Australasian Medical Journal 2009, 1, 14, 244-245

Antibiotic resistance and therapeutic management of sepsis in a Malaysian public Hospital

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Clinical Audit

Please cite this paper as: Gillani W, Sulaiman A, Bayat Nejad F. Antibiotic resistance and therapeutic management of sepsis in a Malaysian public Hospital. AMJ 2009, 1, 14, 244-245. Doi 10.4066/AMJ.2009.116

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Abstract

This study aims to document the microbial profile and pattern of use of antibiotics in the government hospital of Penang state, Malaysia. An audit was conducted in 2007 in the general medical ward of Hospital Pulau Pinang, Malaysia. The mortality rate was 54.22% with severe sepsis or septicaemia. Mithicillin resistant staphylococcus aureus caused 37% of deaths, while 33% of deaths involved *Klebsiella Spp.* Commonly prescribed antibiotics included; cloxacillin 500mg (qid) 20%, tazocin 2gm (bid) 1.1%, and vancomycin 1gm (od) 27%. We report the use of high doses of antibiotics in the six months prior to a notable rise in resistant infections.

Introduction

Sepsis secondary to infection is more common among people aged 65 years and over *(1)*. In 2006 in Malaysia septicemia was the leading cause of death among hospitalized patients with 6811 cases *(2)*. There has been a concerted effort to reduce the incidence of hospital acquired infections in this country *(3)*. Most researches have focused on neonatal intensive care unit *(4)*, infections among NCD (non-communicable disease) patients *(5)* and intensive care acquired nosocomial infection *(6)*, however little systematic research has focused on septicemia associated with respiratory tract infection. Respiratory diseases were the 4th leading cause of hospitalization in government hospitals in Malaysia with a rate of 7.3% *(2)*, while lower respiratory tract infections were the 3rd ranking cause of death in Malaysia with 6% of total deaths and 5% years of life lost *(7)*. The aim of this review is to evaluate the microbial profile in the general wards of a government hospital, to record the

Methodology

A retrospective survey based on the admission data for the year 2007 (January to December) was used to evaluate the microbial profile and use of antibiotics in the general hospital in Pulau Pinang. The total sample was 2028 patients in respiratory ward, 680 patients with known sepsis, and 122 who died with the cause of death being recorded as sepsis. The research protocol was approved by ethical committee of Penang General Hospital (PGH). Data was gathered from the information provided in the medication chart of all the patients admitted during the period of study or from the hospital archives for those patients who had died. For the second objective of the study (assessment of microbial profile), pathological reports of all the hospital departments were collected from the microbiology laboratory.

Results and Discussion

The incidence of sepsis among the hospitalized patients in respiratory infection ward was 33.5%. Total identified cases were 680 of which 122 (17.9%) died. The mortality rate among patients with chest infections was 54.22% mainly due to severe sepsis or septicaemia and associated medical complications. A significantly greater proportion of males died (***p<0.02* CI 95% Chi-square test**).

Table 1: Sepsis induced deaths among the gender

Gender	Admission	Sepsis case	Survive	Deaths
Male	1379	417(30.2%)	327(78.4%)	90(21.58%)
Female	649	263(40.5%)	231(87.8%)	32(12.16%)

Overall 94.6% of deaths were associated with *Streptococcus pneumonia (32.7%), Pseudomonas aurugenosa (15.3%), Acinetobacter Spp. (19.1%) and Klebsiella pneumonia (27.5%)*. More than one third of deaths (37%) were associated with MRSA (*mithicillin resistant streptococcus aureus)*, while one third involved *Klebsiella Spp.* Commonly used antibiotics were: Cloxacillin 500mg (qid) 20%, Tazocin 2gm (bid) 1.1%, Meropenam 500mg (tds) 10.1%, Ceftriaxone 2gm (bd) 15.4%, Ampicillin/Sulbactum 1.5gm (tds) 6.4%, Gentamicin 80mg (bid) 5%, Amikacin 750mg (od) 15% and Vancomycin 1gm (od) (27%). The choice of antibiotic was made on antibiotic sensitivity data. However the doses varied in each case. The microbial profile changed in the second half of the year as shown in Table 2.

Table 2: Increase of microbial load in Healthcare setting during 2007

Organism	Jan-June 2007 Total no of isolates	July-Dec 2007 Total no of isolates	Proportional change in incidence
Enterobacter sp.	109	173	1.70
E. coli	362	791	2.17
Klebsilla sp.(ESBL)	440	759	1.83
Acinetobactor sp.	199	369	1.91
Pseudomonas aeruginosa	584	916	1.79
Staph.aureus	756	1146	1.95
MRSA(staph.aureus)	277	193	0.73
Coagulase negative staph.	382	616	1.98
Strep. penumoniae	12	35	2.85

Overall, findings showed significant increase of *E. coli, Pseudomonas aeruginosa and Staph.aureus* during the second half of the year (Table 2). The medical records suggest that there were increased cases of co-infection and super-infections during second half of the year. We speculate that the increased incidence of resistant infections was related to the injudicious use of high dose potent antibiotics in the first half of the year. Regression modeling was used to identify the therapeutic application of antibiotics in septicaemia secondary infections. It was found that selection of antibiotics; dose and resistance pattern had a significant effect on therapeutic plan with R-square (0.847, P< 0.001). Use of high doses may be contributing to the increased pattern of antibiotic resistance.

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AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

PEER REVIEW

Not commissioned; externally peer reviewed

CONFLICTS OF INTEREST

The authors declare that they have no competing interests