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Title: Investigations into the use of macrolides in Community Acquired Pneumonia

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Introduction:

Recent Canterbury District Health Board (CDHB) guideline changes around the use of macrolides (clarithromycin, azithromycin, roxithromycin and erythromycin) in the treatment of Community Acquired Pneumonia (CAP) kicked off a campaign in December 2013 to encourage the use of oral azithromycin instead of intravenous (IV) clarithromycin and if used an early switch to azithromycin after a single stat dose. The campaign comprised of 20 CDHB wide presentations to doctors, pharmacists and nurses as well as bulletins, posters and a change in macrolide ward stock. This campaign aimed to bring the CDHB in line with PHARMAC's Hospital Medicines List (HML) and in addition azithromycin has been shown to have many superior advantages over other macrolides including better tissue penetration, shorter duration of treatment required, less adverse reactions and drug interactions as well as being more cost effective.

The use of macrolide antibiotics in CAP are usually limited to suspected atypical pneumonias or those with high severity scores. Severity scores are important in guiding clinical decision making in the treatment of CAP. The CURB-A score is the primary severity estimator in CAP and measures the following parameters; confusion, urea, respiratory rate, blood pressure and age, with a maximum score of 5 indicating very severe pneumonia. If prescribing a macrolide antibiotic CDHB guidelines now recommend that patients with mild to moderate CAP (CURB-A: 0 – 2) receive oral azithromycin and the use of IV clarithromycin be reserved for those with severe to very severe CAP (CURB-A: 3 – 5).

Systemic Inflammatory Response Syndrome (SIRS) is a more general severity indicator that measures temperature, heart rate, respiratory rate and white blood cell count; a patient must meet at least two of these criteria. While SIRS is not a severity indicator tool specific for CAP it also provides the clinician useful information about the severity of the illness, and may be used to guide clinical decision making.

Aim:

To investigate the pattern of Macrolide use in patients with CAP both pre (May/June 2013) and post (May/June 2014) CDHB Macrolide campaign (Dec 2013 – April 2014).

Method:

Patients with a discharge diagnosis of CAP during the periods May/June 2013 and 2014 were identified using the CDHB decision support system prior to commencement of this project. Patients were included if they had a primary discharge diagnosis of CAP (as reported on the relevant discharge summary), were aged 15 years or older and received a macrolide antibiotic during their admission. This information was gathered from electronic (Health Connect South) and hard copy patient files. If included in the study the following parameters were also collected and recorded in an excel spreadsheet: demographics, hospital admission information, macrolide(s) including duration and time to treatment, CURB-A parameters, SIRS criteria and investigations. Data was then analysed using Microsoft Excel.

Results:

The Cohorts: In 2013 a total of 272 patients were identified from the CDHB decision support system; of these 206 were excluded from the study as they did not meet the inclusion criteria (Primary diagnosis of CAP, aged at least 15 years and treated with a macrolide) or their hard copy notes were unobtainable (n = 3). This left a total of 66 patients who were included in the 2013 cohort for analysis. In 2014 there were 395 CAP patients identified of which 285 were excluded as they did not meet the inclusion criteria or their files were unobtainable (n= 2), resulting in a cohort of 110 patients for analysis.

Demographics: Patient demographics between the 2013 and 2014 cohorts were similar with the average patient age at admission being 67 years (2013) and 68 years (2013), close to a 1:1 ratio of male and female patients and the majority of patients were of NZ European ethnicity in both cohorts (2013: 60.6%, 2014: 58.2%).

Investigations: Chest x-rays were completed in all but one patient in 2013, a small minority of these found no radiological evidence of pneumonia (2013: 7.2%, 2014: 10.9%), these patients were treated on clinical grounds. Bacterial pathogens were identified in 27% of patients in 2013 and 33% of patients in 2014, with the most common pathogen being *Streptococcus pneumonia* (32% of all patients).

Antibiotic use: The use of oral macrolides changed dramatically from 2013 to 2014; in 2013 there was a greater variety used with 54.5% of patients receiving oral clarithromycin and 40.9% receiving roxithromycin compared to 2014 where the vast majority of patients were treated with oral azithromycin (93.6%). Intravenous clarithromycin use showed a dramatic 36.3% reduction in use from 54.5% (2013) to 18.2% (2014) pre and post campaign. The way in which IV clarithromycin was used also changed between cohorts; there was in increase in those who received a single stat dose in 2014 from 34% to 50% and the average duration of treatment decreased from 2.27 days (range 1 – 6) to 1.55 days (1 – 3) in the post campaign cohort. Of those that were treated with a single stat dose 58% (2013) and 80% (2014) were then switched to an oral macrolide (2013: 42.9% oral clarithromycin, 57.1% roxithromycin; 2014: 100% azithromycin). When analysed by CURB-A score IV clarithromycin use increased with severity in both cohorts as expected. However in 2013 46.9% of patients with mild to moderate CAP (CURB-A 0 – 2) were treated with IV clarithromycin compared to only 13.6% in 2014; a 33.3% reduction. Likewise in 2014 53.1% of patients with severe to very severe CAP received IV clarithromycin compared to 36.4% in 2014.

Conclusion:

A CDHB wide guideline change for the use of macrolide antibiotics and a campaign to drive this change in December 2013 encouraged the use of oral azithromycin to treat CAP instead of IV clarithromycin which would be reserved for severe cases. This shift in macrolide use aimed to bring the CDHB into line with PHARMAC's Hospital Medicines List (HML), while promoting the superior advantages of azithromycin compared to other oral macrolides and IV clarithromycin. As a result this campaign 2014 saw a shift in oral macrolide use; from a variety of macrolides to azithromycin being the macrolide of choice, used in 93.6% of CAP patients in 2014. It also saw a 36.3% reduction in the use of IV clarithromycin and a 33.3% reduction of IV clarithromycin use in those with mild to moderate CAP. In addition to this in 2014 of the 50% of patients treated with a single stat dose of IV clarithromycin 80% were switched to oral azithromycin keeping in line with guideline changes. In conclusion this study has shown the CDHB wide campaign to be effective in changing the use of macrolide antibiotics in the treatment of CAP, which may result in cost saving and better patient outcomes.