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Research paper

Reducing inappropriate third-generation cephalosporin use for community-acquired pneumonia in a small Australian emergency department

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KEYWORDS

Prescribing;
Antibiotics;
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Abstract *Background:* Antimicrobial stewardship is a key component of hospital accreditation in Australia and contributes to the prevention and containment of antimicrobial resistance. The *Second Australian Report on Antimicrobial Use and Resistance in Human Health* (AURA Report) 2017 calls for greater participation by small hospitals in antimicrobial stewardship activities. Community acquired pneumonia (CAP) and third generation cephalosporin (3GCs) use is a known target for intervention. This paper reports the results of an educational intervention for reducing inappropriate prescribing of 3GCs in the empiric treatment of CAP.

Methods: The intervention was based on a leadership and education campaign in an Emergency Department (ED) in a 96 bed acute rural hospital in New South Wales, Australia. A two-point retrospective audit within (April–June 2010, April–June 2011) was conducted comparing pre-intervention and post-intervention antibiotic prescribing trends for CAP from ED presentations. Data was collected via audit tool and appropriateness was assessed against endorsed guidelines. The main outcome measures were improved prescribing appropriateness and decreased utilisation.

Results: Whilst statistically insignificant, a reduction (6.4%) in inappropriate prescribing and a reduction in 3GC utilisation (16.7%) was demonstrated.

Conclusion: Small hospitals have active contributions to make to prevent and contain antimicrobial resistance via antimicrobial stewardship. The challenge is collecting this data for national data sets whilst instituting local benefits in the context of limited resources. Our results suggest change can occur in antibiotic prescribing, studies such as this model a targeted strategy for resource poor facilities to contribute to national AU data whilst instituting local AMS change.

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Highlights

- This article reports successful AMS in Emergency Dept. pneumonia treatment.
- Discusses challenges facing small hospitals in meeting national AMS requirements.
- Proposes avenues to engage small hospitals in AMS at the national level.
- Addresses the Australian Report on Antimicrobial Use and Resistance in Human Health.

Introduction

Antimicrobial Stewardship (AMS) has become a key component of hospital accreditation in the Australian health care sector as part of the National Safety and Quality Health Service Standards established by the Australian Commission on Safety and Quality in Health Care [1]. In particular *Standard 3 – Preventing and Controlling Healthcare Associated Infections* prescribes that all hospitals must have in place an AMS system that governs and measures local antimicrobial use [2]. Strategies for monitoring antimicrobial usage included point prevalence surveys and contribution of data to state-wide or national usage programs [2]. Implementing such a system presents a unique challenge for small rural hospitals with limited specialist skills and resources in this area.

The *Second Australian Report on Antimicrobial Use and Resistance in Human Health* (2017 AURA Report) references two main data sources for information on antimicrobial use in the Australian acute hospital context. The volume of antimicrobial use (AU) in Australia is predominately collated by the National Antimicrobial Utilisation Surveillance Program (NAUSP), and the appropriateness of antimicrobial prescribing via the National Antimicrobial Prescribing Survey (NAPS) [3]. Both data sets are obtained via voluntary audit and submission from participating hospitals. The 2016 AURA report highlights significant gaps in the representation of national AU from these systems due to minimal participation of small public hospitals and private hospitals [4]. Although improved participation from hospitals was noted in AURA 2017 [3]. NAUSP data in particular was noted to be heavily weighted towards principal referral and large public hospitals where AMS activity is well established in both reports [3,4]. NAPS data has had steady increases in participation but is heavily reliant on clinical pharmacist resources with 60.8% of NAPS auditors being pharmacists and inter-rater reliability indicating that appropriateness assessments are best conducted by AMS teams or this pharmacist group [5]. In addition NAPS methodology of whole hospital point prevalence surveys is not well suited to small hospital bed numbers and the required repeated point prevalence (continued survey to meet a minimum 30 antimicrobial prescriptions) is noted by this study's authors of being onerous on limited resources in the small rural hospital setting [5]. This statement is supported by feedback collated by the NAPS team indicating that regional and remote hospitals required more than a

week to complete the survey and greater than 20% of participants required greater than a month to complete the patient survey due to participant numbers [5].

This study describes a practice change initiative initiated in a small rural hospital emergency department (ED) that was deemed achievable in the context of limited AMS resources and lack of specialist AMS clinicians. At the time of this study NAPS was still in the pilot phase and NAUSP was unable to accommodate small rural hospitals in their data collection or benchmarking. Greater resourcing has now allowed for enhanced participation in NAUSP reporting from smaller hospitals in response to the findings from AURA 2016 [3]. A targeted educational intervention against a known broad spectrum group (third generation cephalosporins (3GCs)), for a well-defined presentation (community acquired pneumonia (CAP)) was determined to be an appropriate place to invest limited clinical pharmacy and infection prevention and control resources.

This study aimed to measure the impact of a small scale educational intervention on antibiotic prescribing. The goal of the intervention was to reduce the inappropriate prescribing of 3GCs in CAP for patients presenting to the ED.

Methods

Setting

The study was conducted in a 97 bed acute rural hospital located in northern New South Wales, Australia. In 2010 there were 7697 ED triaged presentations in the 7 bed department. The ED is staffed 24/7 with medical staff directed by a Fellow of the Australian College of Emergency Medicine (FACEM). Most admitted patients are cared for medically by visiting medical officers (VMO) and locum doctors. Antimicrobial formulary is non-restrictive, any credentialed doctor can prescribe a formulary antimicrobial. Previous unpublished studies in the facility had revealed only slight improvements in relation to the prescribing of Antimicrobials for the diagnosis of CAP.

Inclusion and exclusion criteria

Study cohorts were drawn retrospectively within two timeframes (April–June 2010 & April–June 2011) from ED presentations pre and post intervention. Medical records with a diagnosis of CAP were extracted using 'The International

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