Antibiotic management of community acquired aspiration pneumonia in the ICU: how much piperacillin/tazobactam is too much?

Catherine George, Miriam Storti, Melissa Ankravs

Pharmacy Department, The Royal Melbourne Hospital, Melbourne VIC

Introduction

Within the Royal Melbourne Hospital (RMH) Intensive Care Unit (ICU), there have been reports of an increased use of piperacillin/tazobactam as the empiric antibiotic of choice for the treatment of community-acquired aspiration pneumonia in patients where hospital presentation has involved the aspiration of gastric contents, most commonly during a period of reduced conscious state.

Piperacillin/tazobactam is not recommended as a first line empiric therapy for community-acquired aspiration pneumonia in the *Therapeutic Guidelines: Antibiotic Version 15*.

In ICU, however, the exact cause of a patient's deterioration may not be well defined in the early phase of hospitalisation, and local guidelines recommend piperacillin/tazobactam for the empiric treatment of sepsis from an unknown source.

Determining which patients should be prescribed piperacillin/tazobactam for potential sepsis, versus those who require less broad-spectrum antibiotic therapy for aspiration pneumonia is challenging.

Aim

- Describe the antibiotic therapy patients receive for community-acquired aspiration pneumonia in the ICU setting;
- Characterise the features of ICU patients receiving piperacillin/tazobactam compared with those receiving less broad-spectrum therapy for the treatment of community-acquired aspiration pneumonia

Methods

A retrospective audit was conducted of medical records of patients with community-acquired aspiration pneumonia who were transferred to ICU.

Inclusion criteria:
- Antibiotic therapy commenced within 48 hours of hospital admission and received in the ICU
- For those transferred to RMH from another hospital, patient transfer to RMH was within 24 hours of initial hospital presentation *and* antibiotic commencement within 48 hours of initial hospital admission

Exclusion criteria:
- Recent hospital discharge in the preceding two weeks.

Patients were primarily identified using coding data between 1st January 2016 and 30th June 2016 and this process was cross-checked using routinely collected Antimicrobial Stewardship records of patient's indications for antimicrobial therapy.

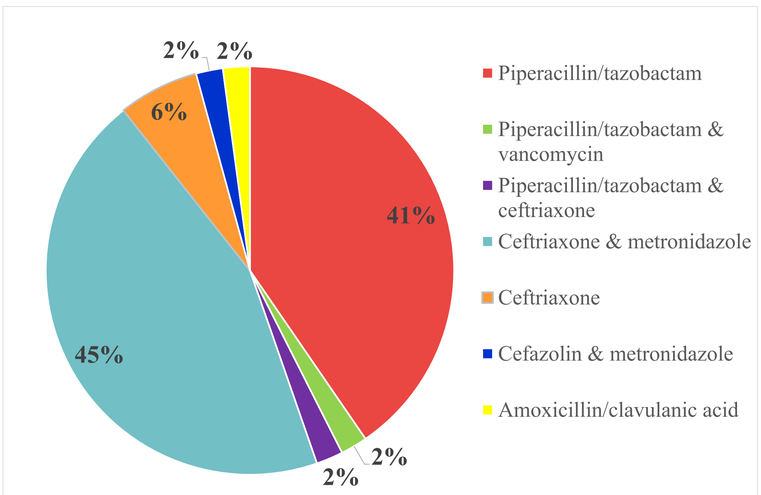
Data was collected from scanned electronic medical records, pathology information system, Australian and New Zealand Intensive Care Society (ANZICS) database, and Synapse (radiology records) and entered into an Excel data collection tool.

The results were assessed using descriptive statistics.

Results

A total of 47 patients were identified for inclusion in the study. The most common reasons for ICU admission were trauma, cardiac arrest, overdose, and stroke.

Figure 1: The breakdown of antibiotic regimens prescribed



Patients were categorised into one of two groups determined by the antibiotic regimen they received:

Standard therapy group (55%, n=26): For patients with severe disease, defined by requiring ICU support and/or intubation, the recommended treatment in the *Therapeutic Guidelines* is ceftriaxone plus metronidazole. Patients were assigned to this group if they received this combination or narrower spectrum therapy.

Broader spectrum therapy group (45%, n=21): patients who received piperacillin/ tazobactam or broader therapy were assigned to this group.

In order to determine and compare the severity of infection a number of parameters within 24 hours of antibiotic commencement were recorded:

Table 1: Comparison of severity parameters between two groups

Parameter	**Broad spectrum** (n=21)	**Standard therapy** (n=26)
Lactate mmol/L - median (range)	2.2 (0.8-11.1)	2.4 (0.8-19.0)
CRP mg/L - median (range)	41.1 (0.7-219.2)	75 (2.3-501.3)
WCC x10^9 peak - median (range)	17.7 (8.3-30.7)	13.7 (3.7-30.8)
SBPmmHg lowest - median(range)	61 (53-86)	67 (54-83)
HR bpm peak - median (range)	108 (65-170)	104.5 (58-159)
RR rpm peak - median (range)	20 (18-39)	20.5 (14-46)
Temp °C peak - median (range)	37.8 (34.2-39.4)	37.8 (35.8–41.5)
Vasopressor requirement (n, %)	11 patients (52%)	9 patients (35%)

Importantly, ***none*** of the patients in this study had any documentation of presence of colonisation with multi-drug resistant organisms in the sputum, travel to a high risk area in the previous 12 months, or residence in a high level care facility.

Table 2: Other factors which may influence antibiotic choice

	Broader spectrum therapy (n=21)	**Standard therapy** (n=26)
History of chronic respiratory disease, n (%)		
Yes	4 (19)	0 (0)
No	17 (81)	26 (100)
Presence of immunosuppression, n (%)		
Yes	2 (9.52)	0 (0)
No	19 (90.48)	26 (100)
Required non-invasive ventilation in first 48 hours of admission, n (%)		
Yes	0 (0)	1 (3.85)
No	21 (100)	25 (96.15)
Required intubation in first 48 hours of hospital admission, n (%)		
Yes	20 (95.24)	23 (88.46)
No	1 (4.76)	3 (11.54)

Chest x-ray(s) on the day of antibiotic commencement and, if available, on the day after antibiotic commencement were assessed by a blinded intensivist. Each chest x-ray was analysed for its consistency with a diagnosis of aspiration pneumonia.

Table 3: Chest x-ray assessments

	Broad spectrum therapy	**Standard therapy**
Chest x-ray on D0 antibiotic commencement consistent with aspiration pneumonia, n (%)		
Yes	12 / 21 (57.14)	11 / 26 (42.31)
No	9 / 21 (42.86)	15 / 26 (57.69)
Chest x-ray on D1 post antibiotic commencement consistent with aspiration pneumonia, n (%)		
Yes	7 / 19 (36.84)	9 / 23 (39.13)
No	12 / 19 (63.16)	14 / 23 (60.87)

Table 4: Identification of other possible sources of sepsis

	Broad spectrum	**Standard therapy**
Other possible sources of sepsis identified	8 (38.1%)	10 (38.5%)

Other potential sources of sepsis included open fractures and contaminated wounds post trauma, suspected community-acquired pneumonia, suspected urosepsis and meningitis.

Discussion

Of the 47 patients, roughly half (55%) received standard antimicrobial therapy in accordance with current guidelines for the treatment of community-acquired aspiration pneumonia.

The two groups appeared similar across all severity parameters, so the selection of broader spectrum antimicrobials is not clearly explained by a greater severity of infection. However, a slightly higher proportion of patients required vasopressor support in the broader therapy group than the standard therapy group (52% vs 35%).

Other patient factors that may influence antimicrobial selection for the treatment of community-acquired aspiration pneumonia were assessed. Patients were similar across both groups with respect to these factors, however, it should be noted that the broader therapy group included four more patients with a history of chronic respiratory disease and two more patients who were immunosuppressed. These factors may have contributed to a decision to treat with broader antimicrobial therapy.

Finally, the presence of other possible sources of sepsis is important in identifying the rationale behind antimicrobial selection. While roughly 38% of patients had another source of sepsis identified, the rates were similar between the two groups.

Conclusion

Almost half of the patients received broad spectrum antibiotic therapy of piperacillin/tazobactam for community acquired aspiration pneumonia in ICU. Those who received broader spectrum therapy did not appear to have a more severe presentation, and no clear reason to explain the antibiotic choice was identified. These results have prompted a multidisciplinary review of the ICU empiric antibiotic recommendations to guide appropriate prescribing of piperacillin/tazobactam.

Acknowledgements

A/Prof Kirsty Buising (Infectious Diseases physician)
Dr Tom Rechnitzer (Intensivist)

Contact: Catherine.George@mh.org.au