INTRODUCTION

- Antibiotic resistance is increasing. It is a major patient safety issue, and a public health priority.
- Resistant strains are associated with increases in length of hospital stay, cost of care, morbidity and mortality.
- Studies in primary care – facilitated by many years of electronic prescribing systems – have clearly demonstrated an association between antibiotic use and the development of resistance at the patient level. Contrariwise, restricting use may be associated with a decline in resistance.
- There is a dearth of such patient level studies conducted with healthcare institutions, yet hospitals are the biggest consumers of the very broad spectrum agents used for the treatment of resistant organisms. Inappropriate use of such drugs is associated with the development of highly resistant, near-untreatable, bacterial strains.
- It is vital that we improve our understanding of this phenomenon within hospitals at the patient level if we are to implement evidence-based measures to help guide empirical antibiotic selection, prevent the emergence of resistance and slow the emergence of resistance.
- Heart of England NHS FT was among the first secondary care users of electronic prescribing in the UK. It has been used throughout the organisation for 8 years.
- We examined antibiotic use and Gram-negative bacterial resistant in all samples from people admitted to our institution over an 8 year period. We looked at temporal changes in the use of antibiotics and identified risk factors associated with the emergence of resistant organisms.

METHODS

- We extracted and anonymised basic demographics, previous admissions dates, and electronic prescribing data for all patients from whom E. coli, K. pneumoniae, or Ps. aeruginosa were isolated over a 7 year period.
- This represented 57,350 patient admissions of which 10,440 had associated electronic prescribing data.
- Antibiotic sensitivity was expressed as “defined daily dose”, calculated as described by World Health Organisation methodology.
- Antibiotic sensitivity data was separated into that from samples taken within 48 hours of admission and those taken over 48 hours after admission.
- There was no detectable relationship between prescribing trends and change in bacterial antibiotic resistance.
- Logistic regression was used to identify factors from demographic, coding and prescribing data that were associated with isolation of organisms resistant to either co-amoxiclav or piperacillin-tazobactam.

RESULTS

Is increasing piperacillin/tazobactam use in response to increasing resistance to co-amoxiclav?

- The Granger causality test was used to test for relationships between prescribing trends and change in bacterial antibiotic resistance.

What factors are associated with isolation of a co-amoxiclav or piperacillin-tazobactam resistant isolate?

- Logistic regression was used to identify factors associated with isolation of a resistant organism (table 1).

CONCLUSIONS

- Co-amoxiclav use remained steady over the 7 years observed. Piperacillin-tazobactam use increased by 39% between 2010 and 2016. This was not explained by any increase in resistance to either agent over this period and laboratory testing did not show any significant relationship between changes in antibiotic use and subsequent development of resistance, or vice versa.

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