Appropriateness of Piperacillin/Tazobactam Prescribing in a Regional Hospital

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Introduction

Inappropriate prescribing and over use of broad spectrum antibiotics can lead to the development of antimicrobial resistance. Antimicrobial Stewardship Programs (AMSP) encourage prescribing of the most narrow spectrum antibiotic to manage the condition and help to prevent development of antibiotic resistance[1].

The National Antimicrobial Prescribing Survey (NAPS) provides hospitals with a standardised data collection instrument designed to assist in assessing antimicrobial prescribing practices. The NAPS data collection tool[2] and appropriateness definitions[3] were used to audit the prescribing practices of piperacillin/tazobactam, a broad spectrum antibiotic in our hospital.

Aim

To identify inappropriate prescribing patterns of piperacillin/tazobactam in a regional hospital.

Methodology

This study was conducted as a retrospective medical file audit. We identified patients who had likely received piperacillin/tazobactam during the period 01/01/2017 to 31/12/2017, by looking at Pharmacy Department and Omnicell automated dispensing cabinet transactions. From this data, we narrowed our focus to the 206 patients who had received more than four vials, which we assumed translated to more than 24 hours of therapy. We took a convenience sample of 50 patients by reviewing every 4th patient's medical record.

The primary investigator collected data from medication charts, observation charts, progress notes and electronic pathology/microbiology results and compiled this into a Microsoft Excel spreadsheet. Each case was assessed independently for appropriateness by both the primary investigator and Antimicrobial Stewardship (AMS) Pharmacist using the NAPS Appropriateness Definitions (summarised in table 1) and the Therapeutic Guidelines (eTG July 2018 edition)[4]. Any differences in scoring between the primary investigator and AMS pharmacist were discussed and a consensus decision was made.

Table 1: Summarised NAPS Appropriateness Definitions[2]

Appropriate	1	Optimal	Prescribing follows Therapeutic Guidelines[4] optimally
	2	Adequate	Prescribing does not optimally follow Therapeutic Guidelines[4] but is a reasonable alternative OR surgical prophylaxis < 24 hours
Inappropriate	3	Suboptimal	Non-life-threatening allergy mismatch OR prescribing is unreasonable choice including spectrum too broad or failure to de-escalate with microbiological results
	4	Inadequate	Prescribing is unlikely to treat causative pathogen OR not indicated OR life-threatening allergy mismatch OR surgical prophylaxis >24 hours
	5	Not assessable	Indication is not documented OR notes not comprehensive enough to assess OR patient too complex

Results

Table 2: Patient demographics (n=50)

Sex	Male	19
	Female	31
Age	Mean	69
	Range	9 to 97

Figure 1: Overall Appropriateness

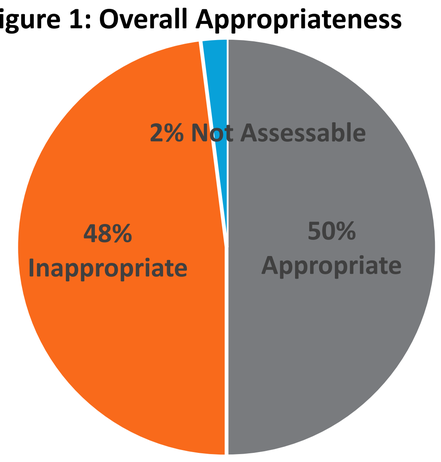


Table 3: NAPS score break down

NAPS Appropriateness Score	Total (50)
Optimal (1)	11
Adequate (2)	13
Sub-optimal (3)	21
Inadequate (4)	4
Not assessable (5)	1

Figure 2: NAPS score break down

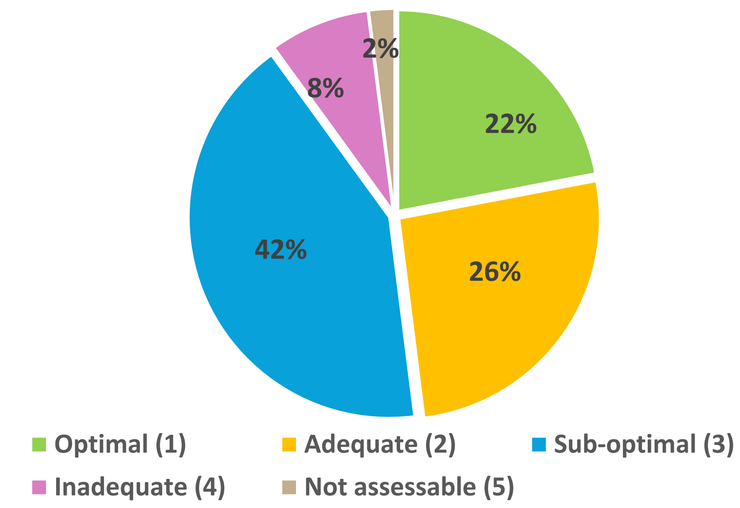


Figure 3: Appropriateness According To Indication

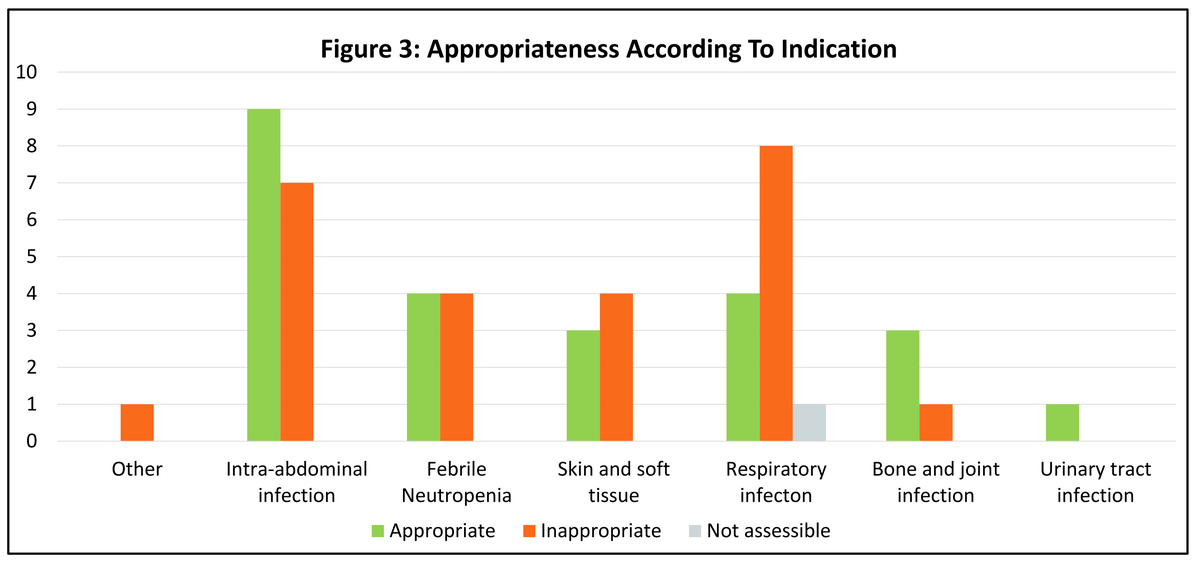
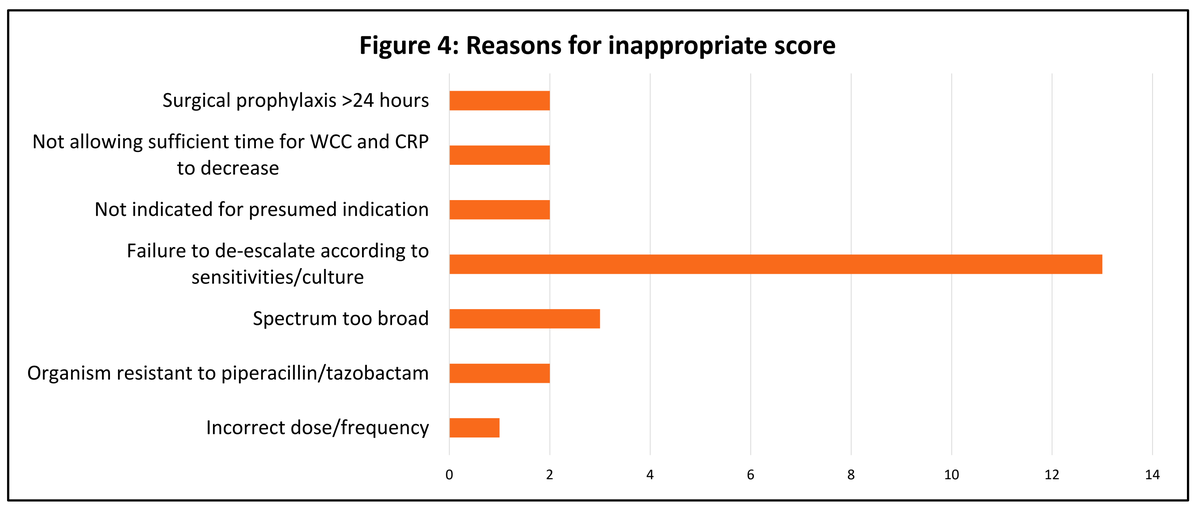


Figure 4: Reasons for inappropriate score



Discussion

- Out of 50 cases, only one was not assessable due to patient complexity.
- Figure 3 describes the range of indications that piperacillin/tazobactam was prescribed for within our hospital, with intra-abdominal infections being the most commonly treated within our study population.
- Failure to de-escalate antibiotics was the leading reason for an 'inappropriate' score, which occurred variably across all indications.

Limitations

- As this was conducted retrospectively, we relied on medical records being complete and accurate.
- NAPS Appropriateness Definitions[3] was a helpful auditing tool, however appropriateness assessment was prone to bias due to the two investigators consisting of an Intern Pharmacist and an AMS Pharmacist. To improve this study we would require input from other health professions. Additionally, investigators were not present during commencement of piperacillin/tazobactam, therefore decisions were made from information documented in the medical file.
- For some cases there was more than one reason for an 'inappropriate' score, however the most relevant reason was decided by the investigators.
- Intermittently throughout the study period, there was a shortage in supply of piperacillin/tazobactam. Therefore this study may not fully reflect prescribing practices.
- As this study analysed a convenience sample receiving piperacillin/tazobactam therapy over 24 hours, it does not capture those only given in the Emergency Department or empirical therapy less than 24 hours. Therefore it may not fully reflect hospital-wide prescribing practices.
- There is a wide variety of prescribers on rotating shifts, therefore prescribing practices may have changed over time.

Conclusion

We identified inappropriate prescribing patterns of piperacillin/tazobactam in a regional hospital. Our audit showed the main reason for inappropriate prescribing was failure to de-escalate according to culture/sensitivities. This is an area that the AMS program could target in the future, implementing a de-escalation protocol such as an IV to oral switch policy.

References

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