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Evaluation of the impact of antimicrobial stewardship program (ASP) at a large district hospital in the UK: implementation of ASP recommendations, clinical outcomes and unintended adverse consequences

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Background: The growing problem of antimicrobial resistance has led to calls for antimicrobial stewardship programs (ASP) to control antibiotic use in healthcare settings. The primary goal of ASP is to optimize clinical outcomes and minimize unintended consequences such as *Clostridium difficile* infection. We implemented an intensified ASP in one of the UK's large district hospitals in April 2016. The aim of this study is to assess (i) the compliance of the clinical team with recommendations of antimicrobial stewardship team (AST) (ii) the impact of ASP on patients' outcomes including length of stay (LoS), mortality rate, clostridium difficile rates and readmissions with particular focus on individual patients reviewed by AST.

Material/methods: Our ASP was intensified in April 2016 and an initiative to reduce meropenem consumption was introduced. Pharmacy records were used to collect information on patients on antibiotics. Microbiology data, radiological imaging and blood tests were reviewed prior to ward rounds. Data on type of stewardship intervention, antibiotic prescribed, indication, and review date were collected. To assess any unintended consequences of AST interventions, patient outcomes were compared in the period prior and after the intensified ASP including LoS, readmission, mortality and *Clostridium difficile* rates. We evaluated the compliance of the clinical team with AST interventions and we also focused on clinical outcome at individual patient level including readmission within 28 days of discharge by retrospectively reviewing discharge letters of patients who have been advised one of the following: (1) stop, (2) de-escalate or (3) switch to oral antibiotics. Data on antibiotic consumption were also collected.

Results: We reviewed a total of 358 antibiotic courses on 255 patients. Two hundreds courses (56 %) were subject to one or more of interventions number 1, 2 and 3. We reviewed discharge letters of these patients and we excluded 89 courses where clear documentation about antibiotic duration was not found. In Total, 82% of recommendations made by AST were implemented by the clinical team. At individual level, none of these patients has recommenced on antibiotics or has been readmitted within 28 days for the same infection episode with the exception of one patient. LoS, total readmission and inpatient mortality rate were not significantly different between the two periods. Less patients developed *Clostridium difficile* infection post intervention. Our total antibiotic, tazocin and meropenem consumptions were reduced by 7%, 41% and 31 % respectively

Conclusions: Patient outcomes need to be a key component of ASP evaluation to ensure attainment of the primary goal of ASP. Our study showed that our ASP achieved its primary goal and did not result in unintended adverse consequences. The choice of optimum metric to adequately capture the impact of ASP on clinical outcomes in the presence of limited resources warrant further consideration.