, et al. Effectiveness and safety of procalcitonin-guided antibiotic therapy in lower respiratory tract infections in "real life": an international, multicenter poststudy survey (ProREAL). Arch Intern Med. 2012;172(9):715-22.

Aldeyab MA, Kearney MP, Scott MG, et al. An evaluation of the impact of antibiotic stewardship on reducing the use of high-risk antibiotics and its effect on the incidence of Clostridium difficile infection in hospital settings. J Antimicrob Chemother. 2012;67(12):2988-96.

Aldeyab MA, Scott MG, Kearney MP, et al. Impact of an enhanced antibiotic stewardship on reducing methicillin-resistant *Staphylococcus aureus* in primary and secondary healthcare settings. *Epidemiol Infect.* 2014;142(3):494-500.

Alfandari S, Berthon C, Coiteux V. Antifungal stewardship: implementation in a French teaching hospital. *Med Mal Infect.* 2014;44(4):154-8.

Allan PA, Newman MJ, Oehmen R, English WA. The use of daily electronic prompts to help improve antimicrobial stewardship in a critical care unit. *J Infect Prev.* 2016;17(4):179-184.

Allison GM, Weigel B, Holcroft C. Does electronic medication reconciliation at hospital discharge decrease prescription medication errors?. *Int J Health Care Qual Assur.* 2015;28(6):564-73.

Almatar M, Peterson GM, Thompson A, McKenzie D, Anderson T, Zaidi ST. Clinical Pathway and Monthly Feedback Improve Adherence to Antibiotic Guideline Recommendations for Community-Acquired Pneumonia. *PLoS ONE.* 2016;11(7):e0159467.

Alshukairi A, Alserehi H, El-saed A, et al. A de-escalation protocol for febrile neutropenia cases and its impact on carbapenem resistance: A retrospective, quasi-experimental single-center study. *J Infect Public Health.* 2016;9(4):443-51.

Altiner A, Brockmann S, Sielk M, Wilm S, Wegscheider K, Abholz HH. Reducing antibiotic prescriptions for acute cough by motivating GPs to change their attitudes to communication and empowering patients: a cluster-randomized intervention study. *J Antimicrob Chemother.* 2007;60(3):638-44.

Altunsoy A, Aypak C, Azap A, Ergönül Ö, Balık I. The impact of a nationwide antibiotic restriction program on antibiotic usage and resistance against nosocomial pathogens in Turkey. *Int J Med Sci.* 2011;8(4):339-44.

Alweis R, Greco M, Wasser T, Wenderoth S. An initiative to improve adherence to evidence-based guidelines in the treatment of URIs, sinusitis, and pharyngitis. *J Community Hosp Intern Med Perspect.* 2014;4

Ambroggio L, Thomson J, Murtagh kurowski E, et al. Quality improvement methods increase appropriate antibiotic prescribing for childhood pneumonia. *Pediatrics*. 2013;131(5):e1623-31.

Amer MR, Akhras NS, Mahmood WA, Al-jazairi AS. Antimicrobial stewardship program implementation in a medical intensive care unit at a tertiary care hospital in Saudi Arabia. *Ann Saudi Med*. 2013;33(6):547-54.

Ansari F, Gray K, Nathwani D, et al. Outcomes of an intervention to improve hospital antibiotic prescribing: interrupted time series with segmented regression analysis. *J Antimicrob Chemother*. 2003;52(5):842-8.

Antworth A, Collins CD, Kunapuli A, et al. Impact of an antimicrobial stewardship program comprehensive care bundle on management of candidemia. *Pharmacotherapy*. 2013;33(2):137-43.

Apisarnthanarak A, Danchaivijitr S, Khawcharoenporn T, et al. Effectiveness of education and an antibiotic-control program in a tertiary care hospital in Thailand. *Clin Infect Dis*. 2006;42(6):768-75.

Apisarnthanarak A, Yatraser A, Mundy LM. Impact of education and an antifungal stewardship program for candidiasis at a Thai tertiary care center. *Infect Control Hosp Epidemiol*. 2010;31(7):722-7.

Apisarnthanarak A, Lapcharoen P, Vanichkul P, Srisaeng-ngoen T, Mundy LM. Design and analysis of a pharmacist-enhanced antimicrobial stewardship program in Thailand. *Am J Infect Control*. 2015;43(9):956-9.

Arboe B, Laub RR, Kronborg G, Knudsen JD. Evaluation of the decision support system for antimicrobial treatment, TREAT, in an acute medical ward of a university hospital. *Int J Infect Dis*. 2014;29:156-61.

Arda B, Sipahi OR, Yamazhan T, et al. Short-term effect of antibiotic control policy on the usage patterns and cost of antimicrobials, mortality, nosocomial infection rates and antibacterial resistance. *J Infect*. 2007;55(1):41-8.

Arnold FW, McDonald LC, Smith RS, Newman D, Ramirez JA. Improving antimicrobial use in the hospital setting by providing usage feedback to prescribing physicians. *Infect Control Hosp Epidemiol*. 2006;27(4):378-82.

Ashe D, Patrick PA, Stempel MM, Shi Q, Brand DA. Educational posters to reduce antibiotic use. *J Pediatr Health Care*. 2006;20(3):192-7.

Ashfaq A, Zhu A, Iyengar A, et al. Impact of an Institutional Antimicrobial Stewardship Program on Bacteriology of Surgical Site Infections in Cardiac Surgery. *J Card Surg*. 2016;31(6):367-72.

Au P, Salama S, Rotstein C. Implementation and evaluation of a preprinted perioperative antimicrobial prophylaxis order form in a teaching hospital. *Can J Infect Dis*. 1998;9(3):157-66.

Aubert G, Carricajo A, Vautrin AC, et al. Impact of restricting fluoroquinolone prescription on bacterial resistance in an intensive care unit. *J Hosp Infect*. 2005;59(2):83-9.

Avdic E, Cushinotto LA, Hughes AH, et al. Impact of an antimicrobial stewardship intervention on shortening the duration of therapy for community-acquired pneumonia. *Clin Infect Dis*. 2012;54(11):1581-7.

Avent ML, Hansen MP, Gilks C, et al. General Practitioner Antimicrobial Stewardship Programme Study (GAPS): protocol for a cluster randomised controlled trial. *BMC Fam Pract*. 2016;17:48.

Avorn J, Soumerai SB, Taylor W, Wessels MR, Janousek J, Weiner M. Reduction of incorrect antibiotic dosing through a structured educational order form. *Arch Intern Med*. 1988;148(8):1720-4.

Awad AI, Eltayeb IB, Baraka OZ. Changing antibiotics prescribing practices in health centers of Khartoum State, Sudan. *Eur J Clin Pharmacol*. 2006;62(2):135-42.

Azap A, Topçuoğlu P, Yeşilkaya A, et al. The effect of a nationwide antibiotic restriction policy on antibiotic usage in a stem cell transplantation unit. *Turk J Haematol*. 2005;22(2):87-90.

Baer G, Baumann P, Buettcher M, et al. Procalcitonin guidance to reduce antibiotic treatment of lower respiratory tract infection in children and adolescents (ProPAED): a randomized controlled trial. PLoS ONE. 2013;8(8):e68419.

Bailey TC, Ritchie DJ, McMullin ST, et al. A randomized, prospective evaluation of an interventional program to discontinue intravenous antibiotics at two tertiary care teaching institutions. Pharmacotherapy. 1997;17(2):277-81.

Baker SN, Acquisto NM, Ashley ED, Fairbanks RJ, Beamish SE, Haas CE. Pharmacist-managed antimicrobial stewardship program for patients discharged from the emergency department. J Pharm Pract. 2012;25(2):190-4.

Bamberger DM, Dahl SL. Impact of voluntary vs enforced compliance of third-generation cephalosporin use in a teaching hospital. Arch Intern Med. 1992;152(3):554-7.

Barlow G, Nathwani D, Williams F, et al. Reducing door-to-antibiotic time in community-acquired pneumonia: Controlled before-and-after evaluation and cost-effectiveness analysis. Thorax. 2007;62(1):67-74.

Bao L, Peng R, Wang Y, et al. Significant reduction of antibiotic consumption and patients' costs after an action plan in China, 2010-2014. PLoS ONE. 2015;10(3):e0118868.

Bao L, Wang Y, Shang T, Ren X, Ma R. A novel clinical pharmacy management system in improving the rational drug use in department of general surgery. Indian J Pharm Sci. 2013;75(1):11-5.

Barriere SL, Conte JE. Aminoglycoside use monitored by clinical pharmaceutical services. Am J Hosp Pharm. 1979;36(9):1209-11.

Bartlett JM, Siola PL. Implementation and first-year results of an antimicrobial stewardship program at a community hospital. Am J Health Syst Pharm. 2014;71(11):943-9.

Bassetti M, Righi E, Ansaldi F, et al. Impact of limited cephalosporin use on prevalence of methicillin-resistant *Staphylococcus aureus* in the intensive care unit. J Chemother. 2009;21(6):633-8.

Bassetti M, Di biagio A, Rebesco B, Cenderello G, Amalfitano ME, Bassetti D. Impact of an antimicrobial formulary and restriction policy in the largest hospital in Italy. *Int J Antimicrob Agents*. 2000;16(3):295-9.

Bassetti M, Di biagio A, Rebesco B, Amalfitano ME, Topal J, Bassetti D. The effect of formulary restriction in the use of antibiotics in an Italian hospital. *Eur J Clin Pharmacol*. 2001;57(6-7):529-34.

Bauchner H, Osganian S, Smith K, Triant R. Improving parent knowledge about antibiotics: a video intervention. *Pediatrics*. 2001;108(4):845-50.

Bauer KA, West JE, Balada-Illasat JM, Pancholi P, Stevenson KB, Goff DA. An antimicrobial stewardship program's impact with rapid polymerase chain reaction methicillin-resistant *Staphylococcus aureus*/S. aureus blood culture test in patients with S. aureus bacteremia. *Clin Infect Dis*. 2010;51(9):1074-80.

Baysari MT, Oliver K, Egan B, et al. Audit and feedback of antibiotic use: utilising electronic prescription data. *Appl Clin Inform*. 2013;4(4):583-95.

Beardsley JR, Williamson JC, Johnson JW, Luther VP, Wrenn RH, Ohl CC. Show me the money: long-term financial impact of an antimicrobial stewardship program. *Infect Control Hosp Epidemiol*. 2012;33(4):398-400.

Beaulac K, Corcione S, Epstein L, Davidson LE, Doron S. Antimicrobial Stewardship in a Long-Term Acute Care Hospital Using Offsite Electronic Medical Record Audit. *Infect Control Hosp Epidemiol*. 2016;37(4):433-9.

Bedini A, De maria N, Del buono M, et al. Antimicrobial stewardship in a Gastroenterology Department: Impact on antimicrobial consumption, antimicrobial resistance and clinical outcome. *Dig Liver Dis*. 2016;48(10):1142-7.

Beeler PE, Kuster SP, Eschmann E, Weber R, Blaser J. Earlier switching from intravenous to oral antibiotics owing to electronic reminders. *Int J Antimicrob Agents*. 2015;46(4):428-33.

Belongia EA, Knobloch MJ, Kieke BA, Davis JP, Janette C, Besser RE. Impact of statewide program to promote appropriate antimicrobial drug use. *Emerging Infect Dis.* 2005;11(6):912-20.

Belongia EA, Sullivan BJ, Chyou PH, Madagame E, Reed KD, Schwartz B. A community intervention trial to promote judicious antibiotic use and reduce penicillin-resistant *Streptococcus pneumoniae* carriage in children. *Pediatrics.* 2001;108(3):575-83.

Benito-fernández J, Vázquez-ronco MA, Morteruel-aizkuren E, Mintegui-raso S, Sánchez-etxaniz J, Fernández-landaluce A. Impact of rapid viral testing for influenza A and B viruses on management of febrile infants without signs of focal infection. *Pediatr Infect Dis J.* 2006;25(12):1153-7.

Benson JM. Incorporating pharmacy student activities into an antimicrobial stewardship program in a long-term acute care hospital. *Am J Health Syst Pharm.* 2014;71(3):227-30.

Bernstein SL, Whitaker D, Winograd J, Brennan JA. An electronic chart prompt to decrease proprietary antibiotic prescription to self-pay patients. *Acad Emerg Med.* 2005;12(3):225-31.

Best JT, Frith K, Anderson F, Rapp CG, Rioux L, Ciccarello C. Implementation of an evidence-based order set to impact initial antibiotic time intervals in adult febrile neutropenia. *Oncol Nurs Forum.* 2011;38(6):661-8.

Bevilacqua S, Demoré B, Boschetti E, et al. 15 years of antibiotic stewardship policy in the Nancy Teaching Hospital. *Med Mal Infect.* 2011;41(10):532-9.

Bexell A, Lwando E, Von hofsten B, Tembo S, Eriksson B, Diwan VK. Improving drug use through continuing education: a randomized controlled trial in Zambia. *J Clin Epidemiol.* 1996;49(3):355-7.

Bhalla N, Hussein N, Atari M, et al. Introducing an antibiotic stewardship program in a humanitarian surgical hospital. *Am J Infect Control.* 2016;44(11):1381-1384.

Bhat BV, Prasad P, Ravi kumar VB, et al. Syndrome Evaluation System (SES) versus Blood Culture (BACTEC) in the Diagnosis and Management of Neonatal Sepsis--A Randomized Controlled Trial. *Indian J Pediatr.* 2016;83(5):370-9.

Bhavnani D, Phatinawin L, Chantra S, Olsen SJ, Simmerman JM. The influence of rapid influenza diagnostic testing on antibiotic prescribing patterns in rural Thailand. *Int J Infect Dis.* 2007;11(4):355-9.

Bhullar HS, Shaikh FA, Deepak R, Poddutoor PK, Chirla D. Antimicrobial Justification form for Restricting Antibiotic Use in a Pediatric Intensive Care Unit. *Indian Pediatr.* 2016;53(4):304-6.

Bjerrum L, Cots JM, Llor C, Molist N, Munck A. Effect of intervention promoting a reduction in antibiotic prescribing by improvement of diagnostic procedures: a prospective, before and after study in general practice. *Eur J Clin Pharmacol.* 2006;62(11):913-8.

Bjerrum L, Munck A, Gahrn-hansen B, et al. Health Alliance for prudent antibiotic prescribing in patients with respiratory tract infections (HAPPY AUDIT) -impact of a non-randomised multifaceted intervention programme. *BMC Fam Pract.* 2011;12:52.

Bjerrum L, Gahrn-hansen B, Munck AP. C-reactive protein measurement in general practice may lead to lower antibiotic prescribing for sinusitis. *Br J Gen Pract.* 2004;54(506):659-62.

Blok WL, Gyssens IC, Hekster YA, Koopmans PP, Van der meer JW. Feasibility of an antibiotic order form. First experience in the department of internal medicine of a university hospital. *Pharm World Sci.* 1996;18(4):137-41.

Bloos F, Trips E, Nierhaus A, et al. Effect of Sodium Selenite Administration and Procalcitonin-Guided Therapy on Mortality in Patients With Severe Sepsis or Septic Shock: A Randomized Clinical Trial. *JAMA Intern Med.* 2016;176(9):1266-76.

Blumenthal KG, Shenoy ES, Hurwitz S, Varughese CA, Hooper DC, Banerji A. Effect of a drug allergy educational program and antibiotic prescribing guideline on inpatient clinical providers' antibiotic prescribing knowledge. *J Allergy Clin Immunol Pract.* 2014;2(4):407-13.

Blumenthal KG, Shenoy ES, Varughese CA, Hurwitz S, Hooper DC, Banerji A. Impact of a clinical guideline for prescribing antibiotics to inpatients reporting penicillin or cephalosporin allergy. *Ann Allergy Asthma Immunol*. 2015;115(4):294-300.e2.

Boel J, Søgaaard M, Andreassen V, Jarløv JO, Arpi M. Evaluating antibiotic stewardship programs in patients with bacteremia using administrative data: a cohort study. *Eur J Clin Microbiol Infect Dis*. 2015;34(7):1475-84.

Boel J, Andreassen V, Jarløv JO, et al. Impact of antibiotic restriction on resistance levels of *Escherichia coli*: a controlled interrupted time series study of a hospital-wide antibiotic stewardship programme. *J Antimicrob Chemother*. 2016;71(7):2047-51.

Boland X. Implementation of a ward round pro-forma to improve adherence to best practice guidelines. *BMJ Qual Improv Rep*. 2015;4(1)

Bond SE, Boutlis CS, Jansen SG, Miyakis S. Discontinuation of peri-operative gentamicin use for indwelling urinary catheter manipulation in orthopaedic surgery. *ANZ J Surg* 2017; 87: E199–203.

Bond SE, Chubaty AJ, Adhikari S, et al. Outcomes of multisite antimicrobial stewardship programme implementation with a shared clinical decision support system. *J Antimicrob Chemother*. 2017;72(7):2110-2118.

Bonnal C, Baune B, Mion M, et al. Bacteriuria in a geriatric hospital: impact of an antibiotic improvement program. *J Am Med Dir Assoc*. 2008;9(8):605-9.

Borde JP, Batin N, Rieg S, et al. Adherence to an antibiotic stewardship bundle targeting *Staphylococcus aureus* blood stream infections at a 200-bed community hospital. *Infection*. 2014;42(4):713-9.

Borde JP, Batin N, Rieg S, et al. Adherence to an antibiotic stewardship bundle targeting *Staphylococcus aureus* blood stream infections at a 200-bed community hospital. *Infection*. 2014;42(4):713-9.

Borde JP, Kaier K, Steib-bauert M, et al. Feasibility and impact of an intensified antibiotic stewardship programme targeting cephalosporin and fluoroquinolone use in a tertiary care university medical center. *BMC Infect Dis*. 2014;14:201.

Borde JP, Kern WV, Hug M, et al. Implementation of an intensified antibiotic stewardship programme targeting third-generation cephalosporin and fluoroquinolone use in an emergency medicine department. *Emerg Med J*. 2015;32(7):509-15.

Borde JP, Litterst S, Ruhnke M, et al. Implementing an intensified antibiotic stewardship programme targeting cephalosporin and fluoroquinolone use in a 200-bed community hospital in Germany. *Infection*. 2015;43(1):45-50.

Borde JP, Nussbaum S, Hauser S, et al. Implementing an intensified antibiotic stewardship programme targeting daptomycin use in orthopaedic surgery: a cost-benefit analysis from the hospital perspective. *Infection*. 2016;44(3):301-7.

Borer A, Gilad J, Meydan N, Schlaeffer P, Riesenber K, Schlaeffer F. Impact of regular attendance by infectious disease specialists on the management of hospitalised adults with community-acquired febrile syndromes. *Clin Microbiol Infect*. 2004;10(10):911-6.

Bornard L, Dellamonica J, Hyvern H, et al. Impact of an assisted reassessment of antibiotic therapies on the quality of prescriptions in an intensive care unit. *Med Mal Infect*. 2011;41(9):480-5.

Bouchand F, Dinh A, Roux AL, et al. Implementation of a simple innovative system for postprescription antibiotic review based on computerized tools with shared access. *J Hosp Infect*. 2017;95(3):312-317.

Bouza E, Torres MV, Radice C, et al. Direct E-test (AB Biodisk) of respiratory samples improves antimicrobial use in ventilator-associated pneumonia. *Clin Infect Dis*. 2007;44(3):382-7.

Box MJ, Sullivan EL, Ortwine KN, et al. Outcomes of rapid identification for gram-positive bacteremia in combination with antibiotic stewardship at a community-based hospital system. *Pharmacotherapy*. 2015;35(3):269-76.

Boyles TH, Whitelaw A, Bamford C, et al. Antibiotic stewardship ward rounds and a dedicated prescription chart reduce antibiotic consumption and pharmacy costs without affecting inpatient mortality or re-admission rates. *PLoS ONE*. 2013;8(12):e79747.

Brady PW, Brinkman WB, Simmons JM, et al. Oral antibiotics at discharge for children with acute osteomyelitis: a rapid cycle improvement project. *BMJ Qual Saf*. 2014;23(6):499-507.

Brahmi N, Blel Y, Kouraichi N, et al. Impact of ceftazidime restriction on gram-negative bacterial resistance in an intensive care unit. *J Infect Chemother*. 2006;12(4):190-4.

Braybrook S, Walker R. Influencing prescribing in primary care: a comparison of two different prescribing feedback methods. *J Clin Pharm Ther*. 1996;21(4):247-54.

Briel M, Langewitz W, Tschudi P, Young J, Hugenschmidt C, Bucher HC. Communication training and antibiotic use in acute respiratory tract infections. A cluster randomised controlled trial in general practice. *Swiss Med Wkly*. 2006;136(15-16):241-7.

Brink AJ, Messina AP, Feldman C, Richards GA, Van den bergh D. From guidelines to practice: a pharmacist-driven prospective audit and feedback improvement model for peri-operative antibiotic prophylaxis in 34 South African hospitals. *J Antimicrob Chemother*. 2017;72(4):1227-1234.

Brink AJ, Messina AP, Feldman C, et al. Antimicrobial stewardship across 47 South African hospitals: an implementation study. *Lancet Infect Dis*. 2016;16(9):1017-1025.

Brown KE, Johnson KJ, Deronne BM, Parenti CM, Rice KL. Order Set to Improve the Care of Patients Hospitalized for an Exacerbation of Chronic Obstructive Pulmonary Disease. *Ann Am Thorac Soc*. 2016;13(6):811-5. Brumley PE, Malani AN, Kabara JJ, Pisani J, Collins CD. Effect of an antimicrobial stewardship bundle for patients with *Clostridium difficile* infection. *J Antimicrob Chemother*. 2016;71(3):836-40.

Bui C, Zhu E, Donnelley MA, et al. Antimicrobial stewardship programs that target only high-cost, broad-spectrum antimicrobials miss opportunities to reduce *Clostridium difficile* infections. *Am J Infect Control*. 2016;44(12):1684-1686.

Buising KL, Thursky KA, Black JF, et al. Improving antibiotic prescribing for adults with community acquired pneumonia: Does a computerised decision support system achieve more than academic detailing alone?--A time series analysis. *BMC Med Inform Decis Mak*. 2008;8:35.

Buising KL, Thursky KA, Robertson MB, et al. Electronic antibiotic stewardship--reduced consumption of broad-spectrum antibiotics using a computerized antimicrobial approval system in a hospital setting. *J Antimicrob Chemother*. 2008;62(3):608-16.

Burchett P, Harpin S, Petersen-smith A, Emery K. Improving a Urine Culture Callback Follow-up System in a Pediatric Emergency Department. *J Pediatr Health Care*. 2015;29(6):518-25.

Burgess MJ,ENZLER MJ, Kashiwagi DT, et al. Clinical Study of an Online Tool for Standardizing Hospital Care. *J Healthc Qual*. 2016;38(6):359-369.

Burkhardt O, Ewig S, Haagen U, et al. Procalcitonin guidance and reduction of antibiotic use in acute respiratory tract infection. *Eur Respir J*. 2010;36(3):601-7.

Butler CC, Simpson SA, Dunstan F, et al. Effectiveness of multifaceted educational programme to reduce antibiotic dispensing in primary care: practice based randomised controlled trial. *BMJ*. 2012;344:d8173.

Byington CL, Castillo H, Gerber K, et al. The effect of rapid respiratory viral diagnostic testing on antibiotic use in a children's hospital. *Arch Pediatr Adolesc Med*. 2002;156(12):1230-4.

Cai T, Verze P, Brugnolli A, et al. Adherence to European Association of Urology Guidelines on Prophylactic Antibiotics: An Important Step in Antimicrobial Stewardship. *Eur Urol*. 2016;69(2):276-83.

Cai Y, Shek PY, Teo I, et al. A multidisciplinary antimicrobial stewardship programme safely decreases the duration of broad-spectrum antibiotic prescription in Singaporean adult renal patients. *Int J Antimicrob Agents*. 2016;47(1):91-6.

Cairns KA, Jenney AW, Abbott IJ, et al. Prescribing trends before and after implementation of an antimicrobial stewardship program. *Med J Aust*. 2013;198(5):262-6.

Cairns KA, Doyle JS, Trevillyan JM, et al. The impact of a multidisciplinary antimicrobial stewardship team on the timeliness of antimicrobial therapy in patients with positive blood cultures: a randomized controlled trial. *J Antimicrob Chemother.* 2016;71(11):3276-3283.

Calil R, Marba ST, Von nowakonski A, Tresoldi AT. Reduction in colonization and nosocomial infection by multiresistant bacteria in a neonatal unit after institution of educational measures and restriction in the use of cephalosporins. *Am J Infect Control.* 2001;29(3):133-8.

Cals JW, Butler CC, Hopstaken RM, Hood K, Dinant GJ. Effect of point of care testing for C reactive protein and training in communication skills on antibiotic use in lower respiratory tract infections: cluster randomised trial. *BMJ.* 2009;338:b1374.

Cals JW, Schot MJ, De jong SA, Dinant GJ, Hopstaken RM. Point-of-care C-reactive protein testing and antibiotic prescribing for respiratory tract infections: a randomized controlled trial. *Ann Fam Med.* 2010;8(2):124-33.

Cals JW, Ament AJ, Hood K, et al. C-reactive protein point of care testing and physician communication skills training for lower respiratory tract infections in general practice: economic evaluation of a cluster randomized trial. *J Eval Clin Pract.* 2011;17(6):1059-69.

Cameron M, Jones S, Adedeji O. Antibiotic prophylaxis audit and questionnaire study: Traffic Light Poster improves adherence to protocol in gastrointestinal surgery. *Int J Surg.* 2015;19:112-5.

Camins BC, King MD, Wells JB, et al. Impact of an antimicrobial utilization program on antimicrobial use at a large teaching hospital: a randomized controlled trial. *Infect Control Hosp Epidemiol.* 2009;30(10):931-8.

Cantey JB, Wozniak PS, Pruszynski JE, Sánchez PJ. Reducing unnecessary antibiotic use in the neonatal intensive care unit (SCOUT): a prospective interrupted time-series study. *Lancet Infect Dis.* 2016;16(10):1178-1184.

Cao H, Phe K, Laine GA, Russo HR, Putney KS, Tam VH. An institutional review of antimicrobial stewardship interventions. *J Glob Antimicrob Resist.* 2016;6:75-77.

Capers CC, Bess DT, Branam AC, et al. Antibiotic surveillance: the results of a clinical pharmacy intervention program. *Hosp Pharm*. 1993;28(3):206-10, 212.

Caplinger C, Smith G, Remington R, Madaras-kelly K. Evaluation of a Computerized Decision Support Intervention to Decrease Use of Anti-Pseudomonal Carbapenems in Penicillin Allergic Patients. *Antibiotics (Basel)*. 2016;5(1)

Cappelletty D, Jacobs D. Evaluating the impact of a pharmacist's absence from an antimicrobial stewardship team. *Am J Health Syst Pharm*. 2013;70(12):1065-9.

Carbo JF, Ruh CA, Kurtzhals KE, Ott MC, Sellick JA, Mergenhagen KA. Male veterans with complicated urinary tract infections: Influence of a patient-centered antimicrobial stewardship program. *Am J Infect Control*. 2016;44(12):1549-1553.

Cardoso DM, Gilio AE, Hsin SH, et al. Impact of the rapid antigen detection test in diagnosis and treatment of acute pharyngotonsillitis in a pediatric emergency room. *Rev Paul Pediatr*. 2013;31(1):4-9.

Carling P, Fung T, Killion A, Terrin N, Barza M. Favorable impact of a multidisciplinary antibiotic management program conducted during 7 years. *Infect Control Hosp Epidemiol*. 2003;24(9):699-706.

Carman MJ, Phipps J, Raley J, Li S, Thornlow D. Use of a Clinical Decision Support Tool to improve guideline adherence for the treatment of methicillin-resistant *Staphylococcus aureus*: Skin and Soft Tissue Infections. *Adv Emerg Nurs J*. 2011;33(3):252-66.

Carreno JJ, Kenney RM, Bloome M, et al. Evaluation of pharmacy generalists performing antimicrobial stewardship services. *Am J Health Syst Pharm*. 2015;72(15):1298-303.

Carroll DJ, Austin GE, Stajich GV, Miyahara RK, Murphy JE, Ward ES. Effect of education on the appropriateness of serum drug concentration determination. *Ther Drug Monit*. 1992;14(1):81-4.

Célinde J, Södermark L, Hjalmarson O. Adherence to treatment guidelines for acute otitis media in children. The necessity of an effective strategy of guideline implementation. *Int J Pediatr Otorhinolaryngol*. 2014;78(7):1128-32.

Chalfine A, Kitzis MD, Bezie Y, et al. Ten-year decrease of acquired methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia at a single institution: the result of a multifaceted program combining cross-transmission prevention and antimicrobial stewardship. *Antimicrob Resist Infect Control*. 2012;1(1):18.

Chan S, Hossain J, Di pentima MC. Implications and impact of prior authorization policy on vancomycin use at a tertiary pediatric teaching hospital. *Pediatr Infect Dis J*. 2015;34(5):506-8.

Chan YY, Lin TY, Huang CT, et al. Implementation and outcomes of a hospital-wide computerised antimicrobial stewardship programme in a large medical centre in Taiwan. *Int J Antimicrob Agents*. 2011;38(6):486-92.

Chandy SJ, Naik GS, Charles R, et al. The impact of policy guidelines on hospital antibiotic use over a decade: a segmented time series analysis. *PLoS ONE*. 2014;9(3):e92206.

Chate RA, White S, Hale LR, et al. The impact of clinical audit on antibiotic prescribing in general dental practice. *Br Dent J*. 2006;201(10):635-41.

Chaves NJ, Ingram RJ, Macisaac CM, Busing KL. Sticking to minimum standards: implementing antibiotic stewardship in intensive care. *Intern Med J*. 2014;44(12a):1180-7.

Chazan B, Turjeman RB, Frost Y, et al. Antibiotic consumption successfully reduced by a community intervention program. *Isr Med Assoc J*. 2007;9(1):16-20.

Chen IL, Lee CH, Su LH, Wang YL, Liu JW. Effects of implementation of an online comprehensive antimicrobial-stewardship program in ICUs: A longitudinal study. *J Microbiol Immunol Infect*. 2018;51(1):55-63.

Chen Y, Yang K, Jing T, et al. Use of text messages to communicate clinical recommendations to health workers in rural China: a cluster-randomized trial. *Bull World Health Organ*. 2014;92(7):474-81.

Cheng CY, Lee CY, Wu MW, et al. Prospective antimicrobial audit and feedback did not decrease case fatality: Experiences from a hospital in northern Taiwan. *J Infect Dev Ctries*. 2016;10(4):395-9.

Cheon S, Kim MJ, Yun SJ, Moon JY, Kim YS. Controlling endemic multidrug-resistant *Acinetobacter baumannii* in Intensive Care Units using antimicrobial stewardship and infection control. Korean J Intern Med. 2016;31(2):367-74.

Cherif H, Kalin M, Björkholm M. Antifungal therapy in patients with hematological malignancies: how to avoid overtreatment?. Eur J Haematol. 2006;77(4):288-92.

Chow AL, Ang A, Chow CZ, et al. Implementation hurdles of an interactive, integrated, point-of-care computerised decision support system for hospital antibiotic prescription. Int J Antimicrob Agents. 2016;47(2):132-9.

Chow AL, Lye DC, Arah OA. Mortality Benefits of Antibiotic Computerised Decision Support System: Modifying Effects of Age. Sci Rep. 2015;5:17346.

Christ-crain M, Stolz D, Bingisser R, et al. Procalcitonin guidance of antibiotic therapy in community-acquired pneumonia: a randomized trial. Am J Respir Crit Care Med. 2006;174(1):84-93.

Christ-crain M, Jaccard-stolz D, Bingisser R, et al. Effect of procalcitonin-guided treatment on antibiotic use and outcome in lower respiratory tract infections: cluster-randomised, single-blinded intervention trial. Lancet. 2004;363(9409):600-7.

Cisneros JM, Neth O, Gil-navarro MV, et al. Global impact of an educational antimicrobial stewardship programme on prescribing practice in a tertiary hospital centre. Clin Microbiol Infect. 2014;20(1):82-8.

Čižman M, Plankar srovin T, Blagus R, et al. The long-term effects of restrictive interventions on consumption and costs of antibiotics. J Glob Antimicrob Resist. 2015;3(1):31-35.

Clements H, Stephenson T, Gabriel V, et al. Rationalised prescribing for community acquired pneumonia: a closed loop audit. Arch Dis Child. 2000;83(4):320-4.

Climo MW, Israel DS, Wong ES, Williams D, Coudron P, Markowitz SM. Hospital-wide restriction of clindamycin: effect on the incidence of *Clostridium difficile*-associated diarrhea and cost. *Ann Intern Med*. 1998;128(12 Pt 1):989-95.

Coenen S, Dirven K, Michiels B, Denekens J, Van royen P. Implementing a clinical practice guideline on acute cough in general practice: a Belgian experience with academic detailing. *Med Mal Infect*. 2005;35 Suppl 2:S97-9

Coleman LK, Wilson AS. Impact of Nursing Education on the Proportion of Appropriately Drawn Vancomycin Trough Concentrations. *J Pharm Pract*. 2016;29(5):472-4.

Coleman RW, Rodondi LC, Kaubisch S, Granzella NB, O'hanley PD. Cost-effectiveness of prospective and continuous parenteral antibiotic control: experience at the Palo Alto Veterans Affairs Medical Center from 1987 to 1989. *Am J Med*. 1991;90(4):439-44.

Coll A, Kinnear M, Kinnear A. Design of antimicrobial stewardship care bundles on the high dependency unit. *Int J Clin Pharm*. 2012;34(6):845-54.

Collier PE, Rudolph M, Ruckert D, Osella T, Collier NA, Ferrero M. Are preoperative antibiotics administered preoperatively?. *Am J Med Qual*. 1998;13(2):94-7.

Collins CD, Kabara JJ, Michienzi SM, Malani AN. Impact of an Antimicrobial Stewardship Care Bundle to Improve the Management of Patients with Suspected or Confirmed Urinary Tract Infection. *Infect Control Hosp Epidemiol*. 2016;37(12):1499-1501.

Cook PP, Gooch M. Long-term effects of an antimicrobial stewardship programme at a tertiary-care teaching hospital. *Int J Antimicrob Agents*. 2015;45(3):262-7.

Cook PP, Catrou PG, Christie JD, Young PD, Polk RE. Reduction in broad-spectrum antimicrobial use associated with no improvement in hospital antibiogram. *J Antimicrob Chemother*. 2004;53(5):853-9.

Cosgrove SE, Patel A, Song X, et al. Impact of different methods of feedback to clinicians after postprescription antimicrobial review based on the Centers For Disease Control and Prevention's 12 Steps to Prevent Antimicrobial Resistance Among Hospitalized Adults. *Infect Control Hosp Epidemiol*. 2007;28(6):641-6.

Cosgrove SE, Seo SK, Bolon MK, et al. Evaluation of postprescription review and feedback as a method of promoting rational antimicrobial use: a multicenter intervention. *Infect Control Hosp Epidemiol*. 2012;33(4):374-80.

Crowley RK, Fitzpatrick F, Solanki D, Fitzgerald S, Humphreys H, Smyth EG. Vancomycin administration: the impact of multidisciplinary interventions. *J Clin Pathol*. 2007;60(10):1155-9.

Curry M, Sung L, Arroll B, Goodyear-smith F, Kerse N, Norris P. Public views and use of antibiotics for the common cold before and after an education campaign in New Zealand. *N Z Med J*. 2006;119(1233):U1957.

D'acremont V, Kahama-marro J, Swai N, Mtasiwa D, Genton B, Lengeler C. Reduction of anti-malarial consumption after rapid diagnostic tests implementation in Dar es Salaam: a before-after and cluster randomized controlled study. *Malar J*. 2011;10:107.

Danaher PJ, Milazzo NA, Kerr KJ, Lagasse CA, Lane JW. The antibiotic support team--a successful educational approach to antibiotic stewardship. *Mil Med*. 2009;174(2):201-5.

Dandoy CE, Hariharan S, Weiss B, et al. Sustained reductions in time to antibiotic delivery in febrile immunocompromised children: results of a quality improvement collaborative. *BMJ Qual Saf*. 2016;25(2):100-9.

David CM, O'neal KS, Miller MJ, Johnson JL, Lloyd AE. A literacy-sensitive approach to improving antibiotic understanding in a community-based setting. *Int J Pharm Pract*. 2017;25(5):394-398.

Davies J, Gordon CL, Tong SY, Baird RW, Davis JS. Impact of results of a rapid *Staphylococcus aureus* diagnostic test on prescribing of antibiotics for patients with clustered gram-positive cocci in blood cultures. *J Clin Microbiol*. 2012;50(6):2056-8.

Davis LC, Covey RB, Weston JS, Hu BB, Laine GA. Pharmacist-driven antimicrobial optimization in the emergency department. *Am J Health Syst Pharm*. 2016;73(5 Suppl 1):S49-56.

Davis RL, Hasselquist MB, Cardenas V, et al. Introduction of the new Centers for Disease Control and Prevention group B streptococcal prevention guideline at a large West Coast health maintenance organization. *Am J Obstet Gynecol*. 2001;184(4):603-10.

De bont EG, Dinant GJ, Elshout G, et al. An illness-focused interactive booklet to optimise management and medication for childhood fever and infections in out-of-hours primary care: study protocol for a cluster randomised trial. *Trials*. 2016;17(1):547.

De jong E, Van oers JA, Beishuizen A, et al. Efficacy and safety of procalcitonin guidance in reducing the duration of antibiotic treatment in critically ill patients: a randomised, controlled, open-label trial. *Lancet Infect Dis*. 2016;16(7):819-827.

De la poza abad M, Mas dalmau G, Moreno bakedano M, et al. Prescription Strategies in Acute Uncomplicated Respiratory Infections: A Randomized Clinical Trial. *JAMA Intern Med*. 2016;176(1):21-9.

De santis G, Harvey KJ, Howard D, Mashford ML, Moulds RF. Improving the quality of antibiotic prescription patterns in general practice. The role of educational intervention. *Med J Aust*. 1994;160(8):502-5.

De araujo OR, Da silva DC, Diegues AR, et al. Cefepime restriction improves gram-negative overall resistance patterns in neonatal intensive care unit. *Braz J Infect Dis*. 2007;11(2):277-80.

Del arco A, Tortajada B, De la torre J, et al. The impact of an antimicrobial stewardship programme on the use of antimicrobials and the evolution of drug resistance. *Eur J Clin Microbiol Infect Dis*. 2015;34(2):247-51.

Dean NC, Jones BE, Jones JP, et al. Impact of an Electronic Clinical Decision Support Tool for Emergency Department Patients With Pneumonia. *Ann Emerg Med*. 2015;66(5):511-20.

Dean NC, Suchyta MR, Bateman KA, Aronsky D, Hadlock CJ. Implementation of admission decision support for community-acquired pneumonia. *Chest*. 2000;117(5):1368-77.

Dean NC, Silver MP, Bateman KA, James B, Hadlock CJ, Hale D. Decreased mortality after implementation of a treatment guideline for community-acquired pneumonia. *Am J Med*. 2001;110(6):451-7.

Dean NC, Bateman KA, Donnelly SM, Silver MP, Snow GL, Hale D. Improved clinical outcomes with utilization of a community-acquired pneumonia guideline. *Chest*. 2006;130(3):794-9.

Deliberato RO, Marra AR, Sanches PR, et al. Clinical and economic impact of procalcitonin to shorten antimicrobial therapy in septic patients with proven bacterial infection in an intensive care setting. *Diagn Microbiol Infect Dis*. 2013;76(3):266-71.

Di pentima MC, Chan S, Eppes SC, Klein JD. Antimicrobial prescription errors in hospitalized children: role of antimicrobial stewardship program in detection and intervention. *Clin Pediatr (Phila)*. 2009;48(5):505-12.

Di pentima MC, Chan S, Hossain J. Benefits of a pediatric antimicrobial stewardship program at a children's hospital. *Pediatrics*. 2011;128(6):1062-70.

Diasinos N, Baysari M, Kumar S, Day RO. Does the availability of therapeutic drug monitoring, computerised dose recommendation and prescribing decision support services promote compliance with national gentamicin prescribing guidelines?. *Intern Med J*. 2015;45(1):55-62.

Diazgranados CA. Prospective audit for antimicrobial stewardship in intensive care: impact on resistance and clinical outcomes. *Am J Infect Control*. 2012;40(6):526-9.

Dib JG, Al-tawfiq JA, Al abdulmohsin S, Mohammed K, Jenden PD. Improvement in vancomycin utilization in adults in a Saudi Arabian Medical Center using the Hospital Infection Control Practices Advisory Committee guidelines and simple educational activity. *J Infect Public Health*. 2009;2(3):141-6.

Didiodato G, Mcarthur L. Evaluating the Effectiveness of an Antimicrobial Stewardship Program on Reducing the Incidence Rate of Healthcare-Associated Clostridium difficile Infection: A Non-Randomized, Stepped Wedge, Single-Site, Observational Study. PLoS ONE. 2016;11(6):e0157671.

Didiodato G, Mcarthur L, Beyene J, Smieja M, Thabane L. Evaluating the impact of an antimicrobial stewardship program on the length of stay of immune-competent adult patients admitted to a hospital ward with a diagnosis of community-acquired pneumonia: A quasi-experimental study. Am J Infect Control. 2016;44(5):e73-9.

Diederichsen HZ, Skamling M, Diederichsen A, et al. Randomised controlled trial of CRP rapid test as a guide to treatment of respiratory infections in general practice. Scand J Prim Health Care. 2000;18(1):39-43.

Dik JW, Hendrix R, Lo-ten-foe JR, et al. Automatic day-2 intervention by a multidisciplinary antimicrobial stewardship-team leads to multiple positive effects. Front Microbiol. 2015;6:546.

Dik JW, Hendrix R, Friedrich AW, et al. Cost-minimization model of a multidisciplinary antibiotic stewardship team based on a successful implementation on a urology ward of an academic hospital. PLoS ONE. 2015;10(5):e0126106.

Diluigi AJ, Peipert JF, Weitzen S, Jamshidi RM. Prophylactic antibiotic administration prior to hysterectomy: a quality improvement initiative. J Reprod Med. 2004;49(12):949-54.

Ding H, Yang Y, Wei J, et al. Influencing the use of antibiotics in a Chinese pediatric intensive care unit. Pharm World Sci. 2008;30(6):787-93.

Dinh A, Duran C, Davido B, et al. Cost effectiveness of pneumococcal urinary antigen in Emergency Department: a pragmatic real-life study. Intern Emerg Med. 2018;13(1):69-73.

Do J, Walker SA, Walker SE, Cornish W, Simor AE. Audit of antibiotic duration of therapy, appropriateness and outcome in patients with nosocomial pneumonia following the removal of an automatic stop-date policy. Eur J Clin Microbiol Infect Dis. 2012;31(8):1819-31.

Doco-lecompte T, Demore B, Hénard S, et al. Relevance of fluoroquinolone use in hospitals in the Lorraine region of France before and after corrective measures: an investigation by the Antibiolor Network. *Scand J Infect Dis*. 2012;44(2):86-92.

Doernberg SB, Dudas V, Trivedi KK. Implementation of an antimicrobial stewardship program targeting residents with urinary tract infections in three community long-term care facilities: a quasi-experimental study using time-series analysis. *Antimicrob Resist Infect Control*. 2015;4:54.

Dollman WB, Leblanc VT, Stevens L, O'connor PJ, Turnidge JD. A community-based intervention to reduce antibiotic use for upper respiratory tract infections in regional South Australia. *Med J Aust*. 2005;182(12):617-20.

Dowell J, Pitkethly M, Bain J, Martin S. A randomised controlled trial of delayed antibiotic prescribing as a strategy for managing uncomplicated respiratory tract infection in primary care. *Br J Gen Pract*. 2001;51(464):200-5.

Doyne EO, Alfaro MP, Siegel RM, et al. A randomized controlled trial to change antibiotic prescribing patterns in a community. *Arch Pediatr Adolesc Med*. 2004;158(6):577-83.

Dranitsaris G, Spizzirri D, Pitre M, Mcgeer A. A randomized trial to measure the optimal role of the pharmacist in promoting evidence-based antibiotic use in acute care hospitals. *Int J Technol Assess Health Care*. 2001;17(2):171-80.

Dryden M, Saeed K, Townsend R, et al. Antibiotic stewardship and early discharge from hospital: impact of a structured approach to antimicrobial management. *J Antimicrob Chemother*. 2012;67(9):2289-96.

Du B, Chen D, Liu D, et al. Restriction of third-generation cephalosporin use decreases infection-related mortality. *Crit Care Med*. 2003;31(4):1088-93.

Dubrovskaya Y, Papadopoulos J, Scipione MR, Altshuler J, Phillips M, Mehta SA. Antibiotic stewardship for intra-abdominal infections: early impact on antimicrobial use and patient outcomes. *Infect Control Hosp Epidemiol*. 2012;33(4):427-9.

Dumartin C, Rogues AM, Amadéo B, et al. Antibiotic usage in south-western French hospitals: trends and association with antibiotic stewardship measures. *J Antimicrob Chemother.* 2011;66(7):1631-7.

Dumkow LE, Kenney RM, Macdonald NC, Carreno JJ, Malhotra MK, Davis SL. Impact of a Multidisciplinary Culture Follow-up Program of Antimicrobial Therapy in the Emergency Department. *Infect Dis Ther.* 2014;3(1):45-53.

Dunn K, O'reilly A, Silke B, Rogers T, Bergin C. Implementing a pharmacist-led sequential antimicrobial therapy strategy: a controlled before-and-after study. *Int J Clin Pharm.* 2011;33(2):208-14.

Dureau AF, Duclos G, Antonini F, et al. Rapid diagnostic test and use of antibiotic against methicillin-resistant *Staphylococcus aureus* in adult intensive care unit. *Eur J Clin Microbiol Infect Dis.* 2017;36(2):267-272.

Dyrkorn R, Gjølstad S, Espnes KA, Lindbæk M. Peer academic detailing on use of antibiotics in acute respiratory tract infections. A controlled study in an urban Norwegian out-of-hours service. *Scand J Prim Health Care.* 2016;34(2):180-5.

Echols RM, Kowalsky SF. The use of an antibiotic order form for antibiotic utilization review: influence on physicians' prescribing patterns. *J Infect Dis.* 1984;150(6):803-7.

Egger M, Balmer F, Friedli-wüthrich H, Mühlemann K. Reduction of urinary catheter use and prescription of antibiotics for asymptomatic bacteriuria in hospitalised patients in internal medicine: before-and-after intervention study. *Swiss Med Wkly.* 2013;143:w13796.

Ehrenkranz NJ, Nerenberg DE, Shultz JM, Slater KC. Intervention to discontinue parenteral antimicrobial therapy in patients hospitalized with pulmonary infections: effect on shortening patient stay. *Infect Control Hosp Epidemiol.* 1992;13(1):21-32.

Eiland EH, Wargo KA, Hamm W, Hassoun AA. Analysis of adherence to national nosocomial pneumonia treatment guidelines. *Ther Clin Risk Manag.* 2007;3(6):983-8.

Elligsen M, Walker SA, Pinto R, et al. Audit and feedback to reduce broad-spectrum antibiotic use among intensive care unit patients: a controlled interrupted time series analysis. *Infect Control Hosp Epidemiol.* 2012;33(4):354-61.

Ellis K, Rubal-peace G, Chang V, Liang E, Wong N, Campbell S. Antimicrobial Stewardship for a Geriatric Behavioral Health Population. *Antibiotics (Basel).* 2016;5(1)

Elouafkaoui P, Young L, Newlands R, et al. An Audit and Feedback Intervention for Reducing Antibiotic Prescribing in General Dental Practice: The RAPiD Cluster Randomised Controlled Trial. *PLoS Med.* 2016;13(8):e1002115.

Engel MF, Bruns AH, Hulscher ME, et al. A tailored implementation strategy to reduce the duration of intravenous antibiotic treatment in community-acquired pneumonia: a controlled before-and-after study. *Eur J Clin Microbiol Infect Dis.* 2014;33(11):1897-908.

Erbay A, Bodur H, Akinci E, Colpan A. Evaluation of antibiotic use in intensive care units of a tertiary care hospital in Turkey. *J Hosp Infect.* 2005;59(1):53-61.

Estep PM, Ferreira JA, Dupree LH, Aldridge PJ, Jankowski CA. Impact of an antimicrobial stewardship initiative to evaluate β -lactam allergy in patients ordered aztreonam. *Am J Health Syst Pharm.* 2016;73(5 Suppl 1):S8-13.

Evans ME, Millheim ET, Rapp RP. Vancomycin use in a university medical center: effect of a vancomycin continuation form. *Infect Control Hosp Epidemiol.* 1999;20(6):417-20.

Evans RS, Classen DC, Pestotnik SL, Clemmer TP, Weaver LK, Burke JP. A decision support tool for antibiotic therapy. *Proc Annu Symp Comput Appl Med Care.* 1995;:651-5.

Evans RS, Pestotnik SL, Classen DC, et al. A computer-assisted management program for antibiotics and other antiinfective agents. *N Engl J Med.* 1998;338(4):232-8.

Everitt DE, Soumerai SB, Avorn J, Klapholz H, Wessels M. Changing surgical antimicrobial prophylaxis practices through education targeted at senior department leaders. *Infect Control Hosp Epidemiol.* 1990;11(11):578-83.

Fagan M, Lindbæk M, Reiso H, Berild D. A simple intervention to reduce inappropriate ciprofloxacin prescribing in the emergency department. *Scand J Infect Dis.* 2014;46(7):481-5.

Faine B, Mohr N, Harland KK, Rolfes K, Porter B, Fuller BM. Importance of Decision Support Implementation in Emergency Department Vancomycin Dosing. *West J Emerg Med.* 2015;16(4):557-64.

Falsey AR, Murata Y, Walsh EE. Impact of rapid diagnosis on management of adults hospitalized with influenza. *Arch Intern Med.* 2007;167(4):354-60.

Fantoni M, Murri R, Scoppettuolo G, et al. Resource-saving advice from an infectious diseases specialist team in a large university hospital: an exportable model?. *Future Microbiol.* 2015;10(1):15-20.

Farris KB, Kirking DM, Shimp LA, Opdycke RA. Design and results of a group counter-detailing DUR educational program. *Pharm Res.* 1996;13(10):1445-52.

Faryna A, Wergowske GL, Goldenberg K. Impact of therapeutic guidelines on antibiotic use by residents in primary care clinics. *J Gen Intern Med.* 1987;2(2):102-7.

Felsenstein S, Bender JM, Sposto R, Gentry M, Takemoto C, Bard JD. Impact of a Rapid Blood Culture Assay for Gram-Positive Identification and Detection of Resistance Markers in a Pediatric Hospital. *Arch Pathol Lab Med.* 2016;140(3):267-75.

Ferrat E, Le breton J, Guéry E, et al. Effects 4.5 years after an interactive GP educational seminar on antibiotic therapy for respiratory tract infections: a randomized controlled trial. *Fam Pract.* 2016;33(2):192-9.

Filice GA, Drekonja DM, Thurn JR, et al. Use of a computer decision support system and antimicrobial therapy appropriateness. *Infect Control Hosp Epidemiol.* 2013;34(6):558-65.

Finau SA, Latu R. Oral rehydration salts and diarrhoeal diseases: effects of changing inpatient management in Tonga. *Ann Trop Paediatr*. 1987;7(2):128-33.

Fine MJ, Stone RA, Lave JR, et al. Implementation of an evidence-based guideline to reduce duration of intravenous antibiotic therapy and length of stay for patients hospitalized with community-acquired pneumonia: a randomized controlled trial. *Am J Med*. 2003;115(5):343-51.

Finkelstein JA, Davis RL, Dowell SF, et al. Reducing antibiotic use in children: a randomized trial in 12 practices. *Pediatrics*. 2001;108(1):1-7.

Finkelstein JA, Huang SS, Kleinman K, et al. Impact of a 16-community trial to promote judicious antibiotic use in Massachusetts. *Pediatrics*. 2008;121(1):e15-23.

Fishbane S, Niederman MS, Daly C, et al. The impact of standardized order sets and intensive clinical case management on outcomes in community-acquired pneumonia. *Arch Intern Med*. 2007;167(15):1664-9.

Fleet E, Gopal rao G, Patel B, et al. Impact of implementation of a novel antimicrobial stewardship tool on antibiotic use in nursing homes: a prospective cluster randomized control pilot study. *J Antimicrob Chemother*. 2014;69(8):2265-73.

Fleming D, Ali KF, Matelski J, D'sa R, Powis J. When Antimicrobial Stewardship Isn't Watching: The Educational Impact of Critical Care Prospective Audit and Feedback. *Open Forum Infect Dis*. 2016;3(3):ofw115.

Fletcher CV, Giese RM, Rodman JH. Pharmacist interventions to improve prescribing of vancomycin and tobramycin. *Am J Hosp Pharm*. 1986;43(9):2198-201.

Flottorp S, Oxman AD, Håvelsrud K, Treweek S, Herrin J. Cluster randomised controlled trial of tailored interventions to improve the management of urinary tract infections in women and sore throat. *BMJ*. 2002;325(7360):367.

Fodero KE, Horey AL, Krajewski MP, Ruh CA, Sellick JA, Mergenhagen KA. Impact of an Antimicrobial Stewardship Program on Patient Safety in Veterans Prescribed Vancomycin. *Clin Ther*. 2016;38(3):494-502.

Fonzo-christe C, Guignard B, Zaugg C, et al. Impact of clinical decision support guidelines on therapeutic drug monitoring of gentamicin in newborns. *Ther Drug Monit*. 2014;36(5):656-62.

Foral PA, Anthone JM, Destache CJ, et al. Education and Communication in an Interprofessional Antimicrobial Stewardship Program. *J Am Osteopath Assoc*. 2016;116(9):588-93.

Fowler S, Webber A, Cooper BS, et al. Successful use of feedback to improve antibiotic prescribing and reduce *Clostridium difficile* infection: a controlled interrupted time series. *J Antimicrob Chemother*. 2007;59(5):990-5.

Fox BC, Imrey PB, Voights MB, Norwood S. Infectious disease consultation and microbiologic surveillance for intensive care unit trauma patients: a pilot study. *Clin Infect Dis*. 2001;33(12):1981-9.

Francis NA, Butler CC, Hood K, Simpson S, Wood F, Nuttall J. Effect of using an interactive booklet about childhood respiratory tract infections in primary care consultations on reconsulting and antibiotic prescribing: a cluster randomised controlled trial. *BMJ*. 2009;339:b2885.

Frank MO, Batteiger BE, Sorensen SJ, et al. Decrease in expenditures and selected nosocomial infections following implementation of an antimicrobial-prescribing improvement program. *Clin Perform Qual Health Care*. 1997;5(4):180-8.

Frazee E, Rule AD, Lieske JC, et al. Cystatin C-Guided Vancomycin Dosing in Critically Ill Patients: A Quality Improvement Project. *Am J Kidney Dis*. 2017;69(5):658-666.

Frenette C, Sperlea D, Tesolin J, Patterson C, Thirion DJ. Influence of a 5-year serial infection control and antibiotic stewardship intervention on cardiac surgical site infections. *Am J Infect Control*. 2016;44(9):977-82.

Frighetto L, Nickoloff D, Martinusen SM, Mamdani FS, Jewesson PJ. Intravenous-to-oral stepdown program: four years of experience in a large teaching hospital. *Ann Pharmacother*. 1992;26(11):1447-51.

Fukuda T, Watanabe H, Ido S, Shiragami M. Contribution of antimicrobial stewardship programs to reduction of antimicrobial therapy costs in community hospital with 429 Beds --before-after comparative two-year trial in Japan. *J Pharm Policy Pract*. 2014;7(1):10.

Fürst J, Čížman M, Mrak J, et al. The influence of a sustained multifaceted approach to improve antibiotic prescribing in Slovenia during the past decade: findings and implications. *Expert Rev Anti Infect Ther*. 2015;13(2):279-89.

Gagliotti C. Doctors and local media: a synergy for public health information?: a controlled trial to evaluate the effects of a multifaceted campaign on antibiotic prescribing (protocol). *BMC Public Health*. 2011;11:816.

Galar A, Leiva J, Espinosa M, Guillén-grima F, Hernáez S, Yuste JR. Clinical and economic evaluation of the impact of rapid microbiological diagnostic testing. *J Infect*. 2012;65(4):302-9.

Garcell HG, Arias AV, Fernandez EA, Guerrero YB, Serrano RN. Antibiotic Consumption During a 4-year Period in a Community Hospital with an Antimicrobial Stewardship Program. *Oman Med J*. 2016;31(5):352-6.

Garcell HG, Arias AV, Sandoval CP, Valle gamboa ME, Sado AB, Alfonso serrano RN. Impact of a focused antimicrobial stewardship program in adherence to antibiotic prophylaxis and antimicrobial consumption in appendectomies. *J Infect Public Health*. 2017;10(4):415-420.

García-martínez L, Gracia-ahulfinger I, Machuca I, et al. Impact of the PROVAUR stewardship programme on linezolid resistance in a tertiary university hospital: a before-and-after interventional study. *J Antimicrob Chemother*. 2016;71(9):2606-11.

García-vázquez E, Moral-escudero E, Hernández-torres A, Canteras M, Gómez J, Ruiz J. What is the impact of a rapid diagnostic E-test in the treatment of patients with Gram-negative bacteraemia?. Scand J Infect Dis. 2013;45(8):623-8.

Garjani A, Salimnejad M, Shamsmohamadi M, et al. Effect of interactive group discussion among physicians to promote rational prescribing. East Mediterr Health J. 2009;15(2):408-15.

Garner SS, Cox TH, Hill EG, Irving MG, Bissinger RL, Annibale DJ. Prospective, controlled study of an intervention to reduce errors in neonatal antibiotic orders. J Perinatol. 2015;35(8):631-5.

Gatewood MO, Wemple M, Greco S, Kritek PA, Durvasula R. A quality improvement project to improve early sepsis care in the emergency department. BMJ Qual Saf. 2015;24(12):787-95.

Gauld NJ, Zeng IS, Ikram RB, Thomas MG, Buetow SA. Antibiotic treatment of women with uncomplicated cystitis before and after allowing pharmacist-supply of trimethoprim. Int J Clin Pharm. 2017;39(1):165-172.

Gauthier TP, Sherman EM, Unger NR. An Elective Course on Antimicrobial Stewardship. Am J Pharm Educ. 2015;79(10):157.

Gentry CA, Greenfield RA, Slater LN, Wack M, Huycke MM. Outcomes of an antimicrobial control program in a teaching hospital. Am J Health Syst Pharm. 2000;57(3):268-74.

Georgopoulou AP, Savva A, Giamarellos-bourboulis EJ, et al. Early changes of procalcitonin may advise about prognosis and appropriateness of antimicrobial therapy in sepsis. J Crit Care. 2011;26(3):331.e1-7.

Gerber JS, Prasad PA, Fiks AG, et al. Effect of an outpatient antimicrobial stewardship intervention on broad-spectrum antibiotic prescribing by primary care pediatricians: a randomized trial. JAMA. 2013;309(22):2345-52.

Ghafur A, Nagvekar V, Thilakavathy S, et al. "Save Antibiotics, Save lives": an Indian success story of infection control through persuasive diplomacy. Antimicrob Resist Infect Control. 2012;1(1):29.

Gilbert DN, Eubanks NM, Jackson JM. The effects of monitoring the use of gentamicin in a community hospital. *J Med Educ*. 1978;53(2):129-34.

Gillespie E, Rodrigues A, Wright L, Williams N, Stuart RL. Improving antibiotic stewardship by involving nurses. *Am J Infect Control*. 2013;41(4):365-7.

Gin AS, Lipinski LA, Honcharik N. Impact of a target drug monitoring program on the usage of clindamycin. *Can J Hosp Pharm*. 1994;47(2):53-8.

Gjelstad S, Høye S, Straand J, Brekke M, Dalen I, Lindbæk M. Improving antibiotic prescribing in acute respiratory tract infections: cluster randomised trial from Norwegian general practice (prescription peer academic detailing (Rx-PAD) study). *BMJ*. 2013;347:f4403.

Gkentzi D, Ramachandran R, Day E, et al. Antibiotic prescribing in the paediatric emergency department and the impact of education. *J Paediatr Child Health*. 2014;50(11):932-3.

Goeckner BJ, Hendershot E, Scott K, Drake M. A vancomycin monitoring program at a community hospital. *Jt Comm J Qual Improv*. 1998;24(7):379-85.

Goff DA, Karam GH, Haines ST. Impact of a national antimicrobial stewardship mentoring program: Insights and lessons learned. *Am J Health Syst Pharm*. 2017;74(4):224-231.

Goldman JL, Lee BR, Hersh AL, et al. Clinical diagnoses and antimicrobials predictive of pediatric antimicrobial stewardship recommendations: a program evaluation. *Infect Control Hosp Epidemiol*. 2015;36(6):673-80.

Gomez MI, Acosta-gnass SI, Mosqueda-barboza L, Basualdo JA. Reduction in surgical antibiotic prophylaxis expenditure and the rate of surgical site infection by means of a protocol that controls the use of prophylaxis. *Infect Control Hosp Epidemiol*. 2006;27(12):1358-65.

Gong S, Qiu X, Song Y, et al. Effect of Financially Punished Audit and Feedback in a Pediatric Setting in China, within an Antimicrobial Stewardship Program, and as Part of an International Accreditation Process. *Front Public Health*. 2016;4:99.

González ochoa E, Armas pérez L, Bravo gonzález JR, Cabrales escobar J, Rosales corrales R, Abreu suárez G. Prescription of antibiotics for mild acute respiratory infections in children. Bull Pan Am Health Organ. 1996;30(2):106-17.

Gonzales R, Corbett KK, Leeman-castillo BA, et al. The "minimizing antibiotic resistance in Colorado" project: impact of patient education in improving antibiotic use in private office practices. Health Serv Res. 2005;40(1):101-16.

Gonzales R, Steiner JF, Lum A, Barrett PH. Decreasing antibiotic use in ambulatory practice: impact of a multidimensional intervention on the treatment of uncomplicated acute bronchitis in adults. JAMA. 1999;281(16):1512-9.

Gonzales R, Sauaia A, Corbett KK, et al. Antibiotic treatment of acute respiratory tract infections in the elderly: effect of a multidimensional educational intervention. J Am Geriatr Soc. 2004;52(1):39-45.

Gonzales R, Anderer T, Mcculloch CE, et al. A cluster randomized trial of decision support strategies for reducing antibiotic use in acute bronchitis. JAMA Intern Med. 2013;173(4):267-73.

Gonzales R, Aagaard EM, Camargo CA, et al. C-reactive protein testing does not decrease antibiotic use for acute cough illness when compared to a clinical algorithm. J Emerg Med. 2011;41(1):1-7.

Gonzalez CE, Johnson TN, Evans S, et al. Assessing Compliance With Established Pneumonia Core Measures at a Comprehensive Cancer Center. J Healthc Qual. 2015;37(4):232-44.

Gould IM, Jappy B. Trends in hospital antibiotic prescribing after introduction of an antibiotic policy. J Antimicrob Chemother. 1996;38(5):895-904.

Graber CJ, Jones MM, Glassman PA, et al. Taking an Antibiotic Time-out: Utilization and Usability of a Self-Stewardship Time-out Program for Renewal of Vancomycin and Piperacillin-Tazobactam. Hosp Pharm. 2015;50(11):1011-24.

Grattan MJ, Power A, Fruitman DS, Islam S, Mackie AS. The Impact of Infective Endocarditis Prophylaxis Recommendations on the Practices of Pediatric and Adult Congenital Cardiologists. *Can J Cardiol*. 2015;31(12):1497.e23-8.

Green AL, Yi J, Bezler N, et al. A Prospective Cohort Quality Improvement Study to Reduce the Time to Antibiotics for New Fever in Neutropenic Pediatric Oncology Inpatients. *Pediatr Blood Cancer*. 2016;63(1):112-7.

Greene RA, Beckman H, Chamberlain J, et al. Increasing adherence to a community-based guideline for acute sinusitis through education, physician profiling, and financial incentives. *Am J Manag Care*. 2004;10(10):670-8.

Grigoryan L, Naik AD, Horwitz D, et al. Survey finds improvement in cognitive biases that drive overtreatment of asymptomatic bacteriuria after a successful antimicrobial stewardship intervention. *Am J Infect Control*. 2016;44(12):1544-1548.

Groth ME, Chan-tompkins NH, Hegde GG, Shang J, Venkat A. Delays in the administration of antimicrobials in the emergency department and the impact of an educational intervention to improve this administration. *Eur J Emerg Med*. 2013;20(5):339-43.

Gruson D, Hilbert G, Vargas F, et al. Rotation and restricted use of antibiotics in a medical intensive care unit. Impact on the incidence of ventilator-associated pneumonia caused by antibiotic-resistant gram-negative bacteria. *Am J Respir Crit Care Med*. 2000;162(3 Pt 1):837-43.

Guarascio AJ, Slain D, Mcknight R, et al. A matched-control evaluation of an antifungal bundle in the intensive care unit at a university teaching hospital. *Int J Clin Pharm*. 2013;35(1):145-8.

Güerri-fernández R, Villar-garcía J, Herrera-fernández S, et al. An antimicrobial stewardship program reduces antimicrobial therapy duration and hospital stay in surgical wards. *Rev Esp Quimioter*. 2016;29(3):119-21.

Guillard P, De la blanchardière A, Cattoir V, Fischer MO, Verdon R, Saint-lorant G. Antimicrobial stewardship and linezolid. *Int J Clin Pharm*. 2014;36(5):1059-68.

Guillemot D, Varon E, Bernède C, et al. Reduction of antibiotic use in the community reduces the rate of colonization with penicillin G-nonsusceptible *Streptococcus pneumoniae*. Clin Infect Dis. 2005;41(7):930-8.

Gulliford MC, Van staa T, Dregan A, et al. Electronic health records for intervention research: a cluster randomized trial to reduce antibiotic prescribing in primary care (eCRT study). Ann Fam Med. 2014;12(4):344-51.

Gums JG, Yancey RW, Hamilton CA, Kubilis PS. A randomized, prospective study measuring outcomes after antibiotic therapy intervention by a multidisciplinary consult team. Pharmacotherapy. 1999;19(12):1369-77.

Gutiérrez G, Guiscafré H, Bronfman M, Walsh J, Martínez H, Muñoz O. Changing physician prescribing patterns: evaluation of an educational strategy for acute diarrhea in Mexico City. Med Care. 1994;32(5):436-46.

Gyssens IC, Blok WL, Van den broek PJ, Hekster YA, Van der meer JW. Implementation of an educational program and an antibiotic order form to optimize quality of antimicrobial drug use in a department of internal medicine. Eur J Clin Microbiol Infect Dis. 1997;16(12):904-12.

Gyssens IC, Geerligs IE, Nannini-bergman MG, Knape JT, Hekster YA, Van der meer JW. Optimizing the timing of antimicrobial prophylaxis in surgery: an intervention study. J Antimicrob Chemother. 1996;38(2):301-8.

Haas MK, Dalton K, Knepper BC, et al. Effects of a Syndrome-Specific Antibiotic Stewardship Intervention for Inpatient Community-Acquired Pneumonia. Open Forum Infect Dis. 2016;3(4):ofw186.

Hagaman JT, Yurkowski P, Trott A, Rouan GW. Getting physicians to make "the switch": the role of clinical guidelines in the management of community-acquired pneumonia. Am J Med Qual. 2005;20(1):15-21.

Hall AB, Montero J, Cobian J, Regan T. The effects of an electronic order set on vancomycin dosing in the ED. Am J Emerg Med. 2015;33(1):92-4.

Hallsworth M, Chadborn T, Sallis A, et al. Provision of social norm feedback to high prescribers of antibiotics in general practice: a pragmatic national randomised controlled trial. *Lancet*. 2016;387(10029):1743-52.

Halpape K, Sulz L, Schuster B, Taylor R. Audit and Feedback-Focused approach to Evidence-based Care in Treating patients with pneumonia in hospital (AFFECT Study). *Can J Hosp Pharm*. 2014;67(1):17-27.

Hamad A, Cavell G, Hinton J, Wade P, Whittlesea C. A pre-postintervention study to evaluate the impact of dose calculators on the accuracy of gentamicin and vancomycin initial doses. *BMJ Open*. 2015;5(6):e006610.

Hammerman A, Greenberg A, Yinnon AM. Drug use evaluation of ciprofloxacin: impact of educational efforts on appropriateness of use. *J Clin Pharm Ther*. 1997;22(5-6):415-20.

Hammersen F, Goetz K, Soennichsen A, Emcke T, Steinhäuser J. Effects of communication training with the MAAS-Global-D instrument on the antibiotic prescribing for respiratory infections in primary care: study protocol of a randomised controlled trial. *Trials*. 2016;17:180.

Haque F, Ball RL, Khatun S, et al. Evaluation of a Smartphone Decision-Support Tool for Diarrheal Disease Management in a Resource-Limited Setting. *PLoS Negl Trop Dis*. 2017;11(1):e0005290.

Harris RH, Mackenzie TD, Leeman-castillo B, et al. Optimizing antibiotic prescribing for acute respiratory tract infections in an urban urgent care clinic. *J Gen Intern Med*. 2003;18(5):326-34.

Hartley SE, Kuhn L, Valley S, et al. Evaluating a Hospitalist-Based Intervention to Decrease Unnecessary Antimicrobial Use in Patients With Asymptomatic Bacteriuria. *Infect Control Hosp Epidemiol*. 2016;37(9):1044-51.

Hecker MT, Fox CJ, Son AH, et al. Effect of a stewardship intervention on adherence to uncomplicated cystitis and pyelonephritis guidelines in an emergency department setting. *PLoS ONE*. 2014;9(2):e87899.

Helitzer-allen DL, Mcfarland DA, Wirima JJ, Macheso AP. Malaria chemoprophylaxis compliance in pregnant women: a cost-effectiveness analysis of alternative interventions. *Soc Sci Med*. 1993;36(4):403-7.

Hemkens LG, Saccilotto R, Reyes SL, et al. Personalized prescription feedback to reduce antibiotic overuse in primary care: rationale and design of a nationwide pragmatic randomized trial. *BMC Infect Dis*. 2016;16:421.

Hemkens LG, Saccilotto R, Reyes SL, et al. Personalized Prescription Feedback Using Routinely Collected Data to Reduce Antibiotic Use in Primary Care: A Randomized Clinical Trial. *JAMA Intern Med*. 2017;177(2):176-183.

Hennessy TW, Petersen KM, Bruden D, et al. Changes in antibiotic-prescribing practices and carriage of penicillin-resistant *Streptococcus pneumoniae*: A controlled intervention trial in rural Alaska. *Clin Infect Dis*. 2002;34(12):1543-50.

Herceg A, Johns MB, Longbottom HM. Reported general practitioner vaccination procedures, 1994 and 1996. *Med J Aust*. 1997;167(6):299-302.

Hernandez-santiago V, Marwick CA, Patton A, Davey PG, Donnan PT, Guthrie B. Time series analysis of the impact of an intervention in Tayside, Scotland to reduce primary care broad-spectrum antimicrobial use. *J Antimicrob Chemother*. 2015;70(8):2397-404.

Hersh AL, De Iurgio SA, Thurm C, et al. Antimicrobial stewardship programs in freestanding children's hospitals. *Pediatrics*. 2015;135(1):33-9.

Hess DA, Mahoney CD, Johnson PN, Corrao WM, Fisher AE. Integration of clinical and administrative strategies to reduce expenditures for antimicrobial agents. *Am J Hosp Pharm*. 1990;47(3):585-91.

Hickman DE, Stebbins MR, Hanak JR, Guglielmo BJ. Pharmacy-based intervention to reduce antibiotic use for acute bronchitis. *Ann Pharmacother*. 2003;37(2):187-91.

Hingorani R, Mahmood M, Alweis R. Improving antibiotic adherence in treatment of acute upper respiratory infections: a quality improvement process. *J Community Hosp Intern Med Perspect*. 2015;5(3):27472.

Hirano R, Sakamoto Y, Kitazawa J, Yamamoto S, Tachibana N. Pharmacist-managed dose adjustment feedback using therapeutic drug monitoring of vancomycin was useful for patients with methicillin-resistant infections: a single institution experience. *Infect Drug Resist*. 2016;9:243-252.

Hitti EA, Lewin JJ, Lopez J, et al. Improving door-to-antibiotic time in severely septic emergency department patients. *J Emerg Med*. 2012;42(4):462-9.

Ho M, Hsiung CA, Yu HT, Chi CL, Chang HJ. Changes before and after a policy to restrict antimicrobial usage in upper respiratory infections in Taiwan. *Int J Antimicrob Agents*. 2004;23(5):438-45.

Høgli JU, Garcia BH, Skjold F, Skogen V, Småbrekke L. An audit and feedback intervention study increased adherence to antibiotic prescribing guidelines at a Norwegian hospital. *BMC Infect Dis*. 2016;16:96.

Hoffmann K, Reichardt B, Zehetmayer S, Maier M. Evaluation of the implementation of a rapid streptococcal antigen test in a routine primary health care setting: from recommendations to practice. *Wien Klin Wochenschr*. 2012;124(17-18):633-8.

Hogan KA, Gazarin M, Lapenskie J. Development and Implementation of an Antimicrobial Stewardship Program in a Rural Hospital. *Can J Hosp Pharm*. 2016;69(5):403-408.

Hohlfelder B, Kubiak DW, Degrado JR, Reardon DP, Szumita PM. Implementation of a Prolonged Infusion Guideline for Time-Dependent Antimicrobial Agents at a Tertiary Academic Medical Center. *Am J Ther*. 2016;23(6):e1768-e1773.

Hohn A, Heising B, Hertel S, Baumgarten G, Hochreiter M, Schroeder S. Antibiotic consumption after implementation of a procalcitonin-guided antimicrobial stewardship programme in surgical patients admitted to an intensive care unit: a retrospective before-and-after analysis. *Infection*. 2015;43(4):405-12.

Hohn A, Schroeder S, Gehrt A, et al. Procalcitonin-guided algorithm to reduce length of antibiotic therapy in patients with severe sepsis and septic shock. *BMC Infect Dis.* 2013;13:158.

Horikoshi Y, Higuchi H, Suwa J, Isogai M, Shoji T, Ito K. Impact of computerized pre-authorization of broad spectrum antibiotics in *Pseudomonas aeruginosa* at a children's hospital in Japan. *J Infect Chemother.* 2016;22(8):532-5.

Hoşoğlu S, Esen S, Ozturk R, et al. The effect of a restriction policy on the antimicrobial consumption in Turkey: a country-wide study. *Eur J Clin Pharmacol.* 2005;61(10):727-31.

Hou D, Wang Q, Jiang C, Tian C, Li H, Ji B. Evaluation of the short-term effects of antimicrobial stewardship in the intensive care unit at a tertiary hospital in China. *PLoS ONE.* 2014;9(7):e101447.

Huang AM, Newton D, Kunapuli A, et al. Impact of rapid organism identification via matrix-assisted laser desorption/ionization time-of-flight combined with antimicrobial stewardship team intervention in adult patients with bacteremia and candidemia. *Clin Infect Dis.* 2013;57(9):1237-45.

Huang TS, Huang SS, Shyu YC, et al. A procalcitonin-based algorithm to guide antibiotic therapy in secondary peritonitis following emergency surgery: a prospective study with propensity score matching analysis. *PLoS ONE.* 2014;9(3):e90539.

Huh K, Chung DR, Park HJ, et al. Impact of monitoring surgical prophylactic antibiotics and a computerized decision support system on antimicrobial use and antimicrobial resistance. *Am J Infect Control.* 2016;44(9):e145-52.

Hum RS, Cato K, Sheehan B, et al. Developing clinical decision support within a commercial electronic health record system to improve antimicrobial prescribing in the neonatal ICU. *Appl Clin Inform.* 2014;5(2):368-87.

Humair JP, Revaz SA, Bovier P, Stalder H. Management of acute pharyngitis in adults: reliability of rapid streptococcal tests and clinical findings. *Arch Intern Med.* 2006;166(6):640-4.

Hulgan T, Rosenbloom ST, Hargrove F, et al. Oral quinolones in hospitalized patients: an evaluation of a computerized decision support intervention. *J Intern Med*. 2004;256(4):349-57.

Huppert JS, Taylor RG, St Cyr S, Hesse EA, Reed JL. Point-of-care testing improves accuracy of STI care in an emergency department. *Sex Transm Infect*. 2013;89(6):489-94.

Hürlimann D, Limacher A, Schabel M, et al. Improvement of antibiotic prescription in outpatient care: a cluster-randomized intervention study using a sentinel surveillance network of physicians. *J Antimicrob Chemother*. 2015;70(2):602-8.

Hurst AL, Child J, Pearce K, Palmer C, Todd JK, Parker SK. Handshake Stewardship: A Highly Effective Rounding-based Antimicrobial Optimization Service. *Pediatr Infect Dis J*. 2016;35(10):1104-10.

Hutt E, Ruscin JM, Corbett K, et al. A multifaceted intervention to implement guidelines improved treatment of nursing home-acquired pneumonia in a state veterans home. *J Am Geriatr Soc*. 2006;54(11):1694-700.

Hux JE, Melady MP, Deboer D. Confidential prescriber feedback and education to improve antibiotic use in primary care: a controlled trial. *CMAJ*. 1999;161(4):388-92.

Ibáñez-garcía S, Rodríguez-gonzález CG, Martín-barbero ML, Sanjurjo-saez M, Herranz-alonso A. Adding value through pharmacy validation: a safety and cost perspective. *J Eval Clin Pract*. 2016;22(2):253-60.

Ijo I, Feyerharm J. Pharmacy intervention on antimicrobial management of critically ill patients. *Pharm Pract (Granada)*. 2011;9(2):106-9.

Ikai H, Morimoto T, Shimbo T, Imanaka Y, Koike K. Impact of postgraduate education on physician practice for community-acquired pneumonia. *J Eval Clin Pract*. 2012;18(2):389-95.

Irfan N, Brooks A, Mithoowani S, Celetti SJ, Main C, Mertz D. A Controlled Quasi-Experimental Study of an Educational Intervention to Reduce the Unnecessary Use of Antimicrobials For Asymptomatic Bacteriuria. *PLoS ONE*. 2015;10(7):e0132071.

Ives TJ, Frey JJ, Furr SJ, Bentz EJ. Effect of an educational intervention on oral cephalosporin use in primary care. *Arch Intern Med*. 1987;147(1):44-7.

Jaggi N, Sissodia P, Sharma L. Control of multidrug resistant bacteria in a tertiary care hospital in India. *Antimicrob Resist Infect Control*. 2012;1(1):23.

Jain SR, Hosseini-moghaddam SM, Dwek P, et al. Infectious diseases specialist management improves outcomes for outpatients diagnosed with cellulitis in the emergency department: a double cohort study. *Diagn Microbiol Infect Dis*. 2017;87(4):371-375.

Jenkins TC, Irwin A, Coombs L, et al. Effects of clinical pathways for common outpatient infections on antibiotic prescribing. *Am J Med*. 2013;126(4):327-335.e12.

Jenkins TC, Knepper BC, Shihadeh K, et al. Long-term outcomes of an antimicrobial stewardship program implemented in a hospital with low baseline antibiotic use. *Infect Control Hosp Epidemiol*. 2015;36(6):664-72.

Jeong HW, Heo JY, Park JS, Kim WJ. Effect of the influenza virus rapid antigen test on a physician's decision to prescribe antibiotics and on patient length of stay in the emergency department. *PLoS ONE*. 2014;9(11):e110978.

Jewesson PJ, Ho R, Jang Q, Watts G, Chow AW. Auditing antibiotic use in a teaching hospital: focus on cefoxitin. *Can Med Assoc J*. 1983;128(9):1075-8.

Jobson M, Sandrof M, Valeriote T, Liberty AL, Walsh-kelly C, Jackson C. Decreasing time to antibiotics in febrile patients with central lines in the emergency department. *Pediatrics*. 2015;135(1):e187-95.

Johnston J, Harris J, Hall JC. The effect of an educational intervention on the use of peri-operative antimicrobial agents. *Aust Clin Rev*. 1992;12(2):53-6.

Jones SR, Pannell J, Barks J, et al. The effect of an educational program upon hospital antibiotic use. *Am J Med Sci*. 1977;273(1):79-85.

Jump RL, Olds DM, Seifi N, et al. Effective antimicrobial stewardship in a long-term care facility through an infectious disease consultation service: keeping a LID on antibiotic use. *Infect Control Hosp Epidemiol.* 2012;33(12):1185-92.

Juszczak D, Charlton J, Mcdermott L, et al. Electronically delivered, multicomponent intervention to reduce unnecessary antibiotic prescribing for respiratory infections in primary care: a cluster randomised trial using electronic health records-REDUCE Trial study original protocol. *BMJ Open.* 2016;6(8):e010892.

Juzych NS, Banerjee M, Essenmacher L, Lerner SA. Improvements in antimicrobial prescribing for treatment of upper respiratory tract infections through provider education. *J Gen Intern Med.* 2005;20(10):901-5.

Kahan NR, Chinitz DP, Waitman DA, Kahan E. When gatekeepers meet the sentinel: the impact of a prior authorization requirement for cefuroxime on the prescribing behaviour of community-based physicians. *Br J Clin Pharmacol.* 2006;61(3):341-4.

Kallen AJ, Thompson A, Ristaino P, et al. Complete restriction of fluoroquinolone use to control an outbreak of *Clostridium difficile* infection at a community hospital. *Infect Control Hosp Epidemiol.* 2009;30(3):264-72.

Karki SD, Holden JM, Mariano E. A team approach to reduce antibiotic costs. *DICP.* 1990;24(2):202-5.

Katsios CM, Burry L, Nelson S, et al. An antimicrobial stewardship program improves antimicrobial treatment by culture site and the quality of antimicrobial prescribing in critically ill patients. *Crit Care.* 2012;16(6):R216.

Kelly AA, Jones MM, Echevarria KL, et al. A Report of the Efforts of the Veterans Health Administration National Antimicrobial Stewardship Initiative. *Infect Control Hosp Epidemiol.* 2017;38(5):513-520.

Kellie SM. Antimicrobial stewardship on the frontier: a pilot study of training using an electronic learning network. *Infect Control Hosp Epidemiol*. 2012;33(11):1181-3.

Khawcharoenporn T, Konsantad A. Impact of the educational program on outcomes among patients with sepsis hospitalized from the ED. *Am J Emerg Med*. 2017;35(1):179-182.

Kim BN, Kim HB, Oh MD. Antibiotic Control Policies in South Korea, 2000-2013. *Infect Chemother*. 2016;48(3):151-159.

Kim M, Song KH, Kim CJ, et al. Electronic Alerts with Automated Consultations Promote Appropriate Antimicrobial Prescriptions. *PLoS ONE*. 2016;11(8):e0160551.

Kisuule F, Wright S, Barreto J, Zenilman J. Improving antibiotic utilization among hospitalists: a pilot academic detailing project with a public health approach. *J Hosp Med*. 2008;3(1):64-70.

Klein LE, Charache P, Johannes RS. Effect of physician tutorials on prescribing patterns of graduate physicians. *J Med Educ*. 1981;56(6):504-11.

Knox MC, Edye M. Educational Antimicrobial Stewardship Intervention Ineffective in Changing Surgical Prophylactic Antibiotic Prescribing. *Surg Infect (Larchmt)*. 2016;17(2):224-8.

Köck R, Wüllenweber J, Horn D, Lanckohr C, Becker K, Idelevich EA. Implementation of short incubation MALDI-TOF MS identification from positive blood cultures in routine diagnostics and effects on empiric antimicrobial therapy. *Antimicrob Resist Infect Control*. 2017;6:12.

Koelemay MJ, Bossuyt PM, Gouma DJ. [Implementation of guidelines for clinical practice in a surgical department]. *Ned Tijdschr Geneeskd*. 1996;140(49):2459-63.

Kofoed K, Zalounina A, Andersen O, et al. Performance of the TREAT decision support system in an environment with a low prevalence of resistant pathogens. *J Antimicrob Chemother*. 2009;63(2):400-4.

Kose E, Sirin kose S, Akca D, et al. The Effect of Rapid Antigen Detection Test on Antibiotic Prescription Decision of Clinicians and Reducing Antibiotic Costs in Children with Acute Pharyngitis. *J Trop Pediatr*. 2016;62(4):308-15.

Kristoffersen KB, Sogaard OS, Wejse C, et al. Antibiotic treatment interruption of suspected lower respiratory tract infections based on a single procalcitonin measurement at hospital admission--a randomized trial. *Clin Microbiol Infect*. 2009;15(5):481-7.

Kritchevsky SB, Braun BI, Bush AJ, et al. The effect of a quality improvement collaborative to improve antimicrobial prophylaxis in surgical patients: a randomized trial. *Ann Intern Med*. 2008;149(7):472-80, W89-93.

Kullar R, Davis SL, Kaye KS, Levine DP, Pogue JM, Rybak MJ. Implementation of an antimicrobial stewardship pathway with daptomycin for optimal treatment of methicillin-resistant *Staphylococcus aureus* bacteremia. *Pharmacotherapy*. 2013;33(1):3-10.

Kumana CR, Ching TY, Kong Y, et al. Curtailing unnecessary vancomycin usage in a hospital with high rates of methicillin resistant *Staphylococcus aureus* infections. *Br J Clin Pharmacol*. 2001;52(4):427-32.

Kurt H, Karabay O, Birengel S, Memikoglu O, Yilmaz bozkurt G, Yalçı A. Effects of legal antibiotic restrictions on consumption of broad-spectrum beta-lactam antibiotics, glycopeptides and amphotericin B. *Chemotherapy*. 2010;56(5):359-63.

Kurtzhals KE, Sellick JA, Ruh CA, Carbo JF, Ott MC, Mergenhagen KA. Impact of Antimicrobial Stewardship on Outcomes in Hospitalized Veterans With Pneumonia. *Clin Ther*. 2016;38(7):1750-8.

Lacombe K, Cariou S, Tilleul P, Offenstadt G, Meynard JL. Optimizing fluoroquinolone utilization in a public hospital: a prospective study of educational intervention. *Eur J Clin Microbiol Infect Dis*. 2005;24(1):6-11.

Lagerlöv P, Loeb M, Andrew M, Hjortdahl P. Improving doctors' prescribing behaviour through reflection on guidelines and prescription feedback: a randomised controlled study. *Qual Health Care*. 2000;9(3):159-65.

Lai CC, Shi ZY, Chen YH, Wang FD. Effects of various antimicrobial stewardship programs on antimicrobial usage and resistance among common gram-negative bacilli causing health care-associated infections: A multicenter comparison. *J Microbiol Immunol Infect*. 2016;49(1):74-82.

Laible BR, Nazir J, Assimacopoulos AP, Schut J. Implementation of a pharmacist-led antimicrobial management team in a community teaching hospital: use of pharmacy residents and pharmacy students in a prospective audit and feedback approach. *J Pharm Pract*. 2010;23(6):531-5.

Lambert MF, Masters GA, Brent SL. Can mass media campaigns change antimicrobial prescribing? A regional evaluation study. *J Antimicrob Chemother*. 2007;59(3):537-43.

Lambert ML, Bruyndonckx R, Goossens H, et al. The Belgian policy of funding antimicrobial stewardship in hospitals and trends of selected quality indicators for antimicrobial use, 1999-2010: a longitudinal study. *BMJ Open*. 2015;5(2):e006916.

Lancaster JW, Lawrence KR, Fong JJ, et al. Impact of an institution-specific hospital-acquired pneumonia protocol on the appropriateness of antibiotic therapy and patient outcomes. *Pharmacotherapy*. 2008;28(7):852-62.

Landgren FT, Harvey KJ, Mashford ML, Moulds RF, Guthrie B, Hemming M. Changing antibiotic prescribing by educational marketing. *Med J Aust*. 1988;149(11-12):595-9.

Landry E, Sulz L, Bell A, Rathgeber L, Balogh H. Urinary Tract Infections: Leading Initiatives in Selecting Empiric Outpatient Treatment (UTILISE). *Can J Hosp Pharm*. 2014;67(2):116-25.

Langford BJ, Seah J, Chan A, Downing M, Johnstone J, Matukas LM. Antimicrobial Stewardship in the Microbiology Laboratory: Impact of Selective Susceptibility Reporting on Ciprofloxacin Utilization and Susceptibility of Gram-Negative Isolates to Ciprofloxacin in a Hospital Setting. *J Clin Microbiol*. 2016;54(9):2343-7.

Larosa LA, Fishman NO, Lautenbach E, Koppel RJ, Morales KH, Linkin DR. Evaluation of antimicrobial therapy orders circumventing an antimicrobial stewardship program: investigating the strategy of "stealth dosing". *Infect Control Hosp Epidemiol*. 2007;28(5):551-6.

Larsen RA, Evans RS, Burke JP, Pestotnik SL, Gardner RM, Classen DC. Improved perioperative antibiotic use and reduced surgical wound infections through use of computer decision analysis. *Infect Control Hosp Epidemiol*. 1989;10(7):316-20.

Lautenbach E, Larosa LA, Marr AM, Nachamkin I, Bilker WB, Fishman NO. Changes in the prevalence of vancomycin-resistant enterococci in response to antimicrobial formulary interventions: impact of progressive restrictions on use of vancomycin and third-generation cephalosporins. *Clin Infect Dis*. 2003;36(4):440-6.

Lavrentieva A, Kontou P, Soulountsi V, Kioumis J, Chrysou O, Bitzani M. Implementation of a procalcitonin-guided algorithm for antibiotic therapy in the burn intensive care unit. *Ann Burns Fire Disasters*. 2015;28(3):163-70.

Lawes T, López-lozano JM, Nebot C, et al. Turning the tide or riding the waves? Impacts of antibiotic stewardship and infection control on MRSA strain dynamics in a Scottish region over 16 years: non-linear time series analysis. *BMJ Open*. 2015;5(3):e006596.

Lawes T, Lopez-lozano JM, Nebot CA, et al. Effects of national antibiotic stewardship and infection control strategies on hospital-associated and community-associated meticillin-resistant *Staphylococcus aureus* infections across a region of Scotland: a non-linear time-series study. *Lancet Infect Dis*. 2015;15(12):1438-49.

Lawes T, Lopez-lozano JM, Nebot CA, et al. Effect of a national 4C antibiotic stewardship intervention on the clinical and molecular epidemiology of *Clostridium difficile* infections in a region of Scotland: a non-linear time-series analysis. *Lancet Infect Dis*. 2017;17(2):194-206.

Le corvoisier P, Renard V, Roudot-thoraval F, et al. Long-term effects of an educational seminar on antibiotic prescribing by GPs: a randomised controlled trial. *Br J Gen Pract*. 2013;63(612):e455-64.

Leblanc A, Légaré F, Labrecque M, et al. Feasibility of a randomised trial of a continuing medical education program in shared decision-making on the use of antibiotics for acute respiratory infections in primary care: the DECISION+ pilot trial. *Implement Sci*. 2011;6:5.

Lee BR, Goldman JL, Yu D, et al. Clinical Impact of an Antibiotic Stewardship Program at a Children's Hospital. *Infect Dis Ther*. 2017;6(1):103-113.

Lee KR, Bagga B, Arnold SR. Reduction of Broad-Spectrum Antimicrobial Use in a Tertiary Children's Hospital Post Antimicrobial Stewardship Program Guideline Implementation. *Pediatr Crit Care Med*. 2016;17(3):187-93.

Lee RW, Lindstrom ST. Early switch to oral antibiotics and early discharge guidelines in the management of community-acquired pneumonia. *Respirology*. 2007;12(1):111-6.

Lee TC, Frenette C, Jayaraman D, Green L, Pilote L. Antibiotic self-stewardship: trainee-led structured antibiotic time-outs to improve antimicrobial use. *Ann Intern Med*. 2014;161(10 Suppl):S53-8.

Lee YT, Tsao SM, Lin HC, Huang HJ, Lee MC, Hsueh PR. Decline in the incidence of healthcare-associated methicillin-resistant *Staphylococcus aureus* (HA-MRSA) correlates with decreased antimicrobial consumption at a tertiary care hospital in Taiwan, 2001-2009. *Int J Antimicrob Agents*. 2010;36(6):523-30.

Légaré F, Labrecque M, Cauchon M, Castel J, Turcotte S, Grimshaw J. Training family physicians in shared decision-making to reduce the overuse of antibiotics in acute respiratory infections: a cluster randomized trial. *CMAJ*. 2012;184(13):E726-34.

Leis JA, Palmay L, Elligsen M, Walker SA, Lee C, Daneman N. Lessons from audit and feedback of hospitalized patients with bacteriuria. *Am J Infect Control*. 2014;42(10):1136-7.

Leisman DE, Zimmel d'amore JA, Gribben JL, et al. Early sepsis bundle compliance for non-hypotensive patients with intermediate versus severe hyperlactemia. *Am J Emerg Med*. 2017;35(6):811-818.

Lemiengre MB, Verbakel JY, De burghgraeve T, et al. Optimizing antibiotic prescribing for acutely ill children in primary care (ERNIE2 study protocol, part B): a cluster randomized, factorial controlled trial evaluating the effect of a point-of-care C-reactive protein test and a brief intervention combined with written safety net advice. *BMC Pediatr*. 2014;14:246.

Lesprit P, De pontfarcy A, Esposito-farese M, et al. Postprescription review improves in-hospital antibiotic use: a multicenter randomized controlled trial. *Clin Microbiol Infect.* 2015;21(2):180.e1-7.

Lesprit P, Duong T, Girou E, Hemery F, Brun-buisson C. Impact of a computer-generated alert system prompting review of antibiotic use in hospitals. *J Antimicrob Chemother.* 2009;63(5):1058-63.

Lesprit P, Merabet L, Fernandez J, Legrand P, Brun-buisson C. Improving antibiotic use in the hospital: Focusing on positive blood cultures is an effective option. *Presse Med.* 2011;40(6):e297-303.

Lesprit P, Landelle C, Brun-buisson C. Unsolicited post-prescription antibiotic review in surgical and medical wards: factors associated with counselling and physicians' compliance. *Eur J Clin Microbiol Infect Dis.* 2013;32(2):227-35.

Leung V, Gill S, Sauve J, Walker K, Stumpo C, Powis J. Growing a "positive culture" of antimicrobial stewardship in a community hospital. *Can J Hosp Pharm.* 2011;64(5):314-20.

Lew KY, Ng TM, Tan M, et al. Safety and clinical outcomes of carbapenem de-escalation as part of an antimicrobial stewardship programme in an ESBL-endemic setting. *J Antimicrob Chemother.* 2015;70(4):1219-25.

Lewis GJ, Fang X, Gooch M, Cook PP. Decreased resistance of *Pseudomonas aeruginosa* with restriction of ciprofloxacin in a large teaching hospital's intensive care and intermediate care units. *Infect Control Hosp Epidemiol.* 2012;33(4):368-73.

Li DX, Ferrada MA, Avdic E, Tamma PD, Cosgrove SE. Sustained Impact of an Antibiotic Stewardship Intervention for Community-Acquired Pneumonia. *Infect Control Hosp Epidemiol.* 2016;37(10):1243-6.

Li SC, Ioannides-demos LL, Spicer WJ, Spelman DW, Tong N, Mclean AJ. Prospective audit of an aminoglycoside consultative service in a general hospital. *Med J Aust.* 1992;157(5):308-11.

Liang B, Wheeler JS, Blanchette LM. Impact of Combination Antibigram and Related Education on Inpatient Fluoroquinolone Prescribing Patterns for Patients With Health Care-Associated Pneumonia. *Ann Pharmacother*. 2016;50(3):172-9.

Liew YX, Lee W, Cai YY, et al. Utility and safety of procalcitonin in an antimicrobial stewardship program (ASP) in patients with malignancies. *Eur J Clin Microbiol Infect Dis*. 2012;31(11):3041-6.

Liew YX, Lee W, Loh JC, et al. Impact of an antimicrobial stewardship programme on patient safety in Singapore General Hospital. *Int J Antimicrob Agents*. 2012;40(1):55-60.

Liew YX, Lee W, Tay D, et al. Prospective audit and feedback in antimicrobial stewardship: is there value in early reviewing within 48 h of antibiotic prescription?. *Int J Antimicrob Agents*. 2015;45(2):168-73.

Likić R, Francetić I, Bilusić M, et al. Antibiotic use optimization program in the largest Croatian university hospital--benefits of restrictions on unlimited antibiotic use. *Coll Antropol*. 2007;31(1):241-6.

Lim VH, Whitehurst T, Usoro E, Ming ng S. Management of urinary tract infections in elderly patients: Strategies for improvement. *BMJ Qual Improv Rep*. 2014;3(1)

Lim WS, Rodrigo C, Turner AM, Welham S, Calvert JM. British Thoracic Society community-acquired pneumonia care bundle: results of a national implementation project. *Thorax*. 2016;71(3):288-90.

Lima AL, Oliveira PR, Paula AP, et al. Carbapenem stewardship: positive impact on hospital ecology. *Braz J Infect Dis*. 2011;15(1):1-5.

Lima SS, Nobre V, De castro romanelli RM, et al. Procalcitonin-guided protocol is not useful to manage antibiotic therapy in febrile neutropenia: a randomized controlled trial. *Ann Hematol*. 2016;95(7):1169-76.

Lin YS, Lin IF, Yen YF, et al. Impact of an antimicrobial stewardship program with multidisciplinary cooperation in a community public teaching hospital in Taiwan. *Am J Infect Control*. 2013;41(11):1069-72.

Linder JA, Schnipper JL, Tsurikova R, et al. Electronic health record feedback to improve antibiotic prescribing for acute respiratory infections. *Am J Manag Care*. 2010;16(12 Suppl HIT):e311-9.

Linder JA, Schnipper JL, Tsurikova R, et al. Documentation-based clinical decision support to improve antibiotic prescribing for acute respiratory infections in primary care: a cluster randomised controlled trial. *Inform Prim Care*. 2009;17(4):231-40.

Link TL, Townsend ML, Leung E, Kommu S, Vega RY, Hendrix CC. Reducing Inappropriate Antibiotic Prescribing for Adults With Acute Bronchitis in an Urgent Care Setting: A Quality Improvement Initiative. *Adv Emerg Nurs J*. 2016;38(4):327-335.

Linnebur SA, Fish DN, Ruscin JM, et al. Impact of a multidisciplinary intervention on antibiotic use for nursing home-acquired pneumonia. *Am J Geriatr Pharmacother*. 2011;9(6):442-450.e1.

Lipworth AD, Hyle EP, Fishman NO, et al. Limiting the emergence of extended-spectrum Beta-lactamase-producing enterobacteriaceae: influence of patient population characteristics on the response to antimicrobial formulary interventions. *Infect Control Hosp Epidemiol*. 2006;27(3):279-86.

Little P, Hobbs FD, Moore M, et al. PRImary care Streptococcal Management (PRISM) study: in vitro study, diagnostic cohorts and a pragmatic adaptive randomised controlled trial with nested qualitative study and cost-effectiveness study. *Health Technol Assess*. 2014;18(6):vii-xxv, 1-101.

Little P, Moore M, Kelly J, et al. Delayed antibiotic prescribing strategies for respiratory tract infections in primary care: pragmatic, factorial, randomised controlled trial. *BMJ*. 2014;348:g1606.

Little P, Moore MV, Turner S, et al. Effectiveness of five different approaches in management of urinary tract infection: randomised controlled trial. *BMJ*. 2010;340:c199.

Little P, Stuart B, Francis N, et al. Effects of internet-based training on antibiotic prescribing rates for acute respiratory-tract infections: a multinational, cluster, randomised, factorial, controlled trial. *Lancet*. 2013;382(9899):1175-82.

Little P, Moore M, Warner G, Dunleavy J, Williamson I. Longer term outcomes from a randomised trial of prescribing strategies in otitis media. *Br J Gen Pract*. 2006;56(524):176-82.

Little P, Rumsby K, Kelly J, et al. Information leaflet and antibiotic prescribing strategies for acute lower respiratory tract infection: a randomized controlled trial. *JAMA*. 2005;293(24):3029-35.

Little P, Williamson I, Warner G, Gould C, Gantley M, Kinmonth AL. Open randomised trial of prescribing strategies in managing sore throat. *BMJ*. 1997;314(7082):722-7.

Little P, Gould C, Williamson I, Moore M, Warner G, Dunleavy J. Pragmatic randomised controlled trial of two prescribing strategies for childhood acute otitis media. *BMJ*. 2001;322(7282):336-42.

Litvin CB, Ornstein SM, Wessell AM, Nemeth LS, Nietert PJ. Use of an electronic health record clinical decision support tool to improve antibiotic prescribing for acute respiratory infections: the ABX-TRIP study. *J Gen Intern Med*. 2013;28(6):810-6.

Litvin CB, Ornstein SM, Wessell AM, Nemeth LS, Nietert PJ. Adoption of a clinical decision support system to promote judicious use of antibiotics for acute respiratory infections in primary care. *Int J Med Inform*. 2012;81(8):521-6.

Liu C, Zhang X, Wan J. Public reporting influences antibiotic and injection prescription in primary care: a segmented regression analysis. *J Eval Clin Pract*. 2015;21(4):597-603.

Liu C, Zhang X, Wang X, Zhang X, Wan J, Zhong F. Does public reporting influence antibiotic and injection prescribing to all patients? A cluster-randomized matched-pair trial in china. *Medicine (Baltimore)*. 2016;95(26):e3965.

Liu VX, Morehouse JW, Marelich GP, et al. Multicenter Implementation of a Treatment Bundle for Patients with Sepsis and Intermediate Lactate Values. *Am J Respir Crit Care Med*. 2016;193(11):1264-70.

Llor C, Bjerrum L, Arranz J, et al. C-reactive protein testing in patients with acute rhinosinusitis leads to a reduction in antibiotic use. *Fam Pract*. 2012;29(6):653-8.

Llor C, Cots JM, López-valcárcel BG, et al. Interventions to reduce antibiotic prescription for lower respiratory tract infections: Happy Audit study. *Eur Respir J*. 2012;40(2):436-41.

Llor C, Hernández S, Sierra N, Moragas A, Hernández M, Bayona C. Association between use of rapid antigen detection tests and adherence to antibiotics in suspected streptococcal pharyngitis. *Scand J Prim Health Care*. 2010;28(1):12-7.

Llor C, Monedero MJ, García G, Arranz J, Cots JM, Bjerrum L. Interventions to improve adherence to first-line antibiotics in respiratory tract infections. The impact depends on the intensity of the intervention. *Eur J Gen Pract*. 2015;21(1):12-8.

Llor C, Sierra N, Hernández S, et al. Impact of C-reactive protein testing on adherence to thrice-daily antibiotic regimens in patients with lower respiratory tract infection. *Prim Care Respir J*. 2010;19(4):358-62.

Lockwood AM, Perez KK, Musick WL, et al. Integrating Rapid Diagnostics and Antimicrobial Stewardship in Two Community Hospitals Improved Process Measures and Antibiotic Adjustment Time. *Infect Control Hosp Epidemiol*. 2016;37(4):425-32.

Loeb M, Brazil K, Lohfeld L, et al. Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infections in residents of nursing homes: cluster randomised controlled trial. *BMJ*. 2005;331(7518):669.

Long W, Deng X, Zhang Y, Lu G, Xie J, Tang J. Procalcitonin guidance for reduction of antibiotic use in low-risk outpatients with community-acquired pneumonia. *Respirology*. 2011;16(5):819-24.

Long W, Li LJ, Huang GZ, et al. Procalcitonin guidance for reduction of antibiotic use in patients hospitalized with severe acute exacerbations of asthma: a randomized controlled study with 12-month follow-up. *Crit Care*. 2014;18(5):471.

Loo LW, Liew YX, Lee W, Chlebicki P, Kwa AL. Impact of Antimicrobial Stewardship Program (ASP) on Outcomes in Patients with Acute Bacterial Skin and Skin Structure Infections (ABSSSIs) in an Acute-Tertiary Care Hospital. *Infect Dis Ther*. 2015;4(Suppl 1):15-25.

Lorenz MA, Moenster RP, Linneman TW. Effect of piperacillin/tazobactam restriction on usage and rates of acute renal failure. *J Med Microbiol*. 2016;65(2):195-9.

Lukaszewicz bushen J, Mehta JM, Hamilton KW, et al. Impact of Two Different Antimicrobial Stewardship Methods on Frequency of Streamlining Antimicrobial Agents in Patients with Bacteremia. *Infect Control Hosp Epidemiol*. 2017;38(1):89-95.

Lundborg CS, Wahlström R, Oke T, Tomson G, Diwan VK. Influencing prescribing for urinary tract infection and asthma in primary care in Sweden: a randomized controlled trial of an interactive educational intervention. *J Clin Epidemiol*. 1999;52(8):801-12.

Lutters M, Harbarth S, Janssens JP, et al. Effect of a comprehensive, multidisciplinary, educational program on the use of antibiotics in a geriatric university hospital. *J Am Geriatr Soc*. 2004;52(1):112-6.

Ma X, Xie J, Yang Y, et al. Antimicrobial stewardship of Chinese ministry of health reduces multidrug-resistant organism isolates in critically ill patients: a pre-post study from a single center. *BMC Infect Dis*. 2016;16(1):704.

Macdougall G, Denholm SW. Audit of the treatment of tonsillar and peritonsillar sepsis in an ear, nose and throat unit. *J Laryngol Otol*. 1995;109(6):531-3.

Macdougall C, Schwartz BS, Kim L, Nanamori M, Shekarchian S, Chin-hong PV. An Interprofessional Curriculum on Antimicrobial Stewardship Improves Knowledge and Attitudes Toward Appropriate Antimicrobial Use and Collaboration. *Open Forum Infect Dis*. 2017;4(1):ofw225.

Macvane SH, Nolte FS. Benefits of Adding a Rapid PCR-Based Blood Culture Identification Panel to an Established Antimicrobial Stewardship Program. *J Clin Microbiol.* 2016;54(10):2455-63.

Madaras-kelly KJ, Remington RE, Lewis PG, Stevens DL. Evaluation of an intervention designed to decrease the rate of nosocomial methicillin-resistant *Staphylococcus aureus* infection by encouraging decreased fluoroquinolone use. *Infect Control Hosp Epidemiol.* 2006;27(2):155-69.

Madridejos-mora R, Amado-guirado E, Pérez-rodríguez MT. Effectiveness of the combination of feedback and educational recommendations for improving drug prescription in general practice. *Med Care.* 2004;42(7):643-8.

Madaras-kelly KJ, Hannah EL, Bateman K, Samore MH. Experience with a clinical decision support system in community pharmacies to recommend narrow-spectrum antimicrobials, nonantimicrobial prescriptions, and OTC products to decrease broad-spectrum antimicrobial use. *J Manag Care Pharm.* 2006;12(5):390-7.

Maeda M, Takuma T, Seki H, et al. Effect of interventions by an antimicrobial stewardship team on clinical course and economic outcome in patients with bloodstream infection. *J Infect Chemother.* 2016;22(2):90-5.

Magedanz L, Silliprandi EM, Dos santos RP. Impact of the pharmacist on a multidisciplinary team in an antimicrobial stewardship program: a quasi-experimental study. *Int J Clin Pharm.* 2012;34(2):290-4.

Mainous AG, Hueston WJ, Love MM, Evans ME, Finger R. An evaluation of statewide strategies to reduce antibiotic overuse. *Fam Med.* 2000;32(1):22-9.

Mainous AG, Lambourne CA, Nietert PJ. Impact of a clinical decision support system on antibiotic prescribing for acute respiratory infections in primary care: quasi-experimental trial. *J Am Med Inform Assoc.* 2013;20(2):317-24.

Malani AN, Richards PG, Kapila S, Otto MH, Czerwinski J, Singal B. Clinical and economic outcomes from a community hospital's antimicrobial stewardship program. *Am J Infect Control.* 2013;41(2):145-8.

Malcolm W, Nathwani D, Davey P, et al. From intermittent antibiotic point prevalence surveys to quality improvement: experience in Scottish hospitals. *Antimicrob Resist Infect Control*. 2013;2(1):3.

Malcolmson C, Ng K, Hughes S, et al. Impact of Matrix-Assisted Laser Desorption and Ionization Time-of-Flight and Antimicrobial Stewardship Intervention on Treatment of Bloodstream Infections in Hospitalized Children. *J Pediatric Infect Dis Soc*. 2017;6(2):178-186.

Malmvall BE, Mölstad S, Darelid J, et al. Reduction of antibiotics sales and sustained low incidence of bacterial resistance: Report on a broad approach during 10 years to implement evidence-based indications for antibiotic prescribing in Jönköping County, Sweden. *Qual Manag Health Care*. 2007;16(1):60-7.

Maltezou HC, Tsagris V, Antoniadou A, et al. Evaluation of a rapid antigen detection test in the diagnosis of streptococcal pharyngitis in children and its impact on antibiotic prescription. *J Antimicrob Chemother*. 2008;62(6):1407-12.

Mamdani M, Mcneely D, Evans G, et al. Impact of a fluoroquinolone restriction policy in an elderly population. *Am J Med*. 2007;120(10):893-900.

Mandryk JA, Mackson JM, Horn FE, et al. Measuring change in prescription drug utilization in Australia. *Pharmacoepidemiol Drug Saf*. 2006;15(7):477-84.

Manns B, Laupland K, Tonelli M, Gao S, Hemmelgarn B. Evaluating the impact of a novel restricted reimbursement policy for quinolone antibiotics: a time series analysis. *BMC Health Serv Res*. 2012;12:290.

Mansouri MD, Cadle RM, Agbahiwe SO, Musher DM. Impact of an antibiotic restriction program on antibiotic utilization in the treatment of community-acquired pneumonia in a Veterans Affairs Medical Center. *Infection*. 2011;39(1):53-8.

Manuel O, Burnand B, Bady P, et al. Impact of standardised review of intravenous antibiotic therapy 72 hours after prescription in two internal medicine wards. *J Hosp Infect*. 2010;74(4):326-31.

Marchetti F, Ronfani L, Nibali SC, Tamburlini G. Delayed prescription may reduce the use of antibiotics for acute otitis media: a prospective observational study in primary care. *Arch Pediatr Adolesc Med*. 2005;159(7):679-84.

Marshall D, Gough J, Grootendorst P, et al. Impact of administrative restrictions on antibiotic use and expenditure in Ontario: time series analysis. *J Health Serv Res Policy*. 2006;11(1):13-20.

Marshall DA, Mcgeer A, Gough J, et al. Impact of antibiotic administrative restrictions on trends in antibiotic resistance. *Can J Public Health*. 2006;97(2):126-31.

Martens JD, Winkens RA, Van der weijden T, De bruyn D, Severens JL. Does a joint development and dissemination of multidisciplinary guidelines improve prescribing behaviour: a pre/post study with concurrent control group and a randomised trial. *BMC Health Serv Res*. 2006;6:145.

Martin C, Ofotokun I, Rapp R, et al. Results of an antimicrobial control program at a university hospital. *Am J Health Syst Pharm*. 2005;62(7):732-8.

Masiá M, Matoses C, Padilla S, et al. Limited efficacy of a nonrestricted intervention on antimicrobial prescription of commonly used antibiotics in the hospital setting: results of a randomized controlled trial. *Eur J Clin Microbiol Infect Dis*. 2008;27(7):597-605.

Masiá M, Padilla S, Ortiz de la tabla V, González M, Bas C, Gutiérrez F. Procalcitonin for selecting the antibiotic regimen in outpatients with low-risk community-acquired pneumonia using a rapid point-of-care testing: A single-arm clinical trial. *PLoS ONE*. 2017;12(4):e0175634.

May L, Ware CE, Jordan JA, et al. A Randomized Controlled Trial Comparing the Treatment of Patients Tested for Chlamydia and Gonorrhea After a Rapid Polymerase Chain Reaction Test Versus Standard of Care Testing. *Sex Transm Dis*. 2016;43(5):290-5.

May LS, Rothman RE, Miller LG, et al. A Randomized Clinical Trial Comparing Use of Rapid Molecular Testing for *Staphylococcus aureus* for Patients With Cutaneous Abscesses in the Emergency Department With Standard of Care. *Infect Control Hosp Epidemiol*. 2015;36(12):1423-30.

Mccallum AD, Sutherland RK, Mackintosh CL. Improving antimicrobial prescribing: implementation of an antimicrobial i.v.-to-oral switch policy. *J R Coll Physicians Edinb*. 2013;43(4):294-300.

Mccombs JS, Nichol MB. Pharmacy-enforced outpatient drug treatment protocols: a case study of Medi-Cal restrictions for cefaclor. *Ann Pharmacother*. 1993;27(2):155-61.

Mcculloh RJ, Queen MA, Lee B, et al. Clinical Impact of an Antimicrobial Stewardship Program on Pediatric Hospitalist Practice, a 5-Year Retrospective Analysis. *Hosp Pediatr*. 2015;5(10):520-7.

Mccullough JM, Zimmerman FJ, Rodriguez HP. Impact of clinical decision support on receipt of antibiotic prescriptions for acute bronchitis and upper respiratory tract infection. *J Am Med Inform Assoc*. 2014;21(6):1091-7.

McInay JC, Scott MG, Sidara JY, Kearney P. Audit of antibiotic usage in medium-sized general hospital over an 11-year period. The impact of antibiotic policies. *Pharm World Sci*. 1995;17(6):207-13.

Mcgillicuddy DC, O'connell FJ, Shapiro NI, et al. Emergency department abnormal vital sign "triggers" program improves time to therapy. *Acad Emerg Med*. 2011;18(5):483-7.

McGinn TG, McCullagh L, Kannry J, et al. Efficacy of an evidence-based clinical decision support in primary care practices: a randomized clinical trial. *JAMA Intern Med*. 2013;173(17):1584-91.

Mcgregor JC, Weekes E, Forrest GN, et al. Impact of a computerized clinical decision support system on reducing inappropriate antimicrobial use: a randomized controlled trial. *J Am Med Inform Assoc*. 2006;13(4):378-84.

Mcintosh KA, Maxwell DJ, Pulver LK, et al. A quality improvement initiative to improve adherence to national guidelines for empiric management of community-acquired pneumonia in emergency departments. *Int J Qual Health Care*. 2011;23(2):142-50.

Mcisaac WJ, Goel V. Effect of an explicit decision-support tool on decisions to prescribe antibiotics for sore throat. *Med Decis Making*. 1998;18(2):220-8.

Mckay RM, Vrbova L, Fuertes E, et al. Evaluation of the Do Bugs Need Drugs? program in British Columbia: Can we curb antibiotic prescribing?. *Can J Infect Dis Med Microbiol*. 2011;22(1):19-24.

Mclaughlin CM, Bodasing N, Boyter AC, Fenelon C, Fox JG, Seaton RA. Pharmacy-implemented guidelines on switching from intravenous to oral antibiotics: an intervention study. *QJM*. 2005;98(10):745-52.

Mclellan L, Dornan T, Newton P, et al. Pharmacist-led feedback workshops increase appropriate prescribing of antimicrobials. *J Antimicrob Chemother*. 2016;71(5):1415-25.

Medina-presentado JC, Margolis A, Teixeira L, et al. Online continuing interprofessional education on hospital-acquired infections for Latin America. *Braz J Infect Dis*. 2017;21(2):140-147.

Meeker D, Linder JA, Fox CR, et al. Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial. *JAMA*. 2016;315(6):562-70.

Meeker D, Knight TK, Friedberg MW, et al. Nudging guideline-concordant antibiotic prescribing: a randomized clinical trial. *JAMA Intern Med*. 2014;174(3):425-31.

Mehta JM, Haynes K, Wileyto EP, et al. Comparison of prior authorization and prospective audit with feedback for antimicrobial stewardship. *Infect Control Hosp Epidemiol*. 2014;35(9):1092-9.

Mertz D, Koller M, Haller P, et al. Outcomes of early switching from intravenous to oral antibiotics on medical wards. *J Antimicrob Chemother*. 2009;64(1):188-99.

Messacar K, Hurst AL, Child J, et al. Clinical Impact and Provider Acceptability of Real-Time Antimicrobial Stewardship Decision Support for Rapid Diagnostics in Children With Positive Blood Culture Results. *J Pediatric Infect Dis Soc*. 2017;6(3):267-274.

Messina AP, Van den bergh D, Goff DA. Antimicrobial Stewardship with Pharmacist Intervention Improves Timeliness of Antimicrobials Across Thirty-three Hospitals in South Africa. *Infect Dis Ther*. 2015;4(Suppl 1):5-14.

Metlay JP, Camargo CA, Mackenzie T, et al. Cluster-randomized trial to improve antibiotic use for adults with acute respiratory infections treated in emergency departments. *Ann Emerg Med*. 2007;50(3):221-30.

Meyer E, Buttler J, Schneider C, et al. Modified guidelines impact on antibiotic use and costs: duration of treatment for pneumonia in a neurosurgical ICU is reduced. *J Antimicrob Chemother*. 2007;59(6):1148-54.

Micallef C, Aliyu SH, Santos R, Brown NM, Rosembert D, Enoch DA. Introduction of an antifungal stewardship programme targeting high-cost antifungals at a tertiary hospital in Cambridge, England. *J Antimicrob Chemother*. 2015;70(6):1908-11.

Micek ST, Ward S, Fraser VJ, Kollef MH. A randomized controlled trial of an antibiotic discontinuation policy for clinically suspected ventilator-associated pneumonia. *Chest*. 2004;125(5):1791-9.

Micek ST, Heard KM, Gowan M, Kollef MH. Identifying critically ill patients at risk for inappropriate antibiotic therapy: a pilot study of a point-of-care decision support alert. *Crit Care Med*. 2014;42(8):1832-8.

Michael KA, Henderson PL, Newman RB, Blackwelder EN, Caldwell RD. Impact of a pharmacist/physician cooperative target drug monitoring program on prophylactic antibiotic prescribing in obstetrics and gynecology. *Hosp Pharm*. 1992;27(3):213-6.

Milder EA, Rizzi MD, Morales KH, Ross RK, Lautenbach E, Gerber JS. Impact of a new practice guideline on antibiotic use with pediatric tonsillectomy. *JAMA Otolaryngol Head Neck Surg*. 2015;141(5):410-6.

Miyawaki K, Miwa Y, Tomono K, Kurokawa N. Impact of antimicrobial stewardship by infection control team in a Japanese teaching hospital. *Yakugaku Zasshi*. 2010;130(8):1105-11.

Mohagheghi MA, Mosavi-jarrahi A, Khatemi-moghaddam M, Afhami S, Khodai S, Azemoodeh O. Community-based outpatient practice of antibiotics use in Tehran. *Pharmacoepidemiol Drug Saf.* 2005;14(2):135-8.

Mohd fozi K, Kamaliah M. The effect of profiling report on antibiotic prescription for upper respiratory tract infection. *Malays Fam Physician.* 2013;8(2):26-31.

Mol PG, Wieringa JE, Nannanpanday PV, et al. Improving compliance with hospital antibiotic guidelines: a time-series intervention analysis. *J Antimicrob Chemother.* 2005;55(4):550-7.

Molloy L, Mcgrath E, Thomas R, Kaye KS, Rybak MJ. Acceptance of Pharmacist-Driven Antimicrobial Stewardship Recommendations With Differing Levels of Physician Involvement in a Children's Hospital. *Clin Pediatr (Phila).* 2017;56(8):744-751.

Mölstad S, Hovelius B. Reduction in antibiotic usage following an educational programme. *Fam Pract.* 1989;6(1):33-7.

Mölstad S, Ekedahl A, Hovelius B, Thimansson H. Antibiotics prescription in primary care: a 5-year follow-up of an educational programme. *Fam Pract.* 1994;11(3):282-6.

Mondain V, Lieutier F, Dumas S, et al. An antibiotic stewardship program in a French teaching hospital. *Med Mal Infect.* 2013;43(1):17-21.

Mondain V, Lieutier F, Hasseine L, et al. A 6-year antifungal stewardship programme in a teaching hospital. *Infection.* 2013;41(3):621-8.

Monette J, Miller MA, Monette M, et al. Effect of an educational intervention on optimizing antibiotic prescribing in long-term care facilities. *J Am Geriatr Soc.* 2007;55(8):1231-5.

Morgan AS, Brennan PJ, Fishman NO. Impact of a vancomycin restriction policy on use and cost of vancomycin and incidence of vancomycin-resistant *Enterococcus*. *Ann Pharmacother.* 1997;31(9):970-3.

Morquin D, Ologeanu-taddei R, Koumar Y, Bourret R, Reynes J. Implementing a tele-expertise system to optimise the antibiotic use and stewardship: The case of the Montpellier University Hospital (France). *Stud Health Technol Inform*. 2015;210:296-300.

Morrill HJ, Caffrey AR, Gaitanis MM, Laplante KL. Impact of a Prospective Audit and Feedback Antimicrobial Stewardship Program at a Veterans Affairs Medical Center: A Six-Point Assessment. *PLoS ONE*. 2016;11(3):e0150795.

Morton JB, Curzake DJ, Morrill HJ, Parente DM, Gaitanis MM, Laplante KL. Verbal Communication With Providers Improves Acceptance of Antimicrobial Stewardship Interventions. *Infect Control Hosp Epidemiol*. 2016;37(6):740-2.

Mukanga D, Tiono AB, Anyorigiya T, et al. Integrated community case management of fever in children under five using rapid diagnostic tests and respiratory rate counting: a multi-country cluster randomized trial. *Am J Trop Med Hyg*. 2012;87(5 Suppl):21-9.

Mullett CJ, Evans RS, Christenson JC, Dean JM. Development and impact of a computerized pediatric antiinfective decision support program. *Pediatrics*. 2001;108(4):E75.

Muñoz EB, Dorado MF, Guerrero JE, Martínez FM. The effect of an educational intervention to improve patient antibiotic adherence during dispensing in a community pharmacy. *Aten Primaria*. 2014;46(7):367-75.

Murni IK, Duke T, Kinney S, Daley AJ, Soenarto Y. Reducing hospital-acquired infections and improving the rational use of antibiotics in a developing country: an effectiveness study. *Arch Dis Child*. 2015;100(5):454-9.

Murray C, Shaw A, Lloyd M, et al. A multidisciplinary intervention to reduce antibiotic duration in lower respiratory tract infections. *J Antimicrob Chemother*. 2014;69(2):515-8.

Murri R, De belvis AG, Fantoni M, et al. Impact of antibiotic stewardship on perioperative antimicrobial prophylaxis. *Int J Qual Health Care*. 2016;28(4):502-7.

Na SH, Kim CJ, Kim M, et al. Impact of the multiplex polymerase chain reaction in culture-positive samples on appropriate antibiotic use in patients with staphylococcal bacteremia. *Diagn Microbiol Infect Dis*. 2016;84(4):353-7.

Nachtigall I, Tafelski S, Deja M, et al. Long-term effect of computer-assisted decision support for antibiotic treatment in critically ill patients: a prospective 'before/after' cohort study. *BMJ Open*. 2014;4(12):e005370.

Nagdeo N, Sonarkar R, Thombare VR, Akhtar M, Dasgupta S. Effects of an Educational Module in Rationalizing Surgical Prophylaxis. *Indian J Surg*. 2015;77(4):290-6.

Nagel JL, Huang AM, Kunapuli A, et al. Impact of antimicrobial stewardship intervention on coagulase-negative *Staphylococcus* blood cultures in conjunction with rapid diagnostic testing. *J Clin Microbiol*. 2014;52(8):2849-54.

Najafi A, Khodadadian A, Sanatkar M, et al. The Comparison of Procalcitonin Guidance Administer Antibiotics with Empiric Antibiotic Therapy in Critically Ill Patients Admitted in Intensive Care Unit. *Acta Med Iran*. 2015;53(9):562-7.

Nakornchai T, Surabenjawong U, Monsomboon A, Praphruetkit N, Chakorn T. Sepsis resuscitation guideline implementation in the Department of Emergency Medicine, Siriraj Hospital. *J Med Assoc Thai*. 2014;97(10):1047-54.

Nanyonjo A, Ssekitooleko J, Counihan H, Makumbi F, Tomson G, Källander K. Impact of an integrated community case management programme on uptake of appropriate diarrhoea and pneumonia treatments in Uganda: A propensity score matching and equity analysis study. *Int J Equity Health*. 2015;14:74.

Naughton C, Feely J, Bennett K. A RCT evaluating the effectiveness and cost-effectiveness of academic detailing versus postal prescribing feedback in changing GP antibiotic prescribing. *J Eval Clin Pract*. 2009;15(5):807-12.

Nault V, Pepin J, Beaudoin M, Perron J, Moutquin JM, Valiquette L. Sustained impact of a computer-assisted antimicrobial stewardship intervention on antimicrobial use and length of stay. *J Antimicrob Chemother.* 2017;72(3):933-940.

Nausheen S, Hammad R, Khan A. Rational use of antibiotics--a quality improvement initiative in hospital setting. *J Pak Med Assoc.* 2013;63(1):60-4.

Neuner EA, Pallotta AM, Lam SW, et al. Experience With Rapid Microarray-Based Diagnostic Technology and Antimicrobial Stewardship for Patients With Gram-Positive Bacteremia. *Infect Control Hosp Epidemiol.* 2016;37(11):1361-1366.

Newland JG, Stach LM, De Iurgio SA, et al. Impact of a Prospective-Audit-With-Feedback Antimicrobial Stewardship Program at a Children's Hospital. *J Pediatric Infect Dis Soc.* 2012;1(3):179-86.

Nguyen CT, Gandhi T, Chenoweth C, et al. Impact of an antimicrobial stewardship-led intervention for *Staphylococcus aureus* bacteraemia: a quasi-experimental study. *J Antimicrob Chemother.* 2015;70(12):3390-6.

Nguyen-ha PT, Howrie D, Crowley K, et al. A Quality Assessment of a Collaborative Model of a Pediatric Antimicrobial Stewardship Program. *Pediatrics.* 2016;137(5)

Ni riain U, Tierney M, Doyle C, Vellinga A, Fleming C, Cormican M. Targeted de-escalation rounds may effectively and safely reduce meropenem use. *Ir J Med Sci.* 2017;186(3):729-732.

Nilholm H, Holmstrand L, Ahl J, et al. An Audit-Based, Infectious Disease Specialist-Guided Antimicrobial Stewardship Program Profoundly Reduced Antibiotic Use Without Negatively Affecting Patient Outcomes. *Open Forum Infect Dis.* 2015;2(2):ofv042.

Niwa T, Shinoda Y, Suzuki A, et al. Outcome measurement of extensive implementation of antimicrobial stewardship in patients receiving intravenous antibiotics in a Japanese university hospital. *Int J Clin Pract.* 2012;66(10):999-1008.

Niwa T, Watanabe T, Goto T, et al. Daily Review of Antimicrobial Use Facilitates the Early Optimization of Antimicrobial Therapy and Improves Clinical Outcomes of Patients with Bloodstream Infections. *Biol Pharm Bull.* 2016;39(5):721-7.

Nowak MA, Nelson RE, Breidenbach JL, Thompson PA, Carson PJ. Clinical and economic outcomes of a prospective antimicrobial stewardship program. *Am J Health Syst Pharm.* 2012;69(17):1500-8.

Ntagiopoulos PG, Paramythiotou E, Antoniadou A, Giamarellou H, Karabinis A. Impact of an antibiotic restriction policy on the antibiotic resistance patterns of Gram-negative microorganisms in an Intensive Care Unit in Greece. *Int J Antimicrob Agents.* 2007;30(4):360-5.

O'brien KA, Zhang J, Mauldin PD, et al. Impact of a Stewardship-Initiated Restriction on Empirical Use of Ciprofloxacin on Nonsusceptibility of *Escherichia coli* Urinary Isolates to Ciprofloxacin. *Pharmacotherapy.* 2015;35(5):464-9.

O'connor JB, Sondhi SS, Mullen KD, Mccullough AJ. A continuous quality improvement initiative reduces inappropriate prescribing of prophylactic antibiotics for endoscopic procedures. *Am J Gastroenterol.* 1999;94(8):2115-21.

O'hanlon M, Mckenna C, Carton E, et al. A Quality Improvement Approach to Reducing the Caesarean section Surgical Site Infection Rate in a Regional Hospital. *Ir Med J.* 2016;109(8):450.

Okumura LM, Silva MM, Veroneze I. Effects of a bundled Antimicrobial Stewardship Program on mortality: a cohort study. *Braz J Infect Dis.* 2015;19(3):246-52.

Okumura LM, Veroneze I, Burgardt CI, Fragoso MF. Effects of a computerized provider order entry and a clinical decision support system to improve cefazolin use in surgical prophylaxis: a cost saving analysis. *Pharm Pract (Granada).* 2016;14(3):717.

Onion CW, Bartzokas CA. Changing attitudes to infection management in primary care: a controlled trial of active versus passive guideline implementation strategies. *Fam Pract.* 1998;15(2):99-104.

Oppenheimer M, Rezwan N. CQUIN audit for prescription of antibiotics for urinary tract infections in an acute medical assessment unit. *BMJ Qual Improv Rep*. 2015;4(1)

O'reilly M, Talsma A, Vanriper S, Kheterpal S, Burney R. An anesthesia information system designed to provide physician-specific feedback improves timely administration of prophylactic antibiotics. *Anesth Analg*. 2006;103(4):908-12.

Ostrowsky B, Sharma S, Defino M, et al. Antimicrobial stewardship and automated pharmacy technology improve antibiotic appropriateness for community-acquired pneumonia. *Infect Control Hosp Epidemiol*. 2013;34(6):566-72.

Ostrowsky B, Ruiz R, Brown S, et al. Lessons learned from implementing *Clostridium difficile*-focused antibiotic stewardship interventions. *Infect Control Hosp Epidemiol*. 2014;35 Suppl 3:S86-95.

Oxman DA, Adams CD, Deluke G, et al. Improving Antibiotic De-Escalation in Suspected Ventilator-Associated Pneumonia: An Observational Study With a Pharmacist-Driven Intervention. *J Pharm Pract*. 2015;28(5):457-61.

Ozgun H, Ertugrul BM, Soyder A, Ozturk B, Aydemir M. Peri-operative antibiotic prophylaxis: adherence to guidelines and effects of educational intervention. *Int J Surg*. 2010;8(2):159-63.

Ozkurt Z, Erol S, Kadanali A, Ertek M, Ozden K, Tasyaran MA. Changes in antibiotic use, cost and consumption after an antibiotic restriction policy applied by infectious disease specialists. *Jpn J Infect Dis*. 2005;58(6):338-43.

Pakyz AL, Oinonen M, Polk RE. Relationship of carbapenem restriction in 22 university teaching hospitals to carbapenem use and carbapenem-resistant *Pseudomonas aeruginosa*. *Antimicrob Agents Chemother*. 2009;53(5):1983-6.

Palmay L, Elligsen M, Walker SA, et al. Hospital-wide rollout of antimicrobial stewardship: a stepped-wedge randomized trial. *Clin Infect Dis*. 2014;59(6):867-74.

Papaevangelou V, Rousounides A, Hadjipanagis A, Katsioulis A, Theodoridou M, Hadjichristodoulou C. Decrease of antibiotic consumption in children with upper respiratory tract infections after implementation of an intervention program in Cyprus. *Antimicrob Agents Chemother*. 2012;56(3):1658-61.

Pardo J, Klinker KP, Borgert SJ, Butler BM, Giglio PG, Rand KH. Clinical and economic impact of antimicrobial stewardship interventions with the FilmArray blood culture identification panel. *Diagn Microbiol Infect Dis*. 2016;84(2):159-64.

Parker BM, Henderson JM, Vitagliano S, et al. Six sigma methodology can be used to improve adherence for antibiotic prophylaxis in patients undergoing noncardiac surgery. *Anesth Analg*. 2007;104(1):140-6.

Pasquale TR, Trienski TL, Olexia DE, et al. Impact of an antimicrobial stewardship program on patients with acute bacterial skin and skin structure infections. *Am J Health Syst Pharm*. 2014;71(13):1136-9.

Pastel DA, Chang S, Nessim S, Shane R, Morgan MA. Department of pharmacy-initiated program for streamlining empirical antibiotic therapy. *Hosp Pharm*. 1992;27(7):596-603, 614.

Pate PG, Storey DF, Baum DL. Implementation of an antimicrobial stewardship program at a 60-bed long-term acute care hospital. *Infect Control Hosp Epidemiol*. 2012;33(4):405-8.

Paul M, Andreassen S, Tacconelli E, et al. Improving empirical antibiotic treatment using TREAT, a computerized decision support system: cluster randomized trial. *J Antimicrob Chemother*. 2006;58(6):1238-45.

Paul R, Melendez E, Stack A, Capraro A, Monuteaux M, Neuman MI. Improving adherence to PALS septic shock guidelines. *Pediatrics*. 2014;133(5):e1358-66.

Pavese P, Saurel N, Labarère J, et al. Does an educational session with an infectious diseases physician reduce the use of inappropriate antibiotic therapy for inpatients with positive urine culture results? A controlled before-and-after study. *Infect Control Hosp Epidemiol*. 2009;30(6):596-9.

Pellerin J, Edmond M, Bearman G, Lee K, Stevens MP. An examination of stewardship interventions by major category in an urban academic medical center. *Infect Control Hosp Epidemiol*. 2012;33(4):432-4.

Percival KM, Valenti KM, Schmittling SE, Strader BD, Lopez RR, Bergman SJ. Impact of an antimicrobial stewardship intervention on urinary tract infection treatment in the ED. *Am J Emerg Med*. 2015;33(9):1129-33.

Pérez A, Dennis RJ, Rodríguez B, et al. An interrupted time series analysis of parenteral antibiotic use in Colombia. *J Clin Epidemiol*. 2003;56(10):1013-20.

Perez KK, Olsen RJ, Musick WL, et al. Integrating rapid pathogen identification and antimicrobial stewardship significantly decreases hospital costs. *Arch Pathol Lab Med*. 2013;137(9):1247-54.

Perez KK, Olsen RJ, Musick WL, et al. Integrating rapid diagnostics and antimicrobial stewardship improves outcomes in patients with antibiotic-resistant Gram-negative bacteremia. *J Infect*. 2014;69(3):216-25.

Pérez-cuevas R, Guiscafré H, Muñoz O, et al. Improving physician prescribing patterns to treat rhinopharyngitis. Intervention strategies in two health systems of Mexico. *Soc Sci Med*. 1996;42(8):1185-94.

Pernica JM, Steenhoff AP, Mokomane M, et al. Correction: Rapid enteric testing to permit targeted antimicrobial therapy, with and without *Lactobacillus reuteri* probiotics, for paediatric acute diarrhoeal disease in Botswana: A pilot, randomized, factorial, controlled trial. *PLoS ONE*. 2018;13(3):e0194957.

Persell SD, Doctor JN, Friedberg MW, et al. Behavioral interventions to reduce inappropriate antibiotic prescribing: a randomized pilot trial. *BMC Infect Dis*. 2016;16:373.

Perz JF, Craig AS, Coffey CS, et al. Changes in antibiotic prescribing for children after a community-wide campaign. *JAMA*. 2002;287(23):3103-9.

Peterson GM, Stanton LA, Bergin JK, Chapman GA. Improving the prescribing of antibiotics for urinary tract infection. *J Clin Pharm Ther.* 1997;22(2):147-53.

Pettersson E, Vernby A, Mölsted S, Lundborg CS. Can a multifaceted educational intervention targeting both nurses and physicians change the prescribing of antibiotics to nursing home residents? A cluster randomized controlled trial. *J Antimicrob Chemother.* 2011;66(11):2659-66.

Peto Z, Benko R, Matuz M, Csullog E, Molnar A, Hajdu E. Results of a local antibiotic management program on antibiotic use in a tertiary intensive care unit in Hungary. *Infection.* 2008;36(6):560-4.

Phuong HL, Nga TT, Giao PT, et al. Randomised primary health center based interventions to improve the diagnosis and treatment of undifferentiated fever and dengue in Vietnam. *BMC Health Serv Res.* 2010;10:275.

Picart J, Moiton MP, Gaüzère BA, Gazaille V, Combes X, Dibernardo S. Introduction of a PCT-based algorithm to guide antibiotic prescription in COPD exacerbation. *Med Mal Infect.* 2016;46(8):429-435.

Pien FD, Lau WK, Sur N. Antibiotic use in a small community hospital. *West J Med.* 1979;130(6):498-502.

Pinilla J, Shafran S, Conly J. A utilization and cost-benefit analysis of an aminoglycoside kinetics monitoring service. *Clin Invest Med.* 1992;15(1):8-17.

Pisano J, Pettit N, Bartlett A, et al. Social media as a tool for antimicrobial stewardship. *Am J Infect Control.* 2016;44(11):1231-1236.

Pittenger K, Williams BL, Mecklenburg RS, Blackmore CC. Improving acute respiratory infection care through nurse phone care and academic detailing of physicians. *J Am Board Fam Med.* 2015;28(2):195-204.

Plachouras D, Antoniadou A, Giannitsioti E, et al. Promoting prudent use of antibiotics: the experience from a multifaceted regional campaign in Greece. *BMC Public Health*. 2014;14:866.

Po JL, Nguyen BQ, Carling PC. The impact of an infectious diseases specialist-directed computerized physician order entry antimicrobial stewardship program targeting linezolid use. *Infect Control Hosp Epidemiol*. 2012;33(4):434-5.

Podhipak A, Varavithya W, Punyaratabandhu P, Vathanophas K, Sangchai R. Impact of an educational program on the treatment practices of diarrheal diseases among pharmacists and drugsellers. *Southeast Asian J Trop Med Public Health*. 1993;24(1):32-9.

Poehling KA, Zhu Y, Tang YW, Edwards K. Accuracy and impact of a point-of-care rapid influenza test in young children with respiratory illnesses. *Arch Pediatr Adolesc Med*. 2006;160(7):713-8.

Pogue JM, Mynatt RP, Marchaim D, et al. Automated alerts coupled with antimicrobial stewardship intervention lead to decreases in length of stay in patients with gram-negative bacteremia. *Infect Control Hosp Epidemiol*. 2014;35(2):132-8.

Popovski Z, Mercuri M, Main C, et al. Multifaceted intervention to optimize antibiotic use for intra-abdominal infections. *J Antimicrob Chemother*. 2015;70(4):1226-9.

Poses RM, Cebul RD, Wigton RS. You can lead a horse to water--improving physicians' knowledge of probabilities may not affect their decisions. *Med Decis Making*. 1995;15(1):65-75.

Possidente CJ, Lynch T. A practical approach enabling staff pharmacists to prospectively review and dose aminoglycoside therapy. *Hosp Pharm*. 1988;23(11):976-8, 981-3.

Postenrieder NR, Reed JL, Hesse E, et al. Rapid Antigen Testing for Trichomoniasis in an Emergency Department. *Pediatrics*. 2016;137(6)

Potasman I, Naftali G, Grupper M. Impact of a computerized integrated antibiotic authorization system. *Isr Med Assoc J*. 2012;14(7):415-9.

Price J, Cheek E, Lippett S, et al. Impact of an intervention to control *Clostridium difficile* infection on hospital- and community-onset disease; an interrupted time series analysis. *Clin Microbiol Infect*. 2010;16(8):1297-302.

Prior M, Elouafkaoui P, Elders A, et al. Evaluating an audit and feedback intervention for reducing antibiotic prescribing behaviour in general dental practice (the RAPiD trial): a partial factorial cluster randomised trial protocol. *Implement Sci*. 2014;9:50.

Przybylski KG, Rybak MJ, Martin PR, et al. A pharmacist-initiated program of intravenous to oral antibiotic conversion. *Pharmacotherapy*. 1997;17(2):271-6.

Puckett F, Baars R, Seay K. Antibiotic use review using the "target drug" method. *Hosp Formul*. 1987;22(5):489-91.

Pulcini C, Dellamonica J, Bernardin G, Molinari N, Sotto A. Impact of an intervention designed to improve the documentation of the reassessment of antibiotic therapies in an intensive care unit. *Med Mal Infect*. 2011;41(10):546-52.

Putnam LR, Chang CM, Rogers NB, et al. Adherence to surgical antibiotic prophylaxis remains a challenge despite multifaceted interventions. *Surgery*. 2015;158(2):413-9.

Quale J, Landman D, Saurina G, Atwood E, Ditore V, Patel K. Manipulation of a hospital antimicrobial formulary to control an outbreak of vancomycin-resistant enterococci. *Clin Infect Dis*. 1996;23(5):1020-5.

Qureshi DI, Habayeb MH, Grundy DC. Improving the correct prescription and dosage of gentamicin. *BMJ Qual Improv Rep*. 2012;1(1)

Rahal JJ, Urban C, Horn D, et al. Class restriction of cephalosporin use to control total cephalosporin resistance in nosocomial *Klebsiella*. *JAMA*. 1998;280(14):1233-7.

Rahman AE, Iqbal A, Hoque DM, et al. Managing Neonatal and Early Childhood Syndromic Sepsis in Sub-District Hospitals in Resource Poor Settings: Improvement in Quality of Care through Introduction of a Package of Interventions in Rural Bangladesh. PLoS ONE. 2017;12(1):e0170267.

Raineri E, Pan A, Mondello P, Acquarolo A, Candiani A, Crema L. Role of the infectious diseases specialist consultant on the appropriateness of antimicrobial therapy prescription in an intensive care unit. Am J Infect Control. 2008;36(4):283-90.

Ramos A, Benitez-gutierrez L, Asensio A, et al. Correction: Antimicrobial stewardship in patients recently transferred to a ward from the ICU. Rev Esp Quimioter. 2014;27(2):134-9.

Rattanaumpawan P, Sutha P, Thamlikitkul V. Effectiveness of drug use evaluation and antibiotic authorization on patients' clinical outcomes, antibiotic consumption, and antibiotic expenditures. Am J Infect Control. 2010;38(1):38-43.

Rattinger GB, Mullins CD, Zuckerman IH, et al. A sustainable strategy to prevent misuse of antibiotics for acute respiratory infections. PLoS ONE. 2012;7(12):e51147.

Rautakorpi UM, Huikko S, Honkanen P, et al. The Antimicrobial Treatment Strategies (MIKSTRA) program: a 5-year follow-up of infection-specific antibiotic use in primary health care and the effect of implementation of treatment guidelines. Clin Infect Dis. 2006;42(9):1221-30.

Raveh D, Muallem-zilcha E, Greenberg A, Wiener-well Y, Schlesinger Y, Yinnon AM. Prospective drug utilization evaluation of three broad-spectrum antimicrobials: cefepime, piperacillin-tazobactam and meropenem. QJM. 2006;99(6):397-406.

Raz R, Sharir R, Ron A, Laks N. The influence of an infectious disease specialist on the antimicrobial budget of a community teaching hospital. J Infect. 1989;18(3):213-9.

Raz R, Porat V, Ephros M. Can an educational program improve the diagnosis and treatment of pharyngotonsillitis in the ambulatory care setting?. Isr J Med Sci. 1995;31(7):432-5.

Razon Y, Ashkenazi S, Cohen A, et al. Effect of educational intervention on antibiotic prescription practices for upper respiratory infections in children: a multicentre study. *J Antimicrob Chemother.* 2005;56(5):937-40.

Redding PJ, Taylor A, Smith AM. Audit on the use of prophylactic parenteral antimicrobial agents and the use of co-amoxiclav and metronidazole. *Health Bull (Edinb).* 1996;54(6):499-504.

Reed EE, West JE, Keating EA, et al. Improving the management of candidemia through antimicrobial stewardship interventions. *Diagn Microbiol Infect Dis.* 2014;78(2):157-61.

Regal RE, Depestele DD, Vandebussche HL. The effect of an antimicrobial restriction program on *Pseudomonas aeruginosa* resistance to beta-lactams in a large teaching hospital. *Pharmacotherapy.* 2003;23(5):618-24.

Regev-yochay G, Raz M, Dagan R, et al. Reduction in antibiotic use following a cluster randomized controlled multifaceted intervention: the Israeli judicious antibiotic prescription study. *Clin Infect Dis.* 2011;53(1):33-41.

Revolinski S. Implementation of a Clinical Decision Support Alert for the Management of *Clostridium difficile* Infection. *Antibiotics (Basel).* 2015;4(4):667-74.

Reyes-morales H, Flores-hernández S, Tomé-sandoval P, Pérez-cuevas R. A multifaceted education intervention for improving family physicians' case management. *Fam Med.* 2009;41(4):277-84.

Rimawi RH, Mazer MA, Siraj DS, Gooch M, Cook PP. Impact of regular collaboration between infectious diseases and critical care practitioners on antimicrobial utilization and patient outcome. *Crit Care Med.* 2013;41(9):2099-107.

Ritchie ND, Irvine SC, Helps A, Robb F, Jones BL, Seaton RA. Restrictive antibiotic stewardship associated with reduced hospital mortality in gram-negative infection. *QJM.* 2017;110(3):155-161.

Ritchie S, Scanlon N, Lewis M, Black PN. Use of a preprinted sticker to improve the prescribing of prophylactic antibiotics for hip fracture surgery. *Qual Saf Health Care.* 2004;13(5):384-7.

Roberts E, Dawoud DM, Hughes DA, Cefai C. Evaluation of a consultant audit and feedback programme to improve the quality of antimicrobial prescribing in acute medical admissions. *Int J Pharm Pract.* 2015;23(5):333-9.

Rodriguez-maresca M, Sorlozano A, Grau M, Rodriguez-castaño R, Ruiz-valverde A, Gutierrez-fernandez J. Implementation of a computerized decision support system to improve the appropriateness of antibiotic therapy using local microbiologic data. *Biomed Res Int.* 2014;2014:395434.

Roque F, Teixeira-rodrigues A, Breitenfeld L, Piñeiro-lamas M, Figueiras A, Herdeiro MT. Decreasing antibiotic use through a joint intervention targeting physicians and pharmacists. *Future Microbiol.* 2016;11:877-86.

Rosa RG, Goldani LZ, Dos santos RP. Association between adherence to an antimicrobial stewardship program and mortality among hospitalised cancer patients with febrile neutropaenia: a prospective cohort study. *BMC Infect Dis.* 2014;14:286.

Roshdy DG, Tran A, Lecroy N, et al. Impact of a rapid microarray-based assay for identification of positive blood cultures for treatment optimization for patients with streptococcal and enterococcal bacteremia. *J Clin Microbiol.* 2015;53(4):1411-4.

Ross JL, Rankin S, Marshik P, Mercier RC, Brett M, Walraven CJ. Antimicrobial Stewardship Intervention and Feedback to Infectious Disease Specialists: A Case Study in High-Dose Daptomycin. *Antibiotics (Basel).* 2015;4(3):309-20.

Ross RK, Beus JM, Metjian TA, et al. Safety of Automatic End Dates for Antimicrobial Orders to Facilitate Stewardship. *Infect Control Hosp Epidemiol.* 2016;37(8):974-8.

Ross RK, Hersh AL, Kronman MP, et al. Impact of Infectious Diseases Society of America/Pediatric Infectious Diseases Society guidelines on treatment of community-acquired pneumonia in hospitalized children. *Clin Infect Dis.* 2014;58(6):834-8.

Rubin MA, Bateman K, Alder S, Donnelly S, Stoddard GJ, Samore MH. A multifaceted intervention to improve antimicrobial prescribing for upper respiratory tract infections in a small rural community. *Clin Infect Dis*. 2005;40(4):546-53.

Russell JM, Nick-dart RL, Nornhold BD. Development of a pharmacist-driven protocol for automatic medication dosage adjustments in obese patients. *Am J Health Syst Pharm*. 2015;72(19):1656-63.

Rutman L, Wright DR, O'callaghan J, et al. A Comprehensive Approach to Pediatric Pneumonia: Relationship Between Standardization, Antimicrobial Stewardship, Clinical Testing, and Cost. *J Healthc Qual*. 2017;39(4):e59-e69.

Sáez-Illorens X, Castrejón de wong MM, Castaño E, De suman O, De morös D, De atencio I. Impact of an antibiotic restriction policy on hospital expenditures and bacterial susceptibilities: a lesson from a pediatric institution in a developing country. *Pediatr Infect Dis J*. 2000;19(3):200-6.

Saied T, Hafez SF, Kandeel A, et al. Antimicrobial stewardship to optimize the use of antimicrobials for surgical prophylaxis in Egypt: A multicenter pilot intervention study. *Am J Infect Control*. 2015;43(11):e67-71.

Saint S, Scholes D, Fihn SD, Farrell RG, Stamm WE. The effectiveness of a clinical practice guideline for the management of presumed uncomplicated urinary tract infection in women. *Am J Med*. 1999;106(6):636-41.

Salama S, Rotstein C, Mandell L. A multidisciplinary hospital-based antimicrobial use program: Impact on hospital pharmacy expenditures and drug use. *Can J Infect Dis*. 1996;7(2):104-9.

Samore MH, Bateman K, Alder SC, et al. Clinical decision support and appropriateness of antimicrobial prescribing: a randomized trial. *JAMA*. 2005;294(18):2305-14.

Sango A, Mccarter YS, Johnson D, Ferreira J, Guzman N, Jankowski CA. Stewardship approach for optimizing antimicrobial therapy through use of a rapid microarray assay on blood cultures positive for *Enterococcus* species. *J Clin Microbiol*. 2013;51(12):4008-11.

Santa-ana-tellez Y, Mantel-teeuwisse AK, Dreser A, Leufkens HG, Wirtz VJ. Impact of over-the-counter restrictions on antibiotic consumption in Brazil and Mexico. PLoS ONE. 2013;8(10):e75550.

Santoso B, Suryawati S, Prawaitasari JE. Small group intervention vs formal seminar for improving appropriate drug use. Soc Sci Med. 1996;42(8):1163-8.

Sarma JB, Marshall B, Cleeve V, Tate D, Oswald T, Woolfrey S. Effects of fluoroquinolone restriction (from 2007 to 2012) on resistance in Enterobacteriaceae: interrupted time-series analysis. J Hosp Infect. 2015;91(1):68-73.

Sarma JB, Marshall B, Cleeve V, Tate D, Oswald T, Woolfrey S. Effects of fluoroquinolone restriction (from 2007 to 2012) on Clostridium difficile infections: interrupted time-series analysis. J Hosp Infect. 2015;91(1):74-80.

Sartelli M, Labricciosa FM, Scoccia L, et al. Non-Restrictive Antimicrobial Stewardship Program in a General and Emergency Surgery Unit. Surg Infect (Larchmt). 2016;17(4):485-90.

Schaeffer EM. Re: Impact of a Computerized Decision Support System on Compliance with Guidelines on Antibiotics Prescribed for Urinary Tract Infections in Emergency Departments: A Multicentre Prospective before-and-after Controlled Interventional Study. J Urol. 2016;195(2):369-70.

Schaffer K, Fitzgerald S, Gonzalez-sanchez Z, Fenelon L. Do educational interventions improve management of patients with community-acquired pneumonia?. J Healthc Qual. 2006;28(6):7-12.

Schaffner W, Ray WA, Federspiel CF. Surveillance of antibiotic prescribing in office practice. Ann Intern Med. 1978;89(5 Pt 2 Suppl):796-9.

Schentag JJ. The results of a targeted pharmacy intervention program. Clin Ther. 1993;15 Suppl A:29-36.

Schön T, Sandelin LL, Bonnedahl J, et al. A comparative study of three methods to evaluate an intervention to improve empirical antibiotic therapy for acute bacterial infections in hospitalized patients. Scand J Infect Dis. 2011;43(4):251-7.

Schouten JA, Hulscher ME, Trap-liefers J, et al. Tailored interventions to improve antibiotic use for lower respiratory tract infections in hospitals: a cluster-randomized, controlled trial. *Clin Infect Dis*. 2007;44(7):931-41.

Schuetz P, Christ-crain M, Wolbers M, et al. Procalcitonin guided antibiotic therapy and hospitalization in patients with lower respiratory tract infections: a prospective, multicenter, randomized controlled trial. *BMC Health Serv Res*. 2007;7:102.

Schulz L, Osterby K, Fox B. The use of best practice alerts with the development of an antimicrobial stewardship navigator to promote antibiotic de-escalation in the electronic medical record. *Infect Control Hosp Epidemiol*. 2013;34(12):1259-65.

Schwann NM, Bretz KA, Eid S, et al. Point-of-care electronic prompts: an effective means of increasing compliance, demonstrating quality, and improving outcome. *Anesth Analg*. 2011;113(4):869-76.

Schwartzberg E, Rubinovich S, Hassin D, et al. Developing and implementing a model for changing physicians' prescribing habits-- the role of clinical pharmacy in leading the change. *J Clin Pharm Ther*. 2006;31(2):179-85.

Seager JM, Howell-jones RS, Dunstan FD, Lewis MA, Richmond S, Thomas DW. A randomised controlled trial of clinical outreach education to rationalise antibiotic prescribing for acute dental pain in the primary care setting. *Br Dent J*. 2006;201(4):217-22.

Seah XF, Ong YL, Tan SW, et al. Impact of an antimicrobial stewardship program on the use of carbapenems in a tertiary women's and children's hospital, Singapore. *Pharmacotherapy*. 2014;34(11):1141-50.

Seligman SJ. Reduction in antibiotic costs by restricting use of an oral cephalosporin. *Am J Med*. 1981;71(6):941-4.

Senn L, Burnand B, Francioli P, Zanetti G. Improving appropriateness of antibiotic therapy: randomized trial of an intervention to foster reassessment of prescription after 3 days. *J Antimicrob Chemother.* 2004;53(6):1062-7.

Serisier DJ, Bowler SD. Effect of a simple educational intervention on the hospital management of community-acquired pneumonia. *Respirology.* 2007;12(3):389-93.

Shafiq N, Praveen kumar M, Gautam V, et al. Antibiotic stewardship in a tertiary care hospital of a developing country: establishment of a system and its application in a unit-GASP Initiative. *Infection.* 2016;44(5):651-9.

Shapiro M, Sacks T, Simchen E, Michel J, Rudensky B. Antibiotic use on the surgical services of two Jerusalem hospitals, as determined by surveillance and influenced by an intervention program. *Rev Infect Dis.* 1981;3(4):754-9.

Sharieff GQ, Hoecker C, Silva PD. Effects of a pediatric emergency department febrile infant protocol on time to antibiotic therapy. *J Emerg Med.* 2001;21(1):1-6.

Shehadeh MB, Suaifan GA, Hammad EA. Active educational intervention as a tool to improve safe and appropriate use of antibiotics. *Saudi Pharm J.* 2016;24(5):611-615.

Shelton BK, Stanik-hutt J, Kane J, Jones RJ. Implementing the Surviving Sepsis Campaign in an Ambulatory Clinic for Patients With Hematologic Malignancies. *Clin J Oncol Nurs.* 2016;20(3):281-8.

Shen J, Sun Q, Zhou X, et al. Pharmacist interventions on antibiotic use in inpatients with respiratory tract infections in a Chinese hospital. *Int J Clin Pharm.* 2011;33(6):929-33.

Sick AC, Lehmann CU, Tamma PD, Lee CK, Agwu AL. Sustained savings from a longitudinal cost analysis of an internet-based preapproval antimicrobial stewardship program. *Infect Control Hosp Epidemiol.* 2013;34(6):573-80.

Sing DY, Boo YL, Mukhlis R, Chin PW, Hoo FK. Antimicrobial stewardship program in a Malaysian district hospital: First year experience. *Pak J Med Sci.* 2016;32(4):999-1004.

Singer MV, Haft R, Barlam T, Aronson M, Shafer A, Sands KE. Vancomycin control measures at a tertiary-care hospital: impact of interventions on volume and patterns of use. *Infect Control Hosp Epidemiol.* 1998;19(4):248-53.

Singh NB, Yim J, Jahanbakhsh S, Sakoulas G, Rybak MJ. Impact of cefazolin co-administration with vancomycin to reduce development of vancomycin-intermediate *Staphylococcus aureus*. *Diagn Microbiol Infect Dis.* 2018;

Singh S, Zhang YZ, Chalkley S, et al. A three-point time series study of antibiotic usage on an intensive care unit, following an antibiotic stewardship programme, after an outbreak of multi-resistant *Acinetobacter baumannii*. *Eur J Clin Microbiol Infect Dis.* 2015;34(9):1893-900.

Sintchenko V, Iredell JR, Gilbert GL, Coiera E. Handheld computer-based decision support reduces patient length of stay and antibiotic prescribing in critical care. *J Am Med Inform Assoc.* 2005;12(4):398-402.

Sintchenko V, Coiera E. Decision complexity affects the extent and type of decision support use. *AMIA Annu Symp Proc.* 2006;:724-8.

Sistanizad M, Kouchek M, Miri M, et al. Carbapenem Restriction and its Effect on Bacterial Resistance in an Intensive Care unit of a Teaching Hospital. *Iran J Pharm Res.* 2013;12(3):503-9.

Skrlin J, Bacic vrca V, Marusic S, Ciric-crncec M, Mayer L. Impact of ceftriaxone de-restriction on the occurrence of ESBL-positive bacterial strains and antibiotic consumption. *J Chemother.* 2011;23(6):341-4.

Slain D, Sarwari AR, Petros KO, et al. Impact of a Multimodal Antimicrobial Stewardship Program on *Pseudomonas aeruginosa* Susceptibility and Antimicrobial Use in the Intensive Care Unit Setting. *Crit Care Res Pract.* 2011;2011:416426.

Slekovec C, Leroy J, Vernaz-hegi N, et al. Impact of a region wide antimicrobial stewardship guideline on urinary tract infection prescription patterns. *Int J Clin Pharm.* 2012;34(2):325-9.

Småbrekke L, Berild D, Giaever A, et al. Educational intervention for parents and healthcare providers leads to reduced antibiotic use in acute otitis media. *Scand J Infect Dis*. 2002;34(9):657-9.

Smeesters PR, Campos D, Van melderen L, De aguiar E, Vanderpas J, Vergison A. Pharyngitis in low-resources settings: a pragmatic clinical approach to reduce unnecessary antibiotic use. *Pediatrics*. 2006;118(6):e1607-11.

Smeets HM, Kuyvenhoven MM, Akkerman AE, et al. Intervention with educational outreach at large scale to reduce antibiotics for respiratory tract infections: a controlled before and after study. *Fam Pract*. 2009;26(3):183-7.

Smith KL, Tran D, Westra BL. Sinusitis Treatment Guideline Adherence in the E-Visit Setting: A Performance Improvement Project. *Appl Clin Inform*. 2016;7(2):299-307.

Smith MJ, Kong M, Cambon A, Woods CR. Effectiveness of antimicrobial guidelines for community-acquired pneumonia in children. *Pediatrics*. 2012;129(5):e1326-33.

Smith T, Philmon CL, Johnson GD, et al. Antimicrobial stewardship in a community hospital: attacking the more difficult problems. *Hosp Pharm*. 2014;49(9):839-46.

So JP, Aleem IS, Tsang DS, Matlow AG, Wright JG. Increasing Compliance With an Antibiotic Prophylaxis Guideline to Prevent Pediatric Surgical Site Infection: Before and After Study. *Ann Surg*. 2015;262(2):403-8.

Soleymani F, Rashidian A, Dinarvand R, Kebriaeezade A, Hosseini M, Abdollahi M. Assessing the effectiveness and cost-effectiveness of audit and feedback on physician's prescribing indicators: study protocol of a randomized controlled trial with economic evaluation. *Daru*. 2012;20(1):88.

Solomon DH, Van houten L, Glynn RJ, et al. Academic detailing to improve use of broad-spectrum antibiotics at an academic medical center. *Arch Intern Med*. 2001;161(15):1897-902.

Søndergaard J, Andersen M, Støvring H, Kragstrup J. Mailed prescriber feedback in addition to a clinical guideline has no impact: a randomised, controlled trial. *Scand J Prim Health Care*. 2003;21(1):47-51.

Song P, Li W, Zhou Q. An outpatient antibacterial stewardship intervention during the journey to JCI accreditation. *BMC Pharmacol Toxicol*. 2014;15:8.

Song YJ, Kim M, Huh S, et al. Impact of an Antimicrobial Stewardship Program on Unnecessary Double Anaerobic Coverage Prescription. *Infect Chemother*. 2015;47(2):111-6.

Sothoron C, Ferreira J, Guzman N, Aldridge P, Mccarter YS, Jankowski CA. Erratum for Sothoron et al., A Stewardship Approach To Optimize Antimicrobial Therapy through Use of a Rapid Microarray Assay on Blood Cultures Positive for Gram-Negative Bacteria. *J Clin Microbiol*. 2016;54(3):820.

Spoorenberg V, Hulscher ME, Geskus RB, et al. A Cluster-Randomized Trial of Two Strategies to Improve Antibiotic Use for Patients with a Complicated Urinary Tract Infection. *PLoS ONE*. 2015;10(12):e0142672.

St jacques P, Sanders N, Patel N, Talbot TR, Deshpande JK, Higgins M. Improving timely surgical antibiotic prophylaxis redosing administration using computerized record prompts. *Surg Infect (Larchmt)*. 2005;6(2):215-21.

Staicu ML, Brundige ML, Ramsey A, et al. Implementation of a penicillin allergy screening tool to optimize aztreonam use. *Am J Health Syst Pharm*. 2016;73(5):298-306.

Standiford HC, Chan S, Tripoli M, Weekes E, Forrest GN. Antimicrobial stewardship at a large tertiary care academic medical center: cost analysis before, during, and after a 7-year program. *Infect Control Hosp Epidemiol*. 2012;33(4):338-45.

Stathoulopoulou F, Papastamatiou L, Lapidakis L. Initiation of clinical pharmacy in Greece. *Pharm World Sci*. 1996;18(6):229-32.

Stéphan F, Sax H, Wachsmuth M, Hoffmeyer P, Clergue F, Pittet D. Reduction of urinary tract infection and antibiotic use after surgery: a controlled, prospective, before-after intervention study. *Clin Infect Dis*. 2006;42(11):1544-51.

Stewart J, Pilla J, Dunn L. Pilot study for appropriate anti-infective community therapy. Effect of a guideline-based strategy to optimize use of antibiotics. *Can Fam Physician*. 2000;46:851-9.

Stolz D, Christ-crain M, Bingisser R, et al. Antibiotic treatment of exacerbations of COPD: a randomized, controlled trial comparing procalcitonin-guidance with standard therapy. *Chest*. 2007;131(1):9-19.

Stolz D, Smyrniotou N, Eggimann P, et al. Procalcitonin for reduced antibiotic exposure in ventilator-associated pneumonia: a randomised study. *Eur Respir J*. 2009;34(6):1364-75.

Storey DF, Pate PG, Nguyen AT, Chang F. Implementation of an antimicrobial stewardship program on the medical-surgical service of a 100-bed community hospital. *Antimicrob Resist Infect Control*. 2012;1(1):32.

Straubhaar K, Schuetz P, Blum CA, et al. Influence of hospital characteristics on quality of care in patients with community-acquired pneumonia. *Swiss Med Wkly*. 2016;146:w14337.

Strykowski DF, Nielsen AB, Llor C, Siersma V, Bjerrum L. An intervention with access to C-reactive protein rapid test reduces antibiotic overprescribing in acute exacerbations of chronic bronchitis and COPD. *Fam Pract*. 2015;32(4):395-400.

Sutton LJ, Jarden RJ. Improving the quality of nurse-influenced patient care in the intensive care unit. *Nurs Crit Care*. 2017;22(6):339-347.

Suwangool P, Moola-or P, Waiwatana A, Sitthi-amorn C, Israsena S, Hanvanich M. Effect of a selective restriction policy on antibiotic expenditure and use: an institutional model. *J Med Assoc Thai*. 1991;74(7):272-5.

Swearingen SM, White C, Weidert S, Hinds M, Narro JP, Guarascio AJ. A multidimensional antimicrobial stewardship intervention targeting aztreonam use in patients with a reported penicillin allergy. *Int J Clin Pharm*. 2016;38(2):213-7.

Swoboda SM, Dixon T, Lipsett PA. Can the clinical pulmonary infection score impact ICU antibiotic days?. *Surg Infect (Larchmt)*. 2006;7(4):331-9.

Tafelski S, Nachtigall I, Deja M, et al. Computer-assisted decision support for changing practice in severe sepsis and septic shock. *J Int Med Res*. 2010;38(5):1605-16.

Tagashira Y, Horiuchi M, Tokuda Y, Heist BS, Higuchi M, Honda H. Antimicrobial stewardship for carbapenem use at a Japanese tertiary care center: An interrupted time series analysis on the impact of infectious disease consultation, prospective audit, and feedback. *Am J Infect Control*. 2016;44(6):708-10.

Taggart LR, Leung E, Muller MP, Matukas LM, Daneman N. Differential outcome of an antimicrobial stewardship audit and feedback program in two intensive care units: a controlled interrupted time series study. *BMC Infect Dis*. 2015;15:480.

Takahashi Y, Takesue Y, Nakajima K, et al. Implementation of a hospital-wide project for appropriate antimicrobial prophylaxis. *J Infect Chemother*. 2010;16(6):418-23.

Takesue Y, Nakajima K, Ichiki K, et al. Impact of a hospital-wide programme of heterogeneous antibiotic use on the development of antibiotic-resistant Gram-negative bacteria. *J Hosp Infect*. 2010;75(1):28-32.

Takesue Y, Ohge H, Sakashita M, et al. Effect of antibiotic heterogeneity on the development of infections with antibiotic-resistant gram-negative organisms in a non-intensive care unit surgical ward. *World J Surg*. 2006;30(7):1269-76.

Talpaert MJ, Gopal rao G, Cooper BS, Wade P. Impact of guidelines and enhanced antibiotic stewardship on reducing broad-spectrum antibiotic usage and its effect on incidence of *Clostridium difficile* infection. *J Antimicrob Chemother*. 2011;66(9):2168-74.

Tamma PD, Avdic E, Keenan JF, et al. What Is the More Effective Antibiotic Stewardship Intervention: Preprescription Authorization or Postprescription Review With Feedback?. *Clin Infect Dis*. 2017;64(5):537-543.

Tang J, Long W, Yan L, et al. Procalcitonin guided antibiotic therapy of acute exacerbations of asthma: a randomized controlled trial. *BMC Infect Dis*. 2013;13:596.

Tang Y, Liu C, Zhang X. Public reporting as a prescriptions quality improvement measure in primary care settings in China: variations in effects associated with diagnoses. *Sci Rep*. 2016;6:39361.

Tängdén T, Eriksson BM, Melhus A, Svennblad B, Cars O. Radical reduction of cephalosporin use at a tertiary hospital after educational antibiotic intervention during an outbreak of extended-spectrum beta-lactamase-producing *Klebsiella pneumoniae*. *J Antimicrob Chemother*. 2011;66(5):1161-7.

Tavakoli-ardakani M, Ghassemi S, Alizadeh AM, Salamzadeh J, Ghadiani M, Ghassemi S. Effects of Pharmacist Intervention on the Utilization of Vancomycin in a Teaching Hospital. *Iran J Pharm Res*. 2015;14(4):1281-8.

Taylor JA, Kwan-gett TS, McMahon EM. Effectiveness of a parental educational intervention in reducing antibiotic use in children: a randomized controlled trial. *Pediatr Infect Dis J*. 2005;24(6):489-93.

Taylor JA, Kwan-gett TS, McMahon EM. Effectiveness of an educational intervention in modifying parental attitudes about antibiotic usage in children. *Pediatrics*. 2003;111(5 Pt 1):e548-54.

Tedeschi S, Trapani F, Giannella M, et al. An Antimicrobial Stewardship Program Based on Systematic Infectious Disease Consultation in a Rehabilitation Facility. *Infect Control Hosp Epidemiol*. 2017;38(1):76-82.

Teng CL, Achike FI, Phua KL, et al. Modifying antibiotic prescribing: the effectiveness of academic detailing plus information leaflet in a Malaysian primary care setting. *Med J Malaysia*. 2006;61(3):323-31.

Teng CB, Ng TM, Tan MW, et al. Safety and effectiveness of improving carbapenem use via prospective review and feedback in a multidisciplinary antimicrobial stewardship programme. *Ann Acad Med Singap*. 2015;44(1):19-25.

Teo J, Kwa AL, Loh J, Chlebicki MP, Lee W. The effect of a whole-system approach in an antimicrobial stewardship programme at the Singapore General Hospital. *Eur J Clin Microbiol Infect Dis*. 2012;31(6):947-55.

Thakkar K, Gilchrist M, Dickinson E, et al. A quality improvement programme to increase compliance with an anti-infective prescribing policy. *J Antimicrob Chemother*. 2011;66(8):1916-20.

Thamlikitkul V, Danchaivijitr S, Kongpattanakul S, Ckokloikaew S. Impact of an educational program on antibiotic use in a tertiary care hospital in a developing country. *J Clin Epidemiol*. 1998;51(9):773-8.

Thamlikitkul V, Apisitwittaya W. Implementation of clinical practice guidelines for upper respiratory infection in Thailand. *Int J Infect Dis*. 2004;8(1):47-51.

Thompson C, Zahradnik M, Brown A, Gina Fleming D, Law M. The use of an IV to PO clinical intervention form to improve antibiotic administration in a community based hospital. *BMJ Qual Improv Rep*. 2015;4(1)

Thursky KA, Buising KL, Bak N, et al. Reduction of broad-spectrum antibiotic use with computerized decision support in an intensive care unit. *Int J Qual Health Care*. 2006;18(3):224-31.

Tillekeratne LG, Bodinayake CK, Nagahawatte A, et al. Use of Rapid Influenza Testing to Reduce Antibiotic Prescriptions Among Outpatients with Influenza-Like Illness in Southern Sri Lanka. *Am J Trop Med Hyg*. 2015;93(5):1031-7.

Toth NR, Chambers RM, Davis SL. Implementation of a care bundle for antimicrobial stewardship. *Am J Health Syst Pharm*. 2010;67(9):746-9.

Torres FA, Pasarelli I, Cutri A, Ossorio MF, Ferrero F. Impact assessment of a decision rule for using antibiotics in pneumonia: a randomized trial. *Pediatr Pulmonol*. 2014;49(7):701-6.

Trautner BW, Kelly PA, Petersen N, et al. A hospital-site controlled intervention using audit and feedback to implement guidelines concerning inappropriate treatment of catheter-associated asymptomatic bacteriuria. *Implement Sci*. 2011;6:41.

Trautner BW, Grigoryan L, Petersen NJ, et al. Effectiveness of an Antimicrobial Stewardship Approach for Urinary Catheter-Associated Asymptomatic Bacteriuria. *JAMA Intern Med*. 2015;175(7):1120-7.

Tsuyuki RT, Nakagawa RS. The effect of pharmacy intervention on aminoglycoside costs. *Can J Hosp Pharm*. 1987;40(2):51-6.

Udomthavornsuk B, Tatsanavivat P, Patjanasoontorn B, et al. Intervention of inappropriate antibiotic use at a university teaching hospital. *J Med Assoc Thai*. 1991;74(10):429-36.

Ullman MA, Parlier GL, Warren JB, et al. The Economic Impact of Starting, Stopping, and Restarting an Antibiotic Stewardship Program: A 14-Year Experience. *Antibiotics (Basel)*. 2013;2(2):256-64.

Ulm L, Hoffmann S, Nabavi D, et al. The Randomized Controlled STRAWINSKI Trial: Procalcitonin-Guided Antibiotic Therapy after Stroke. *Front Neurol*. 2017;8:153.

Valerio M, Muñoz P, Rodríguez CG, et al. Antifungal stewardship in a tertiary-care institution: a bedside intervention. *Clin Microbiol Infect*. 2015;21(5):492.e1-9.

Valimba R, Liana J, Joshi MP, et al. Engaging the private sector to improve antimicrobial use in the community: experience from accredited drug dispensing outlets in Tanzania. *J Pharm Policy Pract*. 2014;7(1):11.

Valiquette L, Cossette B, Garant MP, Diab H, P  pin J. Impact of a reduction in the use of high-risk antibiotics on the course of an epidemic of *Clostridium difficile*-associated disease caused by the hypervirulent NAP1/027 strain. *Clin Infect Dis*. 2007;45 Suppl 2:S112-21.

Van buul LW, Van der steen JT, Achterberg WP, et al. Effect of tailored antibiotic stewardship programmes on the appropriateness of antibiotic prescribing in nursing homes. *J Antimicrob Chemother*. 2015;70(7):2153-62.

Van der does Y, Limper M, Schuit SC, et al. Higher diagnostic accuracy and cost-effectiveness using procalcitonin in the treatment of emergency medicine patients with fever (The HiTEMP study): a multicenter randomized study. *BMC Emerg Med*. 2016;16:17.

Van der velden AW, Kuyvenhoven MM, Verheij TJ. Improving antibiotic prescribing quality by an intervention embedded in the primary care practice accreditation: the ARTI4 randomized trial. *J Antimicrob Chemother*. 2016;71(1):257-63.

Van driel ML, Morgan S, Tapley A, et al. Changing the Antibiotic Prescribing of general practice registrars: the ChAP study protocol for a prospective controlled study of a multimodal educational intervention. *BMC Fam Pract*. 2016;17:67.

Van hees BC, De ruiters E, Wiltink EH, De jongh BM, Tersmette M. Optimizing use of ciprofloxacin: a prospective intervention study. *J Antimicrob Chemother*. 2008;61(1):210-3.

Van kasteren ME, Mannien J, Kullberg BJ, et al. Quality improvement of surgical prophylaxis in Dutch hospitals: evaluation of a multi-site intervention by time series analysis. *J Antimicrob Chemother*. 2005;56(6):1094-102.

Van niekerk AC, Venter DJ, Boschmans SA. Implementation of intravenous to oral antibiotic switch therapy guidelines in the general medical wards of a tertiary-level hospital in South Africa. *J Antimicrob Chemother*. 2012;67(3):756-62.

Van vliet M, Potting CM, Sturm PD, Donnelly JP, Blijlevens NM. How prompt is prompt in daily practice? Earlier initiation of empirical antibacterial therapy for the febrile neutropenic patient. *Eur J Cancer Care (Engl)*. 2011;20(5):679-85.

Velez RP, Becker KL, Davidson P, Sloan E. A quality improvement intervention to address provider behaviour as it relates to utilisation of CA-MRSA guidelines. *J Clin Nurs*. 2015;24(3-4):556-62.

Vellinga A, Galvin S, Duane S, et al. Intervention to improve the quality of antimicrobial prescribing for urinary tract infection: a cluster randomized trial. *CMAJ*. 2016;188(2):108-15.

Venugopal V, Lehmann CU, Diener-west M, Agwu AL. Longitudinal evaluation of a World Wide Web-based antimicrobial stewardship program: assessing factors associated with approval patterns and trends over time. *Am J Infect Control*. 2014;42(2):100-5.

Vercheval C, Gillet M, Maes N, et al. Quality of documentation on antibiotic therapy in medical records: evaluation of combined interventions in a teaching hospital by repeated point prevalence survey. *Eur J Clin Microbiol Infect Dis*. 2016;35(9):1495-500.

Vervloet M, Meulepas MA, Cals JW, Eimers M, Van der hoek LS, Van dijk L. Reducing antibiotic prescriptions for respiratory tract infections in family practice: results of a cluster randomized controlled trial evaluating a multifaceted peer-group-based intervention. *NPJ Prim Care Respir Med*. 2016;26:15083.

Vettese N, Hendershot J, Irvine M, Wimer S, Chamberlain D, Massoud N. Outcomes associated with a thrice-weekly antimicrobial stewardship programme in a 253-bed community hospital. *J Clin Pharm Ther*. 2013;38(5):401-4.

Vinnard C, Linkin DR, Localio AR, et al. Effectiveness of interventions in reducing antibiotic use for upper respiratory infections in ambulatory care practices. *Popul Health Manag*. 2013;16(1):22-7.

Vlahovic-palcevski V, Morovic M, Palcevski G. Antibiotic utilization at the university hospital after introducing an antibiotic policy. *Eur J Clin Pharmacol*. 2000;56(1):97-101.

Wang B, Jessamine P, Desjardins M, Toye B, Ramotar K. Direct mecA polymerase chain reaction testing of blood culture bottles growing Gram-positive cocci and the clinical potential in optimizing antibiotic therapy for staphylococcal bacteremia. *Diagn Microbiol Infect Dis*. 2013;75(1):37-41.

Wang HY, Chiu CH, Huang CT, et al. Blood culture-guided de-escalation of empirical antimicrobial regimen for critical patients in an online antimicrobial stewardship programme. *Int J Antimicrob Agents*. 2014;44(6):520-7.

Waters CD. Pharmacist-driven antimicrobial stewardship program in an institution without infectious diseases physician support. *Am J Health Syst Pharm*. 2015;72(6):466-8.

Wattal C, Goel N, Khanna S, Byotra SP, Laxminarayan R, Easton A. Impact of informational feedback to clinicians on antibiotic-prescribing rates in a tertiary care hospital in Delhi. *Indian J Med Microbiol*. 2015;33(2):255-9.

Webber EC, Warhurst HM, Smith SS, Cox EG, Crumby AS, Nichols KR. Conversion of a single-facility pediatric antimicrobial stewardship program to multi-facility application with computerized provider order entry and clinical decision support. *Appl Clin Inform*. 2013;4(4):556-68.

Weddle G, Goldman J, Myers A, Newland J. Impact of an Educational Intervention to Improve Antibiotic Prescribing for Nurse Practitioners in a Pediatric Urgent Care Center. *J Pediatr Health Care*. 2017;31(2):184-188.

Weiner SG, Brown SF, Goetz JD, Webber CA. Weekly E-mail reminders influence emergency physician behavior: a case study using the Joint Commission and Centers for Medicare and Medicaid Services Pneumonia Guidelines. *Acad Emerg Med*. 2009;16(7):626-31.

Weiss K, Blais R, Fortin A, Lantin S, Gaudet M. Impact of a multipronged education strategy on antibiotic prescribing in Quebec, Canada. *Clin Infect Dis*. 2011;53(5):433-9.

Welch HK, Nagel JL, Patel TS, et al. Effect of an antimicrobial stewardship intervention on outcomes for patients with *Clostridium difficile* infection. *Am J Infect Control*. 2016;44(12):1539-1543.

Welschen I, Kuyvenhoven MM, Hoes AW, Verheij TJ. Effectiveness of a multiple intervention to reduce antibiotic prescribing for respiratory tract symptoms in primary care: randomised controlled trial. *BMJ*. 2004;329(7463):431.

Wenisch JM, Equiluz-bruck S, Fudel M, et al. Decreasing *Clostridium difficile* infections by an antimicrobial stewardship program that reduces moxifloxacin use. *Antimicrob Agents Chemother*. 2014;58(9):5079-83.

Wentzel J, Van drie-pierik R, Nijdam L, Geesing J, Sanderman R, Van gemert-pijnen JE. Antibiotic information application offers nurses quick support. *Am J Infect Control*. 2016;44(6):677-84.

Wenzler E, Goff DA, Mangino JE, Reed EE, Wehr A, Bauer KA. Impact of rapid identification of *Acinetobacter Baumannii* via matrix-assisted laser desorption ionization time-of-flight mass spectrometry combined with antimicrobial stewardship in patients with pneumonia and/or bacteremia. *Diagn Microbiol Infect Dis*. 2016;84(1):63-68.

Westphal JF, Jehl F, Javelot H, Nonnenmacher C. Enhanced physician adherence to antibiotic use guidelines through increased availability of guidelines at the time of drug ordering in hospital setting. *Pharmacoepidemiol Drug Saf*. 2011;20(2):162-8.

White A, Schneider T. Improving compliance with prophylactic antibiotic administration guidelines. *AORN J*. 2007;85(1):173-80.

Wilde AM, Nailor MD, Nicolau DP, Kuti JL. Inappropriate antibiotic use due to decreased compliance with a ventilator-associated pneumonia computerized clinical pathway: implications for continuing education and prospective feedback. *Pharmacotherapy*. 2012;32(8):755-63.

Wilf-miron R, Ron N, Ishai S, Chory H, Abboud L, Peled R. Reducing the volume of antibiotic prescriptions: a peer group intervention among physicians serving a community with special ethnic characteristics. *J Manag Care Pharm*. 2012;18(4):324-8.

Willems L, Denckens P, Philips H, Henriquez R, Remmen R. Can we improve adherence to guidelines for the treatment of lower urinary tract infection? A simple, multifaceted intervention in out-of-hours services. *J Antimicrob Chemother.* 2012;67(12):2997-3000.

Willemssen I, Cooper B, Van buitenen C, Winters M, Andriesse G, Kluytmans J. Improving quinolone use in hospitals by using a bundle of interventions in an interrupted time series analysis. *Antimicrob Agents Chemother.* 2010;54(9):3763-9.

Wilson EJ, Nasrin D, Dear KB, Douglas RM. Changing GPs' antibiotic prescribing: a randomised controlled trial. *Commun Dis Intell Q Rep.* 2003;27 Suppl:S32-8.

Wirtz VJ, Herrera-patino JJ, Santa-ana-tellez Y, Dreser A, Elseviers M, Vander stichele RH. Analysing policy interventions to prohibit over-the-counter antibiotic sales in four Latin American countries. *Trop Med Int Health.* 2013;18(6):665-73.

Wong JR, Bauer KA, Mangino JE, Goff DA. Antimicrobial stewardship pharmacist interventions for coagulase-negative staphylococci positive blood cultures using rapid polymerase chain reaction. *Ann Pharmacother.* 2012;46(11):1484-90.

Wood ZH, Nicolsen NC, Allen N, Cook PP. Remote Antimicrobial Stewardship in Community Hospitals. *Antibiotics (Basel).* 2015;4(4):605-16.

Woodward RS, Medoff G, Smith MD, Gray JL. Antibiotic cost savings from formulary restrictions and physician monitoring in a medical-school-affiliated hospital. *Am J Med.* 1987;83(5):817-23.

Worrall G, Kettle A, Graham W, Hutchinson J. Postdated versus usual delayed antibiotic prescriptions in primary care: Reduction in antibiotic use for acute respiratory infections?. *Can Fam Physician.* 2010;56(10):1032-6.

Wu CT, Chen CL, Lee HY, et al. Decreased antimicrobial resistance and defined daily doses after implementation of a clinical culture-guided antimicrobial stewardship program in a local hospital. *J Microbiol Immunol Infect.* 2017;50(6):846-856.

Wu G, Wu G, Wu S, Wu H. Comparison of Procalcitonin Guidance-Administered Antibiotics with Standard Guidelines on Antibiotic Therapy in Children with Lower Respiratory Tract Infections: A Retrospective Study in China. *Med Princ Pract.* 2017;26(4):316-320.

Wutzke SE, Artist MA, Kehoe LA, Fletcher M, Mackson JM, Weekes LM. Evaluation of a national programme to reduce inappropriate use of antibiotics for upper respiratory tract infections: effects on consumer awareness, beliefs, attitudes and behaviour in Australia. *Health Promot Int.* 2007;22(1):53-64.

Yam P, Fales D, Jemison J, Gillum M, Bernstein M. Implementation of an antimicrobial stewardship program in a rural hospital. *Am J Health Syst Pharm.* 2012;69(13):1142-8.

Yang L, Liu C, Wang L, Yin X, Zhang X. Public reporting improves antibiotic prescribing for upper respiratory tract infections in primary care: a matched-pair cluster-randomized trial in China. *Health Res Policy Syst.* 2014;12:61.

Yeo CL, Wu JE, Chung GW, Chan DS, Fisher D, Hsu LY. Specialist trainees on rotation cannot replace dedicated consultant clinicians for antimicrobial stewardship of specialty disciplines. *Antimicrob Resist Infect Control.* 2012;1(1):36.

Yeo CL, Chan DS, Earnest A, et al. Prospective audit and feedback on antibiotic prescription in an adult hematology-oncology unit in Singapore. *Eur J Clin Microbiol Infect Dis.* 2012;31(4):583-90.

Yeo JM. Antimicrobial stewardship: Improving antibiotic prescribing practice in a respiratory ward. *BMJ Qual Improv Rep.* 2016;5(1)

Yinnon AM, Skorohod Y, Schlesinger Y, Greenberg A. Cefuroxime utilization evaluation: impact of physician education on prescribing patterns. *Isr Med Assoc J.* 2000;2(3):187-91.

Yu K, Rho J, Morcos M, et al. Evaluation of dedicated infectious diseases pharmacists on antimicrobial stewardship teams. *Am J Health Syst Pharm.* 2014;71(12):1019-28.

Zabarsky TF, Sethi AK, Donskey CJ. Sustained reduction in inappropriate treatment of asymptomatic bacteriuria in a long-term care facility through an educational intervention. *Am J Infect Control*. 2008;36(7):476-80.

Zahabiyoun S, Sahabi M, Kharazi MJ. Improving Knowledge of General Dental Practitioners on Antibiotic Prescribing by Raising Awareness of the Faculty of General Dental Practice (UK) Guidelines. *J Dent (Tehran)*. 2015;12(3):171-6.

Zamin MT, Pitre MM, Conly JM. Development of an intravenous-to-oral route conversion program for antimicrobial therapy at a Canadian tertiary care health facility. *Ann Pharmacother*. 1997;31(5):564-70.

Zamora-flores D, Busen NH, Smout R, Velasquez O. Implementing a clinical practice guideline for the treatment of bronchiolitis in a high-risk Hispanic pediatric population. *J Pediatr Health Care*. 2015;29(2):169-80.

Zhanel GG, Gin AS, Przybylo A, Louie TJ, Otten NH. Effect of interventions on prescribing of antimicrobials for prophylaxis in obstetric and gynecologic surgery. *Am J Hosp Pharm*. 1989;46(12):2493-6.

Zhang X, Rowan N, Pflugeisen BM, Alajbegovic S. Urine culture guided antibiotic interventions: A pharmacist driven antimicrobial stewardship effort in the ED. *Am J Emerg Med*. 2017;35(4):594-598.

Zhou L, Ma J, Gao J, Chen S, Bao J. Optimizing Prophylactic Antibiotic Practice for Cardiothoracic Surgery by Pharmacists' Effects. *Medicine (Baltimore)*. 2016;95(9):e2753.

Zhou WJ, Luo ZN, Tang CM, Zou XX, Zhao L, Fang PQ. Is there an improvement of antibiotic use in China? Evidence from the usage analysis of combination antibiotic therapy for type I incisions in 244 hospitals. *J Huazhong Univ Sci Technol Med Sci*. 2016;36(5):772-779.

Zhou Y, Ma LY, Zhao X, Tian SH, Sun LY, Cui YM. Impact of pharmacist intervention on antibiotic use and prophylactic antibiotic use in urology clean operations. *J Clin Pharm Ther*. 2015;40(4):404-8.

Zimmerman S, Sloane PD, Bertrand R, et al. Successfully reducing antibiotic prescribing in nursing homes. J Am Geriatr Soc. 2014;62(5):907-12.

Zoebelein E, Levy M, Greenwald RA. The effect of quality assurance review on implementation of an automatic stop-order policy. QRB Qual Rev Bull. 1982;8(8):12-7.

Zou G, Wei X, Hicks JP, et al. Protocol for a pragmatic cluster randomised controlled trial for reducing irrational antibiotic prescribing among children with upper respiratory infections in rural China. BMJ Open. 2016;6(5):e010544.

Zou XX, Fang Z, Min R, et al. Is nationwide special campaign on antibiotic stewardship program effective on ameliorating irrational antibiotic use in China? Study on the antibiotic use of specialized hospitals in China in 2011-2012. J Huazhong Univ Sci Technol Med Sci. 2014;34(3):456-63.

Zahar JR, Rioux C, Girou E, et al. Inappropriate prescribing of aminoglycosides: risk factors and impact of an antibiotic control team. J Antimicrob Chemother. 2006;58(3):651-6.

Zwar NA, Gordon JJ, Sanson-fisher RW. Evaluation of an educational program in rational prescribing for GP trainees. Aust Fam Physician. 1995;24(5):833-8.