



## Antibiotics prescribing pattern in preterm neonates; hospital based retrospective study

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### Abstract

**Introduction:** Preterm infant have a higher mortality risk than mature babies. The most common cause of neonatal death is preterm birth. Since antibiotics are most common prescribed medication for infants in neonatal intensive care unit, Preterm infants if they suspected to have an infection often receive an empirical antibiotics treatment during first few days of life despite of the low incidence of early onset sepsis. The use of broad-spectrum antibiotics have serious unintentional events in premature infants including drugs resistance and invasive fungal infections.

**Methodology:** A hospital-based retrospective descriptive study was conduct at Maternity and Children hospital in Mecca, Saudi Arabia. On the period from April 2016 up August 2016 collecting data from all neonate and excluding outpatients, emergency patients and patients with AIDS.

**Results:** Sixty cases of infants were included, 60% were male, 40% were female, and Most of preterm were on more than four medications in 41.7% and 87% of neonates prescribed two or more antibiotics.

Beta lactams antibiotics were the most commonly prescribed in 91.7% specifically 3ed generation penicillin 48.3%, beta-lactams and aminoglycoside as common combination used in more than half of neonates.

**Conclusion and Recommendations:** Our study shows alarming rate in the use of broad spectrum antibiotics, which would predispose to serious unintentional events. Our recommendation to stop the use of prophylaxis in preterm neonates.

**Keywords:** prescription pattern – preterm antibiotics - poly pharmacy

### Introduction

Preterm labor defined as birth before completing 37 weeks of gestation, it estimated that each day 41000 infants born as preterm which account 10% of all births worldwide <sup>[1]</sup>. Preterm infant have a higher mortality risk than mature babies. The most common cause of neonatal death is preterm birth, it estimated that about 3.1 million babies worldwide dies as direct result of prematurity <sup>[1]</sup>. Adverse consequences risk decline with increasing in age of gestation reaching term; however, the risk would increase again in births after 42 weeks <sup>[2]</sup>. Preterm babies are at risk of respiratory problems, with up to 40% of preterm births have bronchopulmonary dysplasia and high risk of respiratory infections <sup>[3]</sup>. Preterm babies are likely to readmit to hospital in their early years due to respiratory infections or prematurity morbidity <sup>[4]</sup>.

Antibiotics are most common prescribed medication for infants in neonatal intensive care unit <sup>[5]</sup>. Preterm infants if they suspected to have an infection often receive an empirical antibiotics treatment during first few days of life despite of the low incidence of early onset sepsis <sup>[6, 7]</sup>. The use of broad-spectrum antibiotics have serious unintentional events in premature infants including drugs resistance <sup>[8]</sup> and invasive fungal infections <sup>[9]</sup>. During early postnatal weeks is the time for initial gastrointestinal colonization <sup>[10, 11]</sup> which would

affect by early administration of antimicrobial <sup>[12]</sup>, which thought to contribute in pathophysiology of necrotizing enterocolitis <sup>[13, 15]</sup>.

### Aim of study

To evaluate of antibiotics, prescribing pattern in preterm neonates group at hospital pediatric department.

### Methodology

#### A. Study setting

The study was conduct at Maternity and Children hospital in Mecca, Saudi Arabia.

#### B. Study period

The study conducted from April 2016 up August 2016

#### C. Study design

A hospital-based retrospective descriptive study.

#### D. Source of population

Pediatric population (neonates) age up to 3 months.

#### E. Exclusion criteria

All the neonates' outpatients, emergency patients and

patients with AIDS not include in this study

#### F. Sample size

The sample size for the retrospective study was 60.

#### G. Data collection tool

Primary data collected from the patient chart, lab results, prescription orders and medical records of the patients.

#### H. Ethical considerations:

The study carried out after having the ethical permission.

#### I. Data analysis methods

Data analyzed by using SPSS software statistical program, version 24. For categorical variables, percentage used. Numeric data presented as mean and standard deviation (SD), or as median and range according to the type of distribution of each variable.

### Results

Sixty cases of preterm infant were included and data collected on predesigned questionnaire.

Among 60 preterm infants 36 (60%) were male and 24 (40%) were female,

The average age of patients is 15 days with stander deviation 17.4 and mean hospital stay was 13 days.

Respiratory diseases were leading cause for admission and were the cause in 42 babies (70%) while infectious cause was the second in 15 babies (25%) other causes were GIT disorders 3%, fever 2%, malnutrition 2% and hypoglycemia in 2%. Figure 1.

Most of preterm were on more than 4 medications in 25 preterm (41.7%), while 8 neonates (13.3%) were on 4 medications and also 8 neonates were on 3 medications but only 2 (3.3%) were on only 1 medication. Figure 2.

Total number of antibiotics per prescription was 2 in 38 (63.3%) neonates and 8 (13.3%) were on single antibiotic, 12 (20%) patients were on 3 antibiotics and 2 patients have more than 3 antibiotics. Figure 3.

Most of neonates were on antibiotics for less than a week in 49 patient (81%) and Beta lactams antibiotics were the most commonly prescribed in 55 patients (91.7%), Aminoglycosides antibiotics prescribed in 38 neonates (63.3%) and vancomycin in 23 (38.3%) patient, however other antibiotics such as trimethoprim-sulfa, nitroimidazole and tetracycline were used in single patient. Macrolides and quinolones were never used in our sample. Other classes of medications such anti-fungal used in seven (11.7%) neonates while antihelminthics in one patient. Figure 4.

Regarding beta-lactams, third generation of penicillin most commonly used in 29 patient (48.3%). Followed by carbapenems in 20 (33.3%) patients then third generation of cephalosporin only in 3 cases. First and second generation of penicillin or cephalosporin never used. Figure 5.

Beta-lactams and aminoglycoside usually prescribed together in more than half of patient in 34 (56.7%) neonates specifically third generation of penicillin in 24 patients (40%). other common combination in 20 patients (36.4%) between vancomycin and beta-lactams, 12 patients has combination between vancomycin and aminoglycosides. Figure 6

### Discussion

Preterm infant have a higher mortality risk than mature babies. The most common cause of neonatal death is preterm birth<sup>[1]</sup>. Antibiotics are most common prescribed medication for infants in neonatal intensive care unit<sup>[5]</sup>.

In our study, we aimed to evaluate prescribing pattern of antibiotics in preterm neonates group of patients using WHO guidelines as guided. It well known that prescribing pattern suggests revision periodically to improve prescribing practice, to make rational medical care and cost effectiveness.

In our present study narrow spectrum antibiotics almost never used and according to<sup>[16]</sup> prolong use of broad spectrum antibiotics for >5 day in preterm infants associated with late onset of sepsis, necrotizing enterocolitis or death while In our study one out five neonates were on antibiotics for more than a week which has potential morbidity and mortality.

In our study 87% of neonates prescribed two or more antibiotics with third generation of penicillin most commonly used in half of patients, however, The use of broad-spectrum antibiotics have serious unintentional events in premature infants including drugs resistance and invasive fungal infections<sup>[8,9]</sup>.

According to<sup>[17]</sup> out of total *S. aureus* pathogen, isolated (55.3%) were MRSA. In 14% of total MRSA infected were infants and (9%) isolated in pediatrics ward which might be caused by broad-spectrum use of anti-biotics in early infancy. Despite low incidence of early onset sepsis among preterm<sup>[6,7]</sup> beta-lactams and aminoglycoside as common combination in more than half of patient in our present study for broad-spectrum coverage and also demonstrate synergistic bactericidal activity but might has potential risk for resistance which showed in<sup>[17]</sup>. The data showed significant correlation between the cross resistance between oxacillin, gentamicin and erythromycin ( $p > 0.0001$ ) also supported by (Kim *et al.*, 2004; Schmitz *et al.*, 1999)<sup>[18,19]</sup>.

Prevalence measurements, studies have reported anywhere between 0.6% – 8.4% of NICU patients being colonized or infected with MRSA during their study periods<sup>[20,27]</sup>. which might be the cause of frequent use of vancomycin in 38.3% of patient.

In our study carbapenems used in one third of patients, which may be associated disruption of gut flora, and increased hospital acquired infection *Stenotrophomonas maltophilia*, *clostridium difficile*, multiply resistant coliforms, methicillin-resistant *Staphylococcus aureus* (MRSA), yeasts and enterococci<sup>[28,29]</sup> which might spread and contaminate other patients.

Tables and Figures

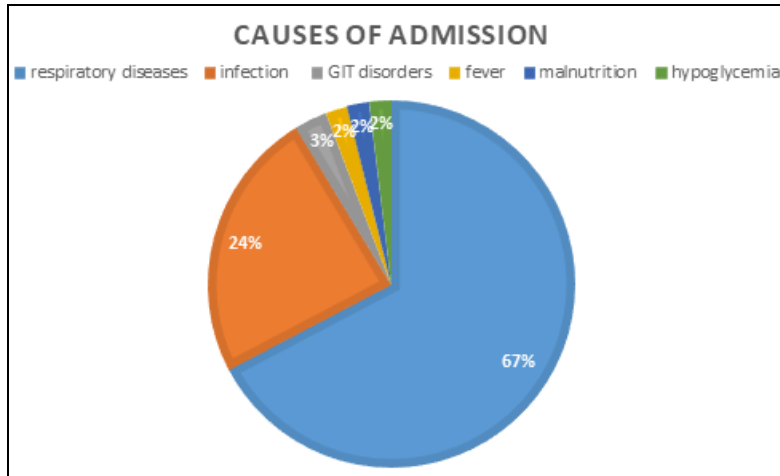


Fig 1

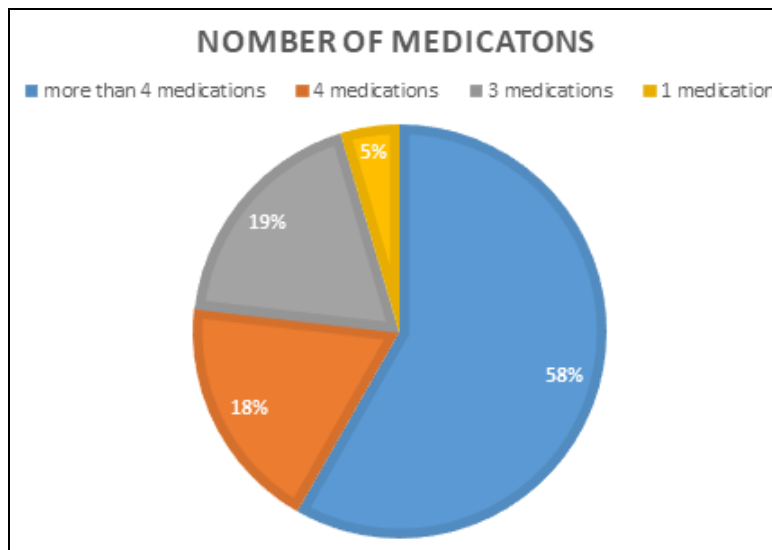


Fig 2

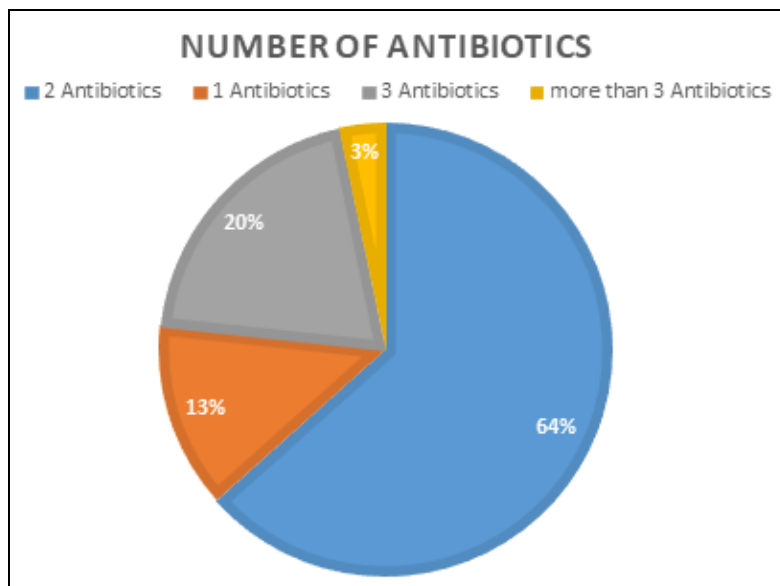


Fig 3

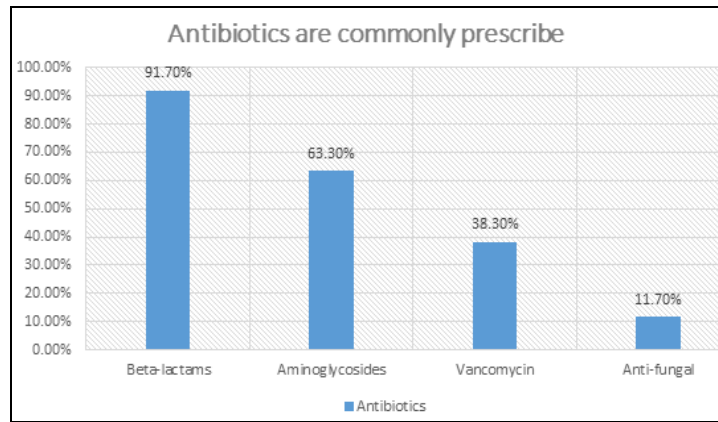


Fig 4

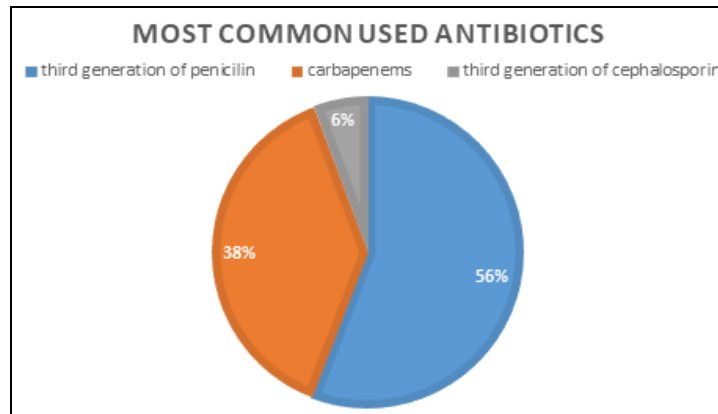


Fig 5

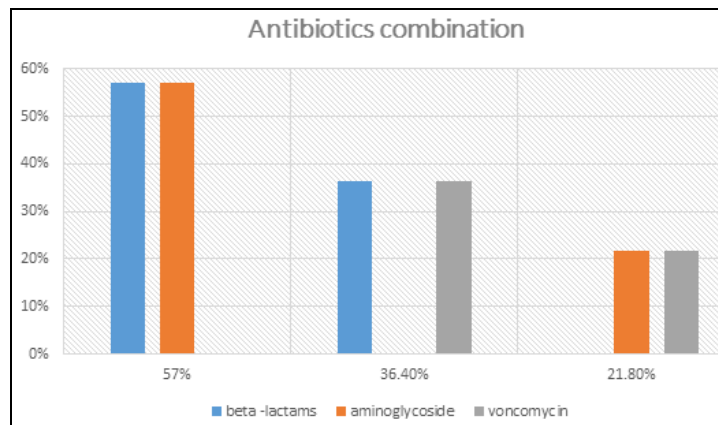


Fig 6

**Conclusion and Recommendations**

In this study, we aimed to evaluate prescribing pattern of antibiotics in preterm neonates group guided by WHO guidelines. Our study shows alarming rate in the use of broad spectrum antibiotics, which would predispose to serious unintentional events. Our recommendation to stop the use of prophylaxis in preterm neonates.

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