Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 09, pp.57796-57798, September, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

COMPARATIVE UTILIZATION STUDY OF BETA LACTAM AND AMINOGLYCOSIDES ANTIMICROBIALS ACCORDING TO DEFINED DAILY DOSE IN SURGERY AND MEDICINE INTENSIVE CARE UNIT OF TERTIARY CARE TEACHING HOSPITAL IN CENTRAL INDIA

***Dr. Shilpa S. Ingle and Dr. S. S. Pathak**

Jawaharlal Nehru Medical Sciences Datta meghe Institute of Medical Sciences – Deemed University Sawangi (Meghe), Wardha, Maharashtra

ARTICLE INFO

Article History:
Received 15th June, 2017
Received in revised form
26th July, 2017
Accepted 20th August, 2017
Published online 30th September, 2017

Key words:

DDD –Defined Daily Dose,
AMS – Antimicrobial,
MICU-Medicine Intensive Care Unit,
SICU- Surgery Intensive Care Unit.

ABSTRACT

A technical unit of measurement called the Defined Daily Dose (DDD) is defined as "the assumed average maintenance dose per day for a drug used for its main indication in adults". Measuring drug utilization in DDD/100 bed-days is proposed by the WHO to analyze and compare the utilization of drugs. DDD can be used as a tool to analyze drug utilization with the ultimate goal of improving drug use. DDD are advantageous for comparing the use of drug in hospitals or regions. This comparison will provide valuable information when establishing appropriate usage level of drugs.

Aims and Objectives: To evaluate and compare utilisation of β- lactam and Aminoglycosides antimicrobials in Medicine and urgery Intensive Care Unit.

Objectives: 1. To determine the extent of DDD/100 bed days) use of β- lactam and Aminoglycosides AMS in medicine and surgery ICU 2. To compare utilisation of β-Lactam and Aminoglycoside antimicrobial in Medicine ICU and Surgery ICU.

Type of study: It is a Cross sectional study.

Study setting: The study was undertaken in Medicine I.C.U and Surgery I.C.U of central India

Sample size: 357 patients**.**

Methodology: The total dose of AMS (β lactam and Aminoglycoside) received by the patient during stay in MICU and SICU is calculated (Gram) for individual patient.Total dose (Gram) of individual AMS is calculated. ATC codes has been given to classify antibiotics (ATC-group J0; Antibacterial for systemic use). Then the data has been expressed as Defined Daily Dose per 100 Bed Days (DDD/100 Bed Days) based on the formula.

Results and Observations: Total 11 Beta lactum and Aminoglycosides antimicrobials were used in 20 beded MICU. Among these AMS utilisation of injection Ceftriaxone (7.12) was highest followed by injection Cefotaxime (1.59), injection Piperacillin+ Tazobactum (1.42), injection Gentamycin (1.18). In SICU utilisation of injection Ceftriaxone (3.96) was highest followed by injection Piperacillin+ Tazobactum (2.29), injection Gentamycin (1.22).

Conclusion: Drug utilization studies (DUR) using ATC/DDD system showed most commonly utilized (DDD/100 bed days) AMS in β - lactam class was Ceftriaxone (3rd generation cephalosporin) in SICU as well as MICU. But Piperacillin+tazobactum (broad spectrum penicillin) was maximally used in SICU (2.29) than MICU (1.42). While most commonly utilized Aminoglycosides AMS was Gentamycin followed by Amikacin with nearly equal utilisation in both ICUs (1.18 and 1.22 respectively).

Citation: Dr. Shilpa S. Ingle and Dr. S. S. Pathak, 2017. "Comparative utilization study of beta lactam and aminoglycosides antimicrobials according to defined daily dose in surgery and medicine intensive care unit of tertiary care teaching hospital in central India", *International Journal of Current Research*, 9, (09), 57796-57798.

INTRODUCTION

A technical unit of measurement called the Defined Daily Dose (DDD) is defined as "the assumed average maintenance dose per day for a drug used for its main indication in adults". Measuring drug utilization in DDD/100 bed-days is proposed by the WHO to analyze and compare the utilization of drugs (Sagar S. Bachhav *et al*., 2015). DDD can be used as a tool to analyze drug utilization with the ultimate goal of improving drug use. DDD are advantageous for comparing the use of drug in hospitals or regions. This comparison will provide valuable information when establishing appropriate usage level of drugs. (Gangwar Singh *et al*., 2013) DDD is a unit of measurement and may not reflect the prescribed daily dose. The Anatomical, Therapeutic, Chemical (ATC) classification system provides global standard for classifying drugs. DDD will be assigned only for drugs that already have an ATC code. However they provide a fixed unit of measurement independent of price and formulation and enable the researcher to perform comparisons between population groups. DDD/100 bed-days provide a rough estimate of consumption of drugs among hospital in-patients (Shankar *et al*., 2003). Drug utilization evaluation studies plays a key role

Corresponding author:** ***Dr. Shilpa S. Ingle,
Jawaharlal Nehru Medical Sciences Datta meghe Institute of Medical Sciences – Deemed University Sawangi (Meghe), Wardha, Maharashtra.

in managing healthcare system to identify the prescription pattern, understand, interpret, evaluate and improvement of the appropriate and effective use of antibiotics in ICU and also developing the proper protocols for the use of antibiotic in ICU settings (Bincy Benjamin *et al*., 2016). A systematic review done by Sagar S. Bachhav *et al*. (2015) showed that there were very few publications from SEARO Region on Drug Utilisation Research/study (DUR). DUR studies and use of ATC/DDD system will be useful for assessing and comparing medicines use across countries and can contribute to public health policy decisions and resource allocations.

Aims and Objectives

AIM: To evaluate and compare utilisation of β- lactam and Aminoglycosides AMS in Medicine and Surgery Intensive Care Unit.

Objectives

1. To determine the extent of (DDD/100 bed days) use of β- lactam and Aminoglycosides antimicrobials in medicine and surgery ICU
2. To compare utilisation of β-Lactam and Aminoglycoside antimicrobial in Medicine ICU and Surgery ICU

Study setting: The study carried out in MICU and SICU of Tertiary care Teaching hospital in central India.

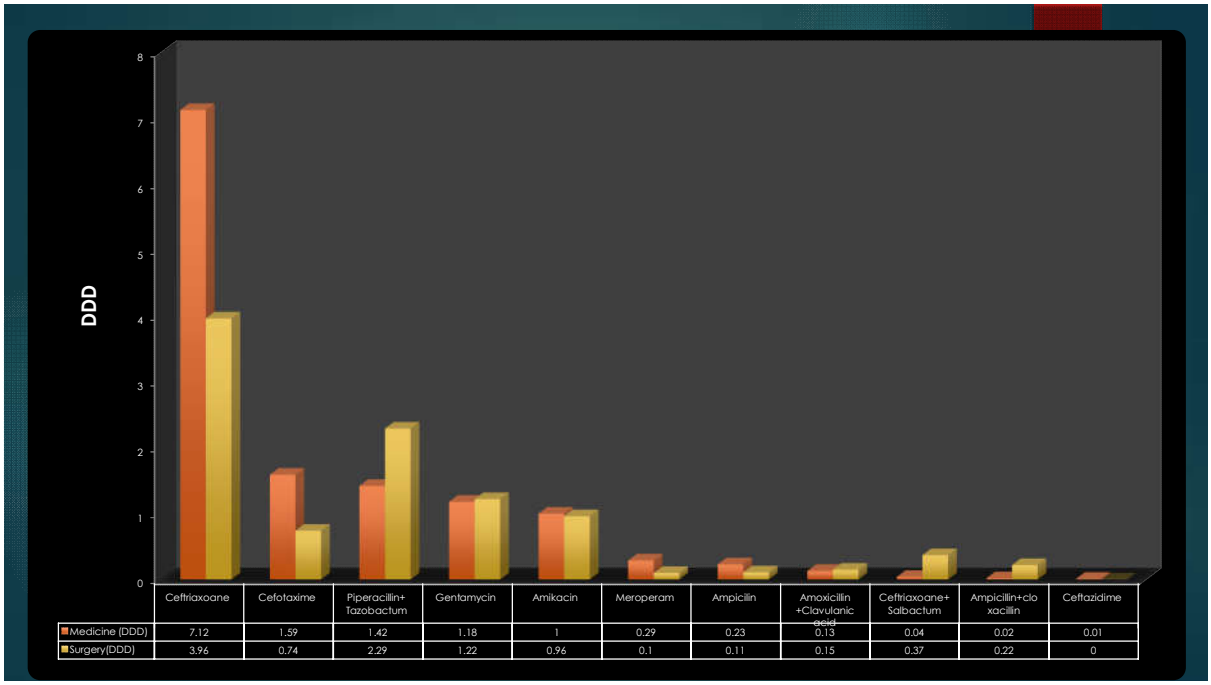
MATERIALS AND METHODS

1. This cross sectional study was carried out in the Department of Medicine and surgery ICU at Tertiary care teaching hospital in central India. After Institutional Ethical committee permission study has been conducted.
2. Patients receiving β Lactum and Aminoglycosides antimicrobials (AMS) were identified and enrolled during their stay in MICU and SICU.
3. The total dose of AMS (β lactam and Aminoglycoside) received by the patient during stay in MICU and SICU is calculated (Gram) for individual patient.
4. Total dose (Gram) of individual AMS is calculated. 5. ATC codes has been given to classify antibiotics (ATC-group J0; Antibacterial for systemic use).

ATC CODEs:

5. For calculating the DDD/100 bed days **WHO DDD Units** of each antibiotic is required.
6. Then the data has been expressed as Defined Daily Dose per 100 Bed Days (DDD/100 Bed Days) based on the below formula ;

$$\text{DDD/100bed-days} = \frac{\text{No. of units administered in a given period} \times 100}{\text{DDD} \times \text{number of days} \times \text{number of beds} \times \text{occupancy index}}$$



Graph 1. Antimicrobials utilisation (DDD/100 bed days) in MICU, SICU

ATC Code	Name	Route	WHO DDD
J01DD01	Cefotaxime	Parentral	4
J01DD04	Ceftriaxone	Parentral	2
J01DD02	Ceftazidime	Parentral	4
J01DD08	Cefixime	Oral	0.4
J01CA01	Ampicillin	Parentral	2
J01CA04	Amoxicillin	Parentral	1
J01CA012	Piperacillin	Parentral	14
J01CR01	Ampicillin and Enzyme inhibitor	Parentral	2
J01CR02	Amoxicillin and enzyme inhibitor	Oral	1
		Parentral	3
J01CR05	Piperacillin and enzyme inhibitor	Parentral	14
J01GB 03	Gentamycin	Parentral	0.24
J01GB 06	Amikacin	Parentral	1

7. **No. of bed-days** = No. of beds in the hospital (20) ×Occupancy index (0.90)× No. of days (during the study period)
8. **Occupancy index**= Percentage of beds occupied during study period (0.90 or 90% was occupied). Occupancy index was collected from medical records dept.
9. The occupancy index of the hospital during the study period was 0.90 for Medicine ICU, 0.85 for Surgery ICU.
10. **Statistical analysis:** The data was subjected to descriptive analysis using Microsoft Excel.

Table 1. Antimicrobials utilisation (DDD/100 bed days) in MICU, SICU

Drug	WHO DDD	Medicine DDD	Surgery DDD
Ceftriaxoane	2	7.12*	3.96
Cefotaxime	4	1.59 *	0.74
Piperacillin+ Tazobactum	14	1.42	2.29*
Gentamycin	0.24	1.18*	1.22*
Amikacin	1	1.00*	0.96*
Meroperam	2	0.29*	0.10
Ampicilin	2	0.23*	0.11
Amoxicillin +Clavulanic acid	3	0.13*	0.15*
Ceftriaxoane+Salbactum	2	0.04	0.37*
Ampicillin+cloxacillin	2	0.02	0.22
Ceftazidime	4	0.01	00
Total		13.02	10.18

RESULTS AND OBSERVATION

Total 11 Beta lactum and Aminoglycosides antimicrobial agents were used in Medicine ICU. Among these antimicrobial agents, consumption (in DDD/100 bed days) of injection Ceftriaxone (7.12) was highest followed by injection Cefotaxime (1.59), injection Piperacillin+ Tazobactum (1.42), injection Gentamycin (1.18), Total 11 Beta lactam and Aminoglycosides antimicrobial agents were used in surgery ICU. Among these antimicrobial agents, consumption (in DDD/100 bed days) of injection Ceftriaxone (3.96) was highest followed by, injection Piperacillin+ Tazobactum (2.29), injection Gentamycin (1.22).

DISCUSSION

- In the present study DDD/100 bed days of Ceftriaxone in Medicine ICU was significantly high (7.12) as compared to Surgery ICU (3.96) and DDD/100 bed days of Piperacillin+tazobactum (2.29) was significantly higher in Surgery ICU as compared to Medicine ICU. Piperacillin+tazobactum is broad spectrum antibiotic so it is prescribed commonly in Surgery ICU to treat serious infections and to prevent post surgical
- In the current study DDD/100 bed days of ceftriaxone and Cefotaxime in Medicine ICU were significantly high 7.12 and 1.59 respectively as compared to Surgery ICU (3.96 and 0.74 respectively). Study conducted by Praksh *et al* showed that DDD/100 bed days of ceftriaxone was 15.47 which was significantly high than in surgery ICU (1.3) but DDD/100 Bed days of Cefotaxim was 0.96 in Medicine ICU which was higher in Surgery ICU (1.9)
- In the present study DDD/100 bed days of, aminoglycosides were almost equal in Surgery ICU and Medicine ICU (for Gentamycin 1.18 and 1.22 and Amikacin 1.00 and 0.96 in Medicine ICU and Surgery ICU respectively). Study conducted by Praksh *et al* showed that DDD/100 Bed days of Aminoglycosides was 4.98 in Medicine ICU which was much lower than in surgery ICU (16.01).
- Prakash *et al.* reported that DDD/100 bed days of ceftazidime was 0.34 in Medicine ICU which was higher as compared to present study (0.01) in Medicine ICU. Bincy Benjamin *et al*.„ reported that DDD/100 bed days of ceftazidime was 0.7 in MICU which was much higher as compared to present study. (0.01)
- In present study DDD/100 Bed days of Piperacillin+ tazobactum (2.29) was significantly higher In Surgery ICU as compared to Medicine ICU (1.42) whereas Prakash *et al* reported that DDD/100 bed days of piperacillin+tazobactam was significantly high (2.2) in Medicine ICU as compared to surgery ICU (0.66). Variation was observed in antimicrobials prescribed in different region and ICU in the world may be due to sensitivity pattern of antimicrobials and cost of the antimicrobials.

Conclusion

Drug utilization studies (DUR) using ATC/DDD system showed most commonly utilized (DDD/100 bed days) AMS in β-lactam class was Ceftriaxone (3rd generation cephalosporin) in SICU as well as MICU. But Piperacillin+ tazobactum (broad spectrum penicillin) was maximally used in SICU (2.29) than MICU (1.42). While most commonly utilized Aminoglycosides AMS was Gentamycin followed by Amikacin with nearly equal utilisation in both ICUs (1.18 and 1.22 respectively)

REFERENCES

Bachhav Sagar S., Kshirsagar Nilima A. 2015. Systematic review of drug utilization studies & the use of the drug classification system in the WHO-SEARO Region *Indian J Med Res*., 142(2): 120–129.

Bincy Benjamin, Sajeev Kumar B., Udaykumar P, *et al*. 2016. Comparative Drug Utilization of Antimicrobial Agents in Medical and Respiratory Intensive Care Units of a Tertiary Care Teaching Hospital in South India, *Indian Journal of Pharmacy Practice*, 9(2):pp123-130

Gangwar Singh A. 2013. Drug Use Evaluation Study in a Tertiary Care Corporate Hospital with Special Reference to Use of Antibiotics in ICU Department. *IN IJAPBC*, Vol.2(1) : pp 179-189

Nikhilesh A. I. M. Nagendra Nayak, M. V. Advaitha, *et al*. 2016. Antimicrobial agents' utilization and cost pattern in an Intensive Care Unit of a Teaching Hospital in South India. *Indian J Crit Care Med*., 20(5): 274–279.).

Shankar RP, Partha P, Shenoy NK, *et al*. 2003. Prescribing patterns of antibiotics and sensitivity patterns of common microorganisms in the Internal Medicine ward of a teaching hospital in Western Nepal: a prospective study. *Annals of Clinical Microbiology and Antimicrobials*, 2:7.

Shelat P.R., Gandhi A, Patel P. P. 2015. A Study of Drug Utilization Pattern According to Daily Define Dose in Intensive Care Unit (ICU)s at Tertiary Care Teaching Hospital, *India Journal of Young Pharmacists*, 7 (4) pp.349-358.

****