International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Assessing Need of an Antimicrobial Stewardship Programme in Neonatal Intensive Care Unit of Rural Tertiary Care Hospital of Central India

Gargi Dangre Mudey[1*], Abhay Mudey[2**], NileemaTankhiwale[3*]

[1]Assistant Professor, [2]Professor and Head, [3]Professor,
[*]Department of Microbiology, [**]Department of Community Medicine,
Jawaharlal Nehru Medical College, Sawangi (M) Wardha

Corresponding Author: Gargi Dangre Mudey

Received: 19/06/2015 *Revised: 10/07/2015* *Accepted: 13/07/2015*

ABSTRACT

Microbial resistance is an ever-growing problem in neonatal intensive care units (NICU's). Implementation of Antimicrobial Stewardship programme (ASP) may help to reduce burden of antimicrobial resistance.

The aim of the present study was to assess the need for ASP in NICU of a tertiary care hospital by studying the antibiotic prescribing practice and sensitivity pattern of common culture isolates.

Among 172 neonates prescribed with antibiotics, empirical antibiotics were stopped after negative report of culture and septic screen in 30 (17.44%) neonates. In 142 neonates in whom antibiotics were continued 5 days only 39 (22.67%) neonates had positive blood culture. In 103(59.89%) cases antibiotics were continued on the basis of results of laboratory markers, strong clinical suspicion of sepsis, for operative or invasive procedure etc. The antibiotics prescribed empirically had low sensitivity for the common culture isolate.

The study emphasizes the need to develop ASP in NICU.

Keywords: Antibiotics, Empirical, sepsis, resistance, neonates.

INTRODUCTION

Antibiotics are the most commonly prescribed medication in Neonatal Intensive Care Units (NICU). [1] The judicious use of antibiotics can limit the emergence of antibiotic-resistant organisms. But over the past 25 years, use of antimicrobial agents has been steadily increasing. Along with this rise in use comes the burden of multidrug resistant organisms. Microbial resistance is an ever-growing problem in NICU's of our country. These organisms increase morbidity, mortality and the overall cost of health care. [2,3]

Neonates are susceptible to infections due to their immature immune system. In the NICU as a common practice, septic screening is done in all the at-risk neonates and antibiotics are started as soon as blood is drawn for septic screen. Prompt treatment of neonatal infections with appropriate antimicrobial agents can be life saving. However many of these at-risk neonates do not have infection and administration of antibiotics can have

serious adverse effects like development of antibiotic resistance, risk of candida colonization, necrotizing enterocolitis etc. In addition, frequent invasive procedures and staff patient contact increases chances of colonization and infections. [4,5]

Antimicrobial Stewardship programme (ASP) is implemented in many hospitals. ASP is the optimization of antibiotic prescribing. It consists of selection of appropriate empirical product, prompt de-escalation based on laboratory data and daily review of prescriptions. This programme has been recommended by medical organizations and governments as critical means to reduce burden of antimicrobial resistance, cost, and toxicity. [2,6]

The clinical microbiologist plays a critical role in ASP by providing patient specific culture and susceptibility data to optimize individual antimicrobial management and assisting in the surveillance of resistant organisms. The aim of the present study was to assess the need for ASP in NICU of a tertiary care hospital by studying the antibiotic prescribing practice and sensitivity pattern of common culture isolates.

MATERIALS AND METHODS

In the present retrospective study we evaluated data of 233 neonates admitted in the Neonatal Intensive Care Unit (NICU) of Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha from Oct 2012 to Jan 2013.

Study was started after obtaining approval from Institutional ethical committee and permission of Chief Medical Superintendent (CMS).Data was collected from the medical record department (MRD) of the Hospital. Case files of all the neonates admitted during study period were included. Data from each file was collected in a proforma which included diagnosis, indication to start antibiotic, Laboratory findings, Indication for changing of antibiotic, Duration of antibiotic treatment, culture reports, Indication for stopping antibiotic etc.

Data obtained was analyzed using Statistical software SPSS 13.0

RESULTS

During the study period there were 233 admissions in the NICU of AVBRH, Sawangi (Meghe). Antibiotics were prescribed to 172(73.82%) neonates. The remaining 61(26.18%) neonates who were not prescribed antibiotics included either neonates admitted for phototherapy or for observation (preterm neonates delivered by caesarian section).

The 172 neonates prescribed with antibiotics were cases of suspected neonatal sepsis. Septic screen was done in all the 172 neonates before starting antibiotics. These neonates were given empirical treatment with more than one antibiotic. Table 1 depicts profile of empirical treatment.

Table 1- antibiotics prescribed empirically

Antibiotics prescribed	No of neonates (%)
Ampicillin +gentamicin	78(45.35%)
Ampicillin +gentamycin+cefotaxime	27(15.70%)
Ampiclox +gentamicin/amikacin	15(8.72%)
Ampiclox+gentamicin/amikacin+cefotaxime	2(1.16%)
Amikacin+Cefotaxime	2(1.16%)
Other	48(27.91%)
Total	172(100%)

Empirical antibiotics were stopped after negative report of culture and septic screen in 30 (17.44%) neonates.

Among142 neonates in whom antibiotics were continued only 39 (22.67%) neonates had positive blood culture. In 103(59.89%) cases antibiotics were continued on the basis of results of laboratory markers, strong clinical suspicion of sepsis, for operative or invasive procedure etc.

In 76(44.19%) neonates same antibiotics were continued. In 66(38.37%)

antibiotics were changed. The various reasons for changing or adding antibiotics were culture reports, not responding clinically and non-improvement in laboratory tests.Table 2 depicts various antibiotics added after results of culture reports and septic screen. These were called second line antibiotics.

Table 2- Second-line antibiotics prescribed

Antibiotics prescribed	No of neonates (%)
Vancomycin	24(13.95%)
Meropenam	18(19.47%)
Piperacillin-tazobactam	12(6.98%)
Amikacin	12(6.98%)
Ceftazidime	06(3.49%)
Metronidazole	09(5.23%)

We also studied blood culture reports of these neonates. The results are depicted in Table 3

Table 3: blood culture isolate

Organism	No of cases (%)
KlebsiellaPneumoniae	12 (30.77%)
Staphylococcus aureus	12 (30.77%)
Pseudomonas aeruginosa	7 *(17.94%)*
Escherichia coli	2 (5.13%)
Acinetobacter species	2(5.13%)
Coagulase negative staphylococcus	2(5.13%)
Candida sp.	2(5.13%)
Total	39(100%)

Antimicrobial susceptibility of the common blood culture isolates showed zero % sensitivity for ampicillin, 8-16% for gentamicin, 40-50% for cefotaxime, 30-40% for cloxacillin, 60-90% for amikacin, 50-90% for ceftazidime, 95-100% for piperacillin-tazobactam, 95-100% meropenem and 100% for vancomycin.

DISCUSSION

NICU have high antibiotic utilization rate. They also have high rate of antimicrobial resistance. Changing pattern of organisms and frequent emergence of resistant bacteria causes difficulty in treatment of neonatal infections. It is observed that the micro-organisms isolated differ not only from place to place but also from time to time in same place. Thus there is a need to screen for finding the causative organism and antibiotic susceptibility in each and every case. However the isolation of a pathogen in culture (must for proven neonatal sepsis) takes minimum 48-72 hours. So, empirical antibiotics are given to all cases of suspected neonatal sepsis.

In the present study most commonly used antibiotics for empirical treatment were combinations of ampicillin plus gentamicin (45.35%); and ampicillin plus gentamicin plus cefotaxime (15.70%). But the antibiotic sensitivity pattern in the present study found that these antibiotics had low sensitivity for the common causative agents with zero % sensitivity for ampicillin, 8-16% for gentamicin and 40-50% for cefotaxime. Similar findings were reported by Zaidi et al. [8] and Shrestha R et al. [5] Empirical antibiotics should be chosen as per pattern of causative agents and sensitivity pattern of isolated organisms in a particular setting instead of following a single regimen across different places. Thus there is need to modify antimicrobial therapy based on local prevalence.

Generally antibiotics are continued for 48-72 hours till the culture result becomes available. Antibiotics are continued beyond this period only in those with positive blood culture or symptomatic neonates. This recommendation is based on the report that 96% of cultures are positive by 48 hours and 98% by 72 hours. [7] It was observed that only 22.67% of neonates receiving antibiotics had positive blood culture. In 59.89% cases antibiotics were continued on the basis of results of laboratory markers, strong clinical suspicion of sepsis, for operative or invasive procedure etc. This finding suggests that blood culture cannot be considered a gold standard and should not be relied for continuing antibiotics. Therefore we should have a sensitive clinical and laboratory tool

that will help a clinician identify those neonates who definitely require antibiotic.

2nd line antibiotics were prescribed in 38.37% cases. All the second line antibiotics prescribed were highly sensitive for the isolated causative agents. Mostly they were prescribed after sensitivity reports and are continued for longer duration.

So, considering large number of neonates with negative culture reports getting long term treatment with antibiotics, resistance of blood culture isolates to the antibiotics prescribed empirically study recommends need of implementing ASP in NICU. Principles of ASP are accurately identify patient in need of antibiotic therapy, use local epidemiology to guide selection of empirical therapy, adjust antibiotics when culture result become available, monitor toxicity, optimize dose, route and duration of therapy. Developing ASP in NICU is difficult. But NICU may develop an antimicrobial stewardship programme by forming interdisciplinary antimicrobial stewardship team.

REFERENCES

1. Tzialla C, Borghesi A, Perotti GF, Garofoli F, Manzoni P, Stronati M. Use and misuse of antibiotics in the neonatal intensive care unit. Journal of Maternal-Fetal &Neonatal Medicine. 2012 Oct; 25Suppl 4:35-7
2. Patel SJ, SaimanL. Principles and strategies of antimicrobial stewardship in the neonatal intensive care unit. Seminars in Perinatoly. 2012 Dec; 36(6): 431-6.
3. William Ford. New Strategiesin Antimicrobial Stewardship: Managing Patient care. Infectious disease special edition; 2010:23-28
4. M. Jeeva Sankar, Ramesh Agarwal, Ashok K. Deorari and Vinod K. Paul. Sepsis in newborn. Indian Journal of Pediatrics: 2008;75(3):261-266.
5. Shrestha R, Shrestha JM, Gurung B. Antibiotic Usage and its Sensitivity Pattern in the NICU. Kathmandu University Medical Journal: 2012; Issue 38; 11(2); 27-32
6. Geisser A, Gerbeaux P, Granier. Rational use of antibiotics in the intensive care unit: impact on microbial resistance and costs. Intensive Care Med2003;2
7. Sindhu Sivanandan, AmuchouS. Soraisham, Kamala Swarnam. Choice and Duration of Antimicrobial Therapy for Neonatal Sepsis and Meningitis. International journal of Pediatrics: 2011;Article ID 712150, 9 pages, http://dx.doi.org/10.1155/2011/712150
8. Zaida AK, Huskins WC, Thaver D. Hospital acquired neonatal infections in developing countries. *Lancet* 2005; 365:1175-1188.

How to cite this article: Mudey GD, Mudey A, Tankhiwale N. Assessing need of an antimicrobial stewardship programme in neonatal intensive care unit of rural tertiary care hospital of central India. Int J Health Sci Res. 2015; 5(8):199-202.

****