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Research paper

Targeting antimicrobial stewardship in hospitalised patients with community-acquired pneumonia within 24 h of admission

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Abstract *Background:* Over-prescribing in patients with respiratory tract infections is common in Australian hospitals. Senior registrar stewardship input within 24 h of admission in hospitalised patients was assessed to determine if this would improve appropriateness.
Methods: Interventional, non-randomised, case-controlled study over six-month period. Patients diagnosed with pneumonia admitted under General Medicine were discussed at morning handover and assessed by a senior registrar within the first 24 h of admission with real-time stewardship feedback provided. Controls did not receive stewardship advice. Appropriateness of antibiotic use was assessed using Therapeutic Guidelines.
Results: In total, 48 patients had an intervention with 49 controls. Ceftriaxone-based regimens were the most commonly prescribed (control 63%; pre-intervention 70%; post-intervention 51%). The senior registrar recommended changes in 26 patients (55%) with 71% uptake of recommendations. The most common recommendation was de-escalation from ceftriaxone-regimen in patients with CORB scores of 0 and 1 (79%; n = 16/20). Post-intervention antibiotic prescribing improved from <5% to 50% in patients with CORB scores of 0 and 1 (p-value <0.05).
Conclusion: Our results demonstrate that involvement of a senior registrar embedded in the treating team is effective in providing timely advice to influence common hospital over-prescribing in patients with pneumonia. This enhances other antimicrobial stewardship activities such as electronic approval systems and dedicated post-prescribing rounds by Antimicrobial Stewardship team.

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Highlights

- Stewardship activities provided by senior registrars embedded in General Medicine teams are effective in reducing inappropriate antimicrobial prescribing.
- Overprescribing of ceftriaxone is common, with narrower-spectrum regimens being, efficacious with no increase in patient length of stay.
- Promoting prescribing algorithms and guidelines at the morning handover by the senior registrar was time-efficient in encouraging appropriate prescribing.

Introduction

Community-acquired pneumonia (CAP) is defined as an acute infection of the pulmonary parenchyma occurring in a patient who has acquired the infection in the community [1]. In Australia, CAP accounts for an estimated 2% of all Australian hospitalisations [2]. In 2012, approximately 2500 deaths in Australia were attributed to pneumonia [3]. Residential age care residents are ten times more susceptible to pneumonia and admitted to hospital 30 times more often compared to older adults in community [4]. The 2014—2015 National Antibiotic Prescribing Survey results revealed that CAP was the second most common indication for antibiotic prescribing in Australian hospitals, following surgical prophylaxis; and accounted for the most common cause of inappropriate prescribing [5].

In the Australian Community-Acquired Pneumonia Study, the most common aetiologies of pneumonia were viruses, *Streptococcus pneumoniae* and *Mycoplasma pneumoniae* [6] while in residential age care facility residents *S. pneumoniae,* followed by gram negative bacilli, *Staphylococcus aureus* and respiratory viruses were common [4]. The rates of atypical pathogens (Legionella, Chlamydia and Mycoplasma) were low in residential age care residents [4].

Antimicrobial stewardship (AMS) measures have been recognised to be effective in improving compliance with treatment guidelines and shortening the duration of therapy for community-acquired pneumonia [7,8]. At Angliss Hospital, clinicians have access to national antibiotic guidelines (Therapeutic Guidelines) [1] and local guidelines. Ceftriaxone is restricted to prescribers using an electronic antibiotic approvals system. Post-prescribing reviews by the AMS team are also performed twice weekly.

We hypothesised that, like other health services [11—14], despite the implementation and promotion of prescribing guidelines and regular post-prescribing reviews, adherence to the prescribing guidelines was suboptimal, especially at the time of antibiotic initiation.

A pilot project using a senior registrar embedded in the treating team to promote community-acquired pneumonia antimicrobial prescribing algorithms and guidelines at morning handover and within the first 24 h of admission was undertaken. The aim of this project was to support initial management of pneumonia with the goals of (1) identifying the best strategy to identify patients in a timely fashion, (2) assess appropriate prescribing of initial antibiotics, (3) provide feedback and education to prescribers, (4) monitor uptake of recommendations and (5) determine impact, if any, on length of stay. It was planned to incorporate these into the usual workflow.

Methods

Setting

This study was conducted at Angliss Hospital, a suburban in Victoria, Australia with 200 bed-occupancy serving a population of 150,000. It is equipped with an emergency department (ED), a high-dependency unit [9], a Hospital in the Home (HITH) program and six-day-a week in-patient pharmacy support.

Study design

This study was designed as a interventional, non-randomised, case-controlled study. Prior agreement was sought from stakeholders before the project initiation including the onsite general medicine director. Patients presented with CAP to the emergency department were either admitted under the General Medicine, short-stay unit in ED, HITH or were discharged. Patients admitted with pneumonia to the ward within the 24 h were assessed by the advanced trainee in the dual role of senior registrar and infectious diseases registrar (CB) who was on-site five-days a week during the working hours. Patients identified were discussed with CB during the morning handover in a stewardship setting and when directly reviewed later in the day. Real-time feedback was provided to the treating doctors, using an algorithm which took into consideration the patient's co-morbidities, recent antimicrobials, allergies and CORB score (defined in Table 3 where a score of 2 or more predicts the need for invasive ventilator or respiratory support) [16].

Selection of participants

Adult patients admitted with community-acquired pneumonia from 1st February 2016 to 31st of July 2016 who received stewardship advice from the senior registrar were included in the intervention group. Controls were identified by data on patients presenting to Angliss Hospital between 1st February 2016 to 31st of July 2016 with the Australian Refined Diagnosis Related Group (AR-DRG), ICD-10 primary diagnosis indicative of bronchopneumonia, unspecified (J18.0) and pneumonia, unspecified (J18.9). There was a

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