Evaluation of antibacterial drug use in an intensive care unit

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INTRODUCTION

Within the Intensive Care Unit (ICU), one of the objectives is to avert additional physiological worsening, such as infectious diseases while the original condition is controlled. [1]

Optimal antibacterial management in ICUs, incorporates prompt identification of pathogens and adequate control of bacterial infections. The occurrence of antibacterial-resistant gram-negative bacteria and gram-positive bacteria can be a result of nosocomial infections. [2]

Unnecessary use of broad-spectrum antibacterials and prolonged use should be prevented.[2] Antibacterial stewardship is essential to control resistant harmful organisms within the ICU.

AIMS

The aims for this study were:

- To conduct a retrospective drug utilization study, by analysing the trend in antibacterials administered in the local ICU for the last 9 years
- To present a scenario analysis of the current use of antibacterial drugs in the ICU, with focus on respective classes, dosage regimens, indications for use and pharmaceutical formulations.

METHOD

A scenario analysis of antibacterial use in the ICU at Mater Dei Hospital (MDH) was carried out through analysis of nine-year available data. The study was divided into two phases; the first consisted, of the retrospective study, and the second part consisted of the prospective study, which included critically ill patients, over 18 years of age, who were administered an antibacterial.

Retrospective study

Annual antibacterial consumption for the years 2009-2017 was extracted from the MDH Pharmacy database and recorded. Consumption was defined as 'Defined Daily Doses' (DDD), using the 2017 ATC/DDD version.

Prospective study

An antibacterial information sheet was developed to facilitate recording of raw data during ICU visits. The WHO ATC/DDD classification system was applied. Data extracted from patient profiles included patient demographics, antibacterial(s) administered, dosage regimen, and route of administration.

RESULTS

Retrospective Study

Antibacterial consumption calculated in DDD/ patient, was highest for 2015 and 2016, at 1872.4 and 1840.6 respectively. An increasing trend in consumption was observed between 2009 and 2013, with DDD/ patient value starting at 642 and increasing to 1713.6 respectively.

Meropenem (Figure 1) and Piperacillin with a beta-lactamase inhibitor (Figure 2) were the two most commonly administered antibacterial drugs in the ICU, with a total DDD value for the years 2009-2017, at 19417 DDD and 12265 DDD respectively.

Prospective Study

Out of the 68 patients analysed, 28 patients were administered beta-lactam antibacterials, whilst 20 patients were administered a carbapenem antibacterial. Thirty-one of the inpatients (n=68) were administered an antibacterial for a respiratory infection.

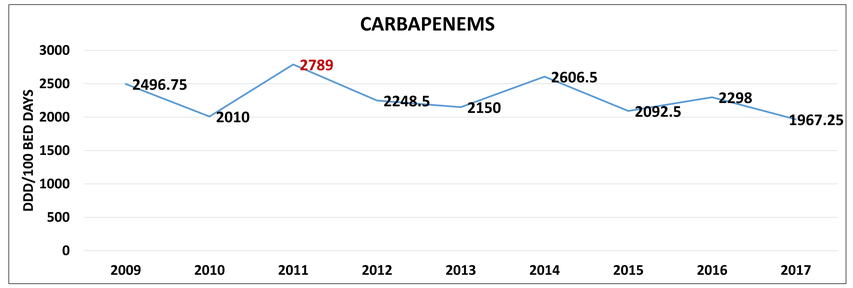

Figure 1: Carbapenem use in DDD/100 bed days during the years 2009-2017

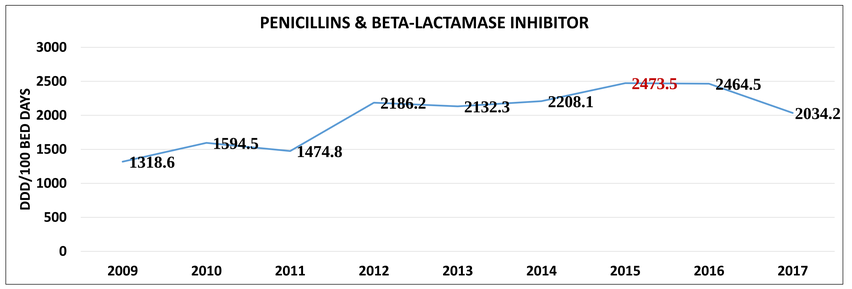

Figure 2: Penicillins & Beta-lactamase inhibitor use in DDD/100 bed days during the years 2009-2017

CONCLUSION

The study highlighted trends in antibacterial consumption within the Maltese ICU. An increase in DDD values was observed through the years 2009-2017, highlighting a rise in infections in the ICU, requiring antibacterial drug treatment. Results from the retrospective part of the study and the prospective part, go in tandem as they both show the highest consumption for carbapenems and penicillins with beta-lactamase inhibitors.

Reflection on this rise in carbapenem use is of utmost importance. Interpretation from this study can help guide the healthcare professional team in prudent use of antibacterials, addressing threats posed by multidrug resistant bacteria. Implementation of ways to address antibacterial stewardship can help improve management of infections and decrease antibacterial resistance.

REFERENCES

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