ejpmr, 2015,2(3),370-389

SJIF Impact Factor 2.026

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 3294-3211

EJPMR

PATTERN OF INJECTABLE ANTIBIOTIC PRESCRIPTION AND IT'S USE IN AMBO HOSPITAL IN-PATIENT PEDIATRIC WARD, WEST SHOA ZONE, OROMIA, ETHIOPIA

Diriba Alemayehu Gadisa[1]* and Amelework Gidisa Duresa[2]

[1]Assistant Lecturer; Pharmacology Unit, Department of Pharmacy, College of Medicine and Health Sciences, Ambo University, Ethiopia.

[2]College of Medicine and Health Sciences, Ambo University, Ethiopia.

Article Received on 23/02/2015 **Article Revised on 16/03/2015** **Article Accepted on 08/04/2015**

***Correspondence for Author**

Diriba Alemayehu Gadisa

Assistant Lecturer; Pharmacology Unit, Department of Pharmacy, College of Medicine and Health Sciences, Ambo University, Ethiopia.

ABSTRACT

Introduction: Pediatric Injectable antibiotic prescription is a major concern in terms of public health, since infections are the most frequent cause of childhood disease. Irrational prescribing is a habit which is difficult to counteract and this may lead to ineffective treatment, health risks, patient non-compliance, drug wastage, wasting resources and unnecessary expenditure. **Objective:** The aim of this hospital-based cross sectional study was to assess the pattern of Injectable antibiotic prescription and its use in the in-patient Pediatric ward of Ambo Hospital. **Methods:** Retrospective cross sectional study of medication records of hospitalized pediatric patients who received injectable antibiotic from February, 2013 to February, 2014 GC at in-patient pediatrics ward of Ambo Hospital. The study employed a cross-sectional quantitative survey. **Results:** At the Ambo Hospital from February, 2013 to February, 2014 GC, totally 1524 children were admitted and 1156(75.85%) of them were treated with the injectable antibiotics. A total of 512 client documents were collected and analyzed out of which 292 (57.03%) were male and 220(42.92%) were female. Pneumonia was most frequently seen and treated at all age groups that was 27.34%, 13.67%, 3.71%, 4.88% and 1.17% for 0-1, 1-3, 3-5, 5-10 and 11-14 years age groups. Chloramphenicol injection +Penicillin-G crystalline 161(53.48%) were the most frequently prescribed combined antibiotics while ceftriaxone accounted for 198(38.66 %) of the single frequently prescribed injectable antibiotic. Most often an inappropriate use of injectable antibiotics prescribed was interms of inappropriate indication; ceftraxone 93(39.9%) and Cloxacillin

injection 11(73.33%) and CAF injection 80(40.40%) of them took this drug for inappropriate duration of treatment which followed by ampicillin 59(64.13%) and gentamicin 49(47.50%) from 92 and 103 pediatric patient who took it respectively. **Conclusion:** In the hospital most frequently antibiotic prescribed were ceftriaxone, CAF, and penicillin G crystalline while Pneumonia was the most frequently diagnosed disease. Significant number of patients was prescribed with inappropriate over all injectable antibiotics as per WHO indicators.

KEYWORDS: *Injectable, antibiotics, pediatrics, in-patient, irrational.*

1. INTRODUCTION

1.1 Background

Antibiotics are powerful and effective drugs in the fight against infectious diseases caused by bacteria and have been frequently used for decades worldwide for effective treatment of a variety of bacterial infections. Antibiotics have saved millions of lives since their first appearance about fifty years ago. Yet, more and more people are dying from infectious disease that were curable but for which we no longer have the right treatment. This, according to the authors, is because certain bacteria are transforming themselves and developing resistance to antibiotics. The prime cause of rapid increase of resistant bacteria in both developing and developed countries is the abuse and inappropriate use of antibiotics. In addition to bacterial resistance to antibiotics, it has given rise to an increased risk of side effects, drug toxicity, and makes the treatment more expensive. The authors state that one of the possible measures to reduce this inappropriate use of antibiotics is rationalization.[1]

Children and infants constitute about 28% of world population and mainly due to under development of immune system, Hormonal imbalance, genetic factors, environmental change, water borne and food borne etc, they are the most susceptible group to diseases than adults. They further argue that pediatricians and other medical personnel who provide health care to infants and children in developing countries face huge challenges in day to day practice due to lack of knowledge about the appropriate drugs. According to the authors, many studies across the globe have shown the inappropriate utilization of antibiotics which are being prescribed for common childhood illnesses which were not caused by bacteria and lead to irrational use of antibiotics which significantly contributes to antibiotic resistance, side effects and cost of the therapy.[2]

Antibiotics are among the drugs most commonly used in health care systems but prescription is mostly made on empirical basis by prescribing broad-spectrum antibiotics.[1, 2] Thus, appropriate drug use utilization studies are important tools to evaluate whether antibiotics are properly utilized in terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use. Regardless of considerable improvements in the availability and control in hospitals, rational antibiotic use is still a worldwide concern.[3]

Antibiotics have saved millions of lives since their first appearance about fifty years ago. Yet, more and more people are dying from infectious disease that were curable but for which we no longer have the right treatment. This is because certain bacteria are transforming themselves and developing resistance to antibiotics.[1, 3]

Antibiotics are an essential part of modern medicine and play a major role both in the prophylaxis and treatment of infectious diseases and are among the drugs most commonly prescribed for children. The issues of their availability, selection, and proper use are of critical importance to the global community. Prudent use of antibiotics will curtail health care costs and potential adverse effects to the individual taking them and also diminishes the wide ecologic effects leading to selection of antibiotic resistant pathogenic organisms.[4]

The most recent estimates suggest that neonatal mortality is responsible for 41% of the total under age five mortality, or approximately 3.1 million neonatal deaths per year. Approximately 99% of these deaths occur in developing countries, and most are attributable to preterm birth (28%), severe infections (26%), and asphyxia (23%). Case-fatality rates for severe bacterial infections in developing countries are high, in part due to late or inadequate administration of the necessary antibiotics.[5]

Ceftriaxone is one of the most commonly used antibiotics due to its high antibacterial potency, wide spectrum of activity and low potential for toxicity.[6] Appropriate use of antibiotics is important from a clinical perspective and usually, the selection of antibiotic drugs should be based on the microbiological data on bacterial sensitivity. Regular patient card review, reducing the spectrum of coverage, and monitoring response as well as duration of therapy can contribute to rational use of antibiotics.[7]

1.2. Statement of the Problem

Previous studies showed that inappropriate use of antibiotics is central to limiting the development and spread of resistant bacteria in hospitals and community.[8] Antibiotics are

the most widely prescribed therapeutic agents in children. This is particularly true for children under-5-year-old as they are reported to receive the greatest exposure with a prevalence of up to 50%.[9]

Majority of patients were prescribed drugs irrationally without doing any laboratory investigations. Overall extensive poly-pharmacy and poly-pharmacy among antimicrobial agents was noticed. Pediatric population is prone to suffer from recurrent infections of the respiratory tract and gastrointestinal system and lower respiratory tract infections are the leading causes of death in children below 5 five years of age.[10]

The overuse, underuse or misuse of medicines results in wastage of scarce resources and widespread health hazards. Examples of irrational use of medicines include use of too many medicines per patient ("poly-pharmacy"); inappropriate use of antimicrobials, often inadequate dosage; over-use of injections when oral formulations would be more appropriate; failure to prescribe in accordance with clinical guidelines; non-adherence to dosing regimens.[11] Antimicrobial resistance is an increasing problem worldwide, impacting infection control efforts and costs of antimicrobial treatment.

Ethiopian hospitals consume about 50% of the national drug budget, which are considered to have high drug budget compared to the population segment using these health facilities.[12] However, very little is known how drugs (particularly antibiotics) are used in hospitals like in other health facilities. Therefore, the objective of the present study was to assess the Pattern of Inject able Antibiotic prescription and It's Use in Ambo Hospital in-patient Pediatric Ward.

1.3 Significance of the Study

The data regarding pattern of inject able antibiotics use in the Ambo Hospital is scarce or lacking. This study is thus initiated to fill such information gaps of the knowledge, expectations of prescribers and patients, economic incentives, and the regulatory environment. The consequences of inappropriate antibiotic use and resistances are severe and can result in unnecessary health care expenditure, treatment failures and/or adverse drug effects. By determining the pattern of Inject able antibiotic use in the hospital, it is hoped to overcome these problems. Additionally this data can generate baseline information for those who want to make a research on this issue in the future.

2. OBJECTIVE

2.1 General Objective

To assess the pattern of injectable antibiotic prescription and its use in Ambo Hospital in-patient Pediatric Ward.

2.2 Specific Objectives

1. To identify the common class of injectable antibiotic prescribed and indication for therapy.
2. To assess number of single or combination of injectable antibiotics in the prescription.
3. To investigate the appropriateness of injectable antibiotic prescribed.

3. METHODOLOGY

3.1 Study Design

A hospital-based retrospective cross sectional study was conducted among in-patient pediatric Population admitted at Ambo Hospital.

3.2 Study area and period

The study was conducted in Ambo Hospital. Ambo Hospital is located in West Shoa Zone, Oromia Regional State, Ethiopia. Ambo town is the capital city of West Shoa Zone and located at 114km west of Addis Ababa. Ambo hospital is the only hospital that is found in the town. The hospital gave services for about 18,000 patients within the last six months that is from July 2005 E.C.to December 2006 E.C.

The study was conducted from March 30/2014 G.C to June 30/2014 G.C

3.3 Source Population: - In-patient Pediatric Population admitted at Ambo Hospital within the last one year period.

3.4 Study population

In-patient pediatric population < 14 years of age was included in the study sample.

3.5 Eligibility criteria

3.5.1 Inclusion

All Pediatric population < 14 years of age who were admitted to in-patient pediatric ward and received injectable antibiotic.

3.5.2 Exclusion criteria: Children >14 years of age and who did not receive injectable antibiotics was not be part of the study.

3.6 Sample Size determination

The sample size was determined using the formula for estimating a single population proportion.

$N_i = [(Z\ a/2)^2 p\ (1-p)]/d^2$

Where,

Zα/2 is probability coefficient for desired interval [CI = 95%],

n_i = minimum sample size determined,

P = proportion of population possessing characteristics of interest /50% prevalence/,

d = margin of sampling error tolerated (5%),

1-p = proportion of population that do not possess the character of interest.

$n_i = (1.96)2*0.5[1-0.5]/(0.05)^2 = 384$

Since our population (N) is less than 10,000, we divide the sample size obtained above by $1 + \frac{n_i}{N}$ where

n_i = initial sample size (n_i=384)

N =legal study population (N=1156)

$$n_f = \frac{n_i}{1+\frac{n_i}{N}} = \frac{384}{1+\frac{384}{1156}} \approx 512$$

Source of Data

Patient chart

Prescription orders.

3.7 Sampling Technique

First all patient cards within the past 12months were collected together, then those children prescribed to injectable antibiotics were identified among all and the patient card was arranged based on Card Number then the first Patient card will be selected using simple random sampling finally the actual procedure for data collection was selected by systematic sampling.

3.8 Data collection method and tool

3.8.1 Data Collection Tools

All relevant data was collected from the patients' medical records and prescription. Details of the record include patients' demographic data, antibiotic use, indication of injectable antibiotics, and parameter of antibiotic choice, route, dose, timing and duration. After reviewing of relevant literatures from previous similar studies and other materials; checklist that could address the objectives of the study was developed and/or adapted. One male and female Pharmacy students were recruited as data collectors. Prior to the data collection, the data collectors were oriented about the objective of the study and how to collect the necessary information to attain the study objectives.

3.8.2 Instrument

Checklist was used as an instrument to collect relevant data for the study.

3.9 Data Analysis

The collected data was cleared and checked for completeness and it was analyzed in terms of frequencies, percentage and appropriate graphic presentations were used for describing data.

3.10 Data Quality Assurance

To assure quality of the data, relevant checklist was prepared and the data collectors were also be given proper training and orientation on the purpose and objective of the study and the ongoing procedure.

Close follow up was done by supervisor and principal investigator, the check list was checked for its completeness and errors have been corrected accordingly. Pretest was also another method in assuring quality of data which was performed on 10% of the sample other than the actual study participants.

3.11 Study variables

3.11.1 Dependent (outcome) variables

The dependent variables in this study are injectable antibiotic prescription and Injectable antibiotic use.

3.11.2 Independent (exposure) variables

Socio – demographic variables: age, sex, residence.

3.12 Operational Definitions

Antimicrobial: - Any substance of natural, synthetic or semi synthetic origin which at low concentrations kills or inhibits the growth of micro-organisms but causes little or no host damage.

Antibiotic: - The term antibiotic is used as a synonym for antibacterial used to treat bacterial infections. Source of Definition is World Health Organization (WHO).

3.13 Ethical consideration: Ethical clearance will be reviewed and approved by Ambo University College of Medicine and Health Sciences, Department of Pharmacy. The survey was commenced after written consent obtained from department of Pharmacy. Informed verbal consent was secured for each study subjects. Each respondent was informed about the objective of the study and assurance of confidentiality.

3.14 Dissemination and utilization of results

The thesis was presented to Ambo University (AU) department of Pharmacy, AU library, Ambo town Health Office. And the finding of this study was disseminated through presentation. The hard and soft copy of the thesis was made available for all bodies concerned with the issue.

3.15 Limitation of the study: The limitation of the study could be budget constraint and lack full information about admitted children because of poor documentation on their cards.

4. RESULT AND DISCUSSION

This part of the paper is, devoted to presenting the results of data analysis and followed by discussion of the obtained results.

4.1 Socio- demographic characteristic: A total of 512 client documents were collected and analyzed out of which 185 (36.1%) were male of age 0-1years and 129(25.2%) of them were females of the same age. The other age category of children who got injectable treatment in the Hospital was 1-3 years and in this age group there were 70(13.7%) males and 39(7.6%) females. In the age category of 5-10 years 14 (2.7%) males and 28 (5.5%) females received injectable treatment at Ambo Hospital. The last age category (11-14 years) comprised of 5(1.00%) male and 7 (1.4%) females. From total pediatrics admitted, 380 (74.21%) of them were from ambo town while 132 (25.78%) of them where from rural areas around Ambo town.

Table 1: Socio-demographic characteristic of In-Patient Pediatric Ward, from February, 2013 to February, 2014 GC. N= 512

Age	Sex			
	Male)		Female	
	(frequency	Percent (%)	(frequency	Percent (%)
0-1	185	36.10	129	25.20
1-3	70	13.70	39	7.60
3-5	18	3.50	17	3.30
5-10	14	2.70	28	5.50
11-14	5	1.00	7	1.4
Total	292	57.03	220	42.96
Residence	Urban	380 (74.21%)		
	Rural	132 (25.78%)		

This study showed that the pattern of injectable antibiotic prescriptions at Pediatric ward of Ambo Hospital for preschool children was relatively higher compared to other pediatric age groups. This is similar with research at Hawassa University Referral Hospital.[14] From the pediatric patients admitted to pediatric ward of Ambo Hospital and who used injectable antibiotics 380 (74.21%) were from areas outside Ambo city (rural) and 132 (25.78%) were from the city.

At the Ambo Hospital from February, 2013 to February, 2014 GC, totally 1524 children were admitted and 1156(75.85%) of them were treated with the injectable antibiotics which was less than research done at Hawassa University Referral Hospital the frequency and percentage of Injectable prescription was 1729 (93.6%).[15] But more than study done by Rasi et al. where 52.90% of the children studied received at least one antibiotic[16] and Study done on Dessie referral hospital Parental route 135 (35.70%).[17] This study concluded that there was high antibiotic usage in pediatric population like the other study done by Ciofi et al.[18]

4.2 Clinical characteristics of the patients

At the in-patient pediatric ward of Ambo Hospital pneumonia was most frequently seen and treated at all age groups that was 27.34%, 13.67%, 3.71%, 4.88% and 1.17% for 0-1, 1-3, 3-5, 5-10 and 11-14 age groups respectively. 136(26.60%) Sepsis, 50(9.60%) acute gastro entries 50(9.76%) and 34(6.60%) meningitis were the most frequently diagnosed disease respectively next to pneumonia.

Table 2: The Most Frequently Diagnosed Disease In-Patient Pediatric Ward, from February, 2013 to February, 2014 GC. N= 512

Age	Diagnosis								
	Pneumonia	**Sepsis**	**Meningitis**	**AGI**	**NT**	**Croup**	**SAM**	**AFI**	**Other**
	Fr (%)	**Fr (%)**	**Fr (%)**	**Fr (%)**	**Fr (%)**	**Fr (%)**	**Fr (%)**	**Fr (%)**	
0-1	140 (27.34)	117(22.9)	18(3.50)	30(0.58)	0(0.00)	0(0.00)	8(1.56)	0(0.00)	1(0.19)
1-3	70(13.67)	14(2.73)	5(0.97)	10(1.95)	0(0.00)	2(0.39)	6(1.17)	2(0.39)	0(0.00)
3-5	19(3.71)	3(0.58)	2(0.39)	5(0.97)	0(0.00)	2(0.39)	2(0.39)	2(0.39)	0(0.00)
5-10	25(4.88)	2(0.39)	7(1.40)	4(0.78)	2(0.39)	0(0.00)	0(0.00)	0(0.00)	2(0.39)
11-14	6(1.17)	0(0.00)	2(0.39)	1(0.19)	3(0.58)	0(0.00)	0(0.00)	0(0.00)	0(0.00)
Total	260(50.78)	136(26.6)	34(6.60)	50(9.76)	5(0.97)	4(0.78)	16(3.12)	4(0.78)	3(0.58)

Pneumonia cases were generally found to be the most frequently observed and treated cases at the Ambo Hospital 260(50.78%) but less frequent than research done Vanivilas Hospital, Bangalore and the result of which showed that pneumonia accounted for (56.00%) of the cases.[19] Sepsis 136(26.6%), acute gastro entries 50(9.76%), meningitis 34(6.60%), SAM 16(3.12%), Neonatal tetanus 5(0.97%), croup 4(0.78%) and AFI 4(0.78%) were found to be the frequently treated diseases at the hospital ward next to pneumonia in their descending order.

Table 3: Guidelines for injectable antibiotics the Management of Common Illnesses in Hospitals Pediatric Care: Ethiopia pocket book (First Edition, 2010) and STG of Ethiopia

Disease condition	Drugs recommended	Dosage	Frequency of Administration	Duration
Severe Pneumonia	Benzyl penicillin,	50,000 units/kg/24hrs IM OR IV	QID	For at least 3 days
Very severe pneumonia	ampicillin plus	50 mg/kg IV/IM	QID	for 5 days
	Gentamicin	7.5 mg/kg IM	once a day	
Alternatively	chloramphenicol OR	25 mg/kg IM or IV	QID	until the child has improved
	Ceftriaxone	80 mg/kg IM or IV once daily	once daily	
	Gentamicin plus	7.5 mg/kg IM	once a day)	daily for a total of 10 days and cloxacillin oral a total course of 3 weeks
	cloxacillin	50 mg/kg IM or IV	QID	
Neonatal sepsis	Penicillin G Sodium Crystalline *Plus*	50,000 IU/kg	QID	For 10 day
	Gentamicin	5 mg/kg /day IM	TID	
Pyogenic meningitis	Crystalline penicillin *plus*	50,000 IU/kg IV followed	by single dose	10-15 days
		250,000 IU/kg/24 hours IV	divided in 8 doses (Q 3 hourly)	
	Chloramphenicol,	50 mg/kg IV followed by	single dose	
		100 mg/kg/24 hours	divided in to four doses (Q 6 hourly)	
Neonatal tetanus	Tetanus Immune Globulin (TIG), *Plus*	500–3000 IU IM should be given - -	--	---
	Penicillin G Sodium Crystalline, *Plus*	50,000 IU/kg/24hrs	QID	For ten days
	Chlorpromazine,	1.6 mg/kg/24 hours IV/IM	divided in to 4 doses	----
Croup	Dexamethasone,	0.6mg/kg IM.	single dose	
	Procaine penicillin G	12,500–25,000 U/kg	BID	Until the patient can swallow comfortably
SAM	Broad–spectrum antibiotics	------	----	------

Ceftriaxone 198 (38.66%), which was most frequently prescribed and followed by

CAF 6 (1.17%), Cloxacillin 1(0.19%) and Penicillin-G crystalline 6(1.1%) respectively.

Table 4: The most frequently prescribed single injectable antibiotic for pediatric in-patients, from February, 2013 to February, 2014 GC. N= 512

Drug	Ceftriaxone		CAF injection		Penicillin-G crystalline		Cloxacillin injection	
	Fr	(%)	Fr	(%)	Fr	%	Fr	%
0-1	110	21.48	0	0.00	3	0.58	1	0.19
1-3	49	9.57	2	0.39	0	0.00	0	0.00
4-5	14	2.73	2	0.39	1	0.19	0	0.00
6-10	19	3.71	2	0.39	2	0.39	0	0.00
11-14	6	1.17	0	0.00	0	0.00	0	0.00
Total	198	38.67	6	1.17	6	1.17	1	0.19

One of the most frequently prescribed medications in Ambo Hospital in-patient Pediatric ward was ceftriaxone injection at all age categories (0-14 years). It was generally found that ceftriaxone accounted for 198(38.66 %) of the single frequently prescribed inject able antibiotic at Ambo Hospital followed by CAF 6(1.17%), Penicillin-G crystalline 6(1.1%) and Cloxacillin 1(0.19%). This contradicts with the result of study conducted at Hawassa University Referral Hospital where pencillin G was found to be the most frequently prescribed single antibiotic followed by followed by ceftriaxone 128 (24.9%), cloxacillin injection 66 (12.84%), ampicillin injection 58 (11.28%), gentamicin injection 51 (9.92%) and chloramphenicol injection 28 (5.45%).[14] According to a study done on prescribing pattern of drugs in pediatric wards of three Ethiopian hospitals, antibiotics, particularly chloramphenicol and penicillin G were the most frequently prescribed individual drugs and this also contradicts with the practice at Ambo Hospital.[17]

From the different combinations of injectable antibiotics prescribed at ambo hospital pediatric Ward Chloramphenicol + Penicillin-G crystalline was the most prescribed 161(31.50%) followed by Ampicillin + Gentamicin 92(17.96%), Procaine penicillin + Gentamicin 7(1.36%), Ceftriaxone + Cloxacillin 6(1.17%), ceftriaxone + Gentamicin 3(0.58%), Cloxacillin injection + Penicillin-G crystalline + CAF injection 3(0.58%), CAF injection + Ceftriaxone + Cloxacillin injection 3(0.58%), CAF injection + cloxacillin injection 2(0.39%), Gentamicin + Penicillin-G crystalline 1(0.19%) were also prescribed in at the Hospital.

Table 5: The most frequently prescribed combined injectable antibiotics for in-patient pediatric ward, from February, 2013 to February, 2014 GC. N=512

Drugs	Age (in years)					
	0-1	1-3	3-5	5-10	11-14	Total
	Fr (%)	Fr (%)	Fr (%)	Fr (%)	Fr (%)	Fr (%)
CAF+Penicillin-G crystalline	95(18.50)	40(7.80)	14(2.73)	11(2.10)	1(0.19)	161(31.50)
Ampicillin + Gentamicin	84(6.80)	8(1.56)	0(0.00)	0(0.00)	0(0.00)	92(17.96)
Ceftriaxone + CAF	5(0.98)	3(0.58)	3(0.58)	8(1.60)	4(0.78)	23(4.50)
Procaine penicillin + Gentamicin	2(0.39)	5(0.98)	0(0.00)	0(0.00)	0(0.00)	7(1.36)
Ceftriaxone + Cloxacillin	6(1.17)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	6(1.17)
Cloxacillin + Penicillin-G crystalline + CAF	3(0.58)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	3(0.58)
CAF + Ceftriaxone + Cloxacillin	3(0.58)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	3(0.58)
ceftriaxone + Gentamicin	2(0.39)	1(0.19)	0(0.00)	0(0.00)	0(0.00)	3(0.58)
CAF + Cloxacillin	1(0.19)	0(0.00)	1(0.19)	0(0.00)	0(0.00)	2(0.39)
Gentamicin + Penicillin-G crystalline	0(0.00)	1(0.19)	0(0.00)	0(0.00)	0(0.00)	1(0.19)
Total	201	58(11.32)	18(3.52)	19(3.71)	5(0.98)	301(58.78

From the total of 512 pediatric inpatients from the age of 0-14 years studied, 161(31.5%) of them took the combined form of CAF injection + Penicillin-G crystalline at the Ambo Hospital. However, the combination of CAF and Penicillin-G crystalline was frequently prescribed for very young children (0-1) compared to other age categories. This contradicts with the result of study conducted at Hawassa Referal Hospital where Ampicillin injection plus Gentamicin injection was found to be prescribed most of the time.[14]

Ampicillin + Gentamicin 92(17.96%), Procaine penicillin + Gentamicin 7(1.36%), Ceftriaxone + Cloxacillin 6(1.17%), ceftriaxone + Gentamicin 3(0.58%), Cloxacillin injection + Penicillin-G crystalline + CAF injection 3(0.58%), CAF injection + Ceftriaxone + Cloxacillin injection 3(0.58%), CAF injection + cloxacillin injection 2(0.39%), Gentamicin + Penicillin-G crystalline 1(0.19%), were also prescribed in their descending order at the Hospital. This contradicts with the result of study conducted at Hawassa Referal Hospital where Ampicillin injection plus Gentamicin injection 113 (27.20%), Chloramphenicol injection + Penicillin-G crystalline 35 (8.41%) was found to be prescribed most of the

time.[14] Another study conducted on prescribing pattern of antibiotics in pediatric hospital of Kathmandu Valley revealed that, infants are at special risk for receiving multiple courses of antibiotics and it suggested the control of antibiotic usage to curb the problem.[20]

From the different combinations of injectable antibiotics prescribed at Ambo Hospital Pediatric Ward Ampicillin injection + Gentamicin injection was the most rationally prescribed one 87(28.90%) followed by Ceftriaxone + Chloramphenicol 23(7.64%) and ceftriaxone + Gentamicin 3(0.99%). However Chloramphenicol injection +Penicillin-G crystallin 161(53.48%) was the most irrationally prescribed and followed by Ceftriaxone + Cloxacillin injection 6(1.99%), Ampicillin + Gentamicin injection 5(1.66%), Chloramphenicol + Ceftriaxone + Cloxacillin injection 3(0.99%) and Cloxacillin injection + Penicillin-G crystalline + Chloramphenicol injection 3(0.99%); Chloramphenicol + Cloxacillin injection 2(0.66%). But Chloramphenicol injection +Penicillin-G crystalline was most frequently prescribed inappropriately 161(53.48%).

Table 6: Rationality of the Combined Injectable Antibiotic Prescribed for in-patient pediatric ward of Ambo Hospital, from February, 2013 to February, 2014 GC. N=301

Combined drug	No. of pediatric in patient (%)	
	Appropriate	In appropriate
	Frequency (%)	Frequency (%)
CAF + Penicillin-G crystalline	0(0.00)	161(53.48)
Ampicillin + Gentamicin	87(28.9)	5(1.66)
Ceftriaxone + CAF injection	23(7.64)	0(0.00)
Procaine penicillin + Gentamicin	7(2.30)	0(0.00)
Ceftriaxone + Cloxacillin	0(0.00)	6(1.99)
Ceftriaxone + Gentamicin	3(0.99)	0(0.00)
CAF + Cloxacillin	0(0.00)	2(0.66)
Gentamicin + Penicillin-G crystalline	1(0.33)	0(0.00)
CAF + Ceftriaxone + Cloxacillin	0(0.00)	3(0.99)
Cloxacillin + Penicillin-G crystalline + CAF	0(0.00)	3(0.99)
Total	121(40.19)	180(59.80)

Pneumonia cases were generally found to be the most frequently observed and treated cases at the Ambo Hospital 260(50.78%), but the treatment is irrational according to STG for General Hospitals 2010.[21] There was no difference in efficacy between Chloramphenicol alone and combination of Benzyl penicillin and chloramphenicol for severe pneumonia treatment.[17] Neonatal sepsis were predominantly appropriately or rationally treated with Ampicillin + Gentamicin 87(28.90%) in this study as per STG of Ethiopia.[21] Cloxacillin +

Penicillin-G crystalline + CAF 3(0.99%) and CAF + Ceftriaxone + Cloxacillin 3 (0.99%) is used for treatment of severe pneumonia, respectively in Ambo Hospital pediatric ward. These were irrational according to STG for general Hospitals 2010.[21] Appropriate drug use utilization studies are important tools to evaluate whether antibiotics are properly utilized in terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use.[3]

Most often an inappropriate use of injectable antibiotics prescribed was interms of inappropriate indication; ceftraxone 93(39.9%) and Cloxacillin injection 11(73.33%), CAF injection 80(40.40%) and Penicillin-G crystalline 5(2.92%). Followed by the inappropriate duration of treatment; Ampicillin injection 59(64.13%), Gentamicin 49(47.5%), Penicillin-G crystalline 32(18.71%) and ceftriaxone 13 (5.57%). And then inappropriate dose; Gentamicin 7(6.79%), CAF 3(1.51%), Penicillin G crystalline 3 (1.75%) followed by inappropriate frequency; Ampcillin 15(16.30%), CAF 2(1.01%), Penicillin G crystalline 4(2.33%).

Table 7: Summary of inappropriate use of injectable antibiotic by using WHO indicator with Ethiopian STG in-patient pediatric ward of Ambo General Hospital. From February, 2013 to February, 2014 GC.

Drug use evaluation indicators	Number of errors with injectable antibiotics					
	Ceftriaxone (N=233)	Ampicillin (N=92)	Gentamicin (N=103)	Cloxacillin (N=15)	CAF (N=198)	Penicillin G crystalline (N=171)
	Fr (%)	Fr (%)	Fr (%)	Fr (%)	Fr (%)	Fr (%)
Indication	93(39.9)	3(3.26)	8(7.76)	11(73.33)	80(40.40)	5(2.92)
Dose	0(0.00)	0(0.00)	7(6.79)	0(0.00)	3(1.51)	3(1.75)
Frequency	0(0.00)	15(16.30)	0(0.00)	0(0.00)	2(1.01)	4(2.33)
Duration	13(5.57)	59(64.13)	49(47.5)	0(0.00)	0(0.00)	32(18.71)

From 233 ceftriaxone and ceftriaxone containing combination prescribed 93(39.90%) of it were inappropriately indicated while 13(5.57%) were given for inappropriate duration of treatment. CAF and CAF contain regimen were prescribed for 198 pediatric patients. From these patients 80(40.40%), 3(1.51%) and 2(1.01%) of them were took inappropriate indication, dose and frequency respectively. Likewise out of 117 pediatric patients who took a penicillin G crystalline, 32(18.71%) of them took this drug for inappropriate duration of treatment which followed by ampicillin 59(64.13%) and gentamicin 49(47.50%) from 92 and 103 pediatric patient who took it respectively. Out of 92 pediatric patients who took Ampicillin 15(16.30%) of them took inappropriately in terms of frequency and followed by

penicillin G crystalline and CAF which were not in line with STG of Ethiopia and WHO.[21, 22]

Gentamicin prescription at Ambo Hospital was inappropriately prescribed in terms of duration 49(47.50%), Indication 8(7.76%) and Dose 7(6.79%). This contradicts with the result of study conducted at where the appropriateness of use of amino glycosides was found to be 72.10% for indication, 86.30% for dose and 84.80% for duration.[23]

Ceftriaxone prescription at Ambo Hospital was found to be not in line with Ethiopian national STG. This supports the result of study conducted in Dessie Referral Hospital where prescribers did not stick to WHO set criteria.[6] The result of this study showed that inappropriate use of ceftriaxone at Ambo Hospital was high. With regard to the inappropriateness of Ampicillin injection prescription, duration of therapy was found to be the most frequent one.

Crystalline penicillin prescription at Ambo Hospital showed that inappropriate use was seen with duration of therapy. This supports the results of Study done on crystalline penicillin utilization pattern in pediatric ward of Jimma University Specialized Hospital where the majority of inappropriateness of crystalline penicillin use was seen with dose and duration of therapy. The dose of crystalline penicillin in most pediatric patient was not calculated as per the weight of the Patient to minimize over or under dosing[24], irrationally with misleading indications without confirming the bacteriological culture sensitivity.[25]

In the present study, there is sound able irrationality of utilizing and use antibiotics in this study area in terms of indication, duration, frequency, dose and duration in treatment of a given disease with antibiotics particularly with injectable antibiotics which is similar with many other studies done in the other World and in the country.[13, 26, 27]

Out of 512 admitted pediatric patients 76(14.84%) of them took Ringer lactate + ceftriaxone combination. This contradict study done on American Academy of Pediatrics the concurrent use of intravenous ceftriaxone and calcium-containing solutions in the newborn and young infant may result in a life-threatening adverse drug reaction.[28]

In patients of any age ceftriaxone must not be mixed or administered simultaneously with any calcium-containing IV solutions, even via different infusion lines or at different infusion sites. Concomitant administration of ceftriaxone with calcium-containing solutions or

products is likewise contraindicated, even via different infusion lines; 48 hours should elapse between the last dose of ceftriaxone and their use. Cases of fatal reactions with calcium-ceftriaxone precipitates in the lungs and kidneys have been reported in both term and premature neonates, according to an alert sent from Med Watch, the FDA's safety information and adverse event reporting program. Some of these cases occurred when ceftriaxone and the calcium-containing products were administered by different routes at different times.[29, 30]

From the total of (N=812) drugs prescribed Penicillin 278(34.23%) were most commonly used, followed by cephalosporins, Ceftriaxone 233(28.69%); Chloramphenicol 198(24.38%); and aminoglycosides, Gentamicin 103(12.68%) respectively.

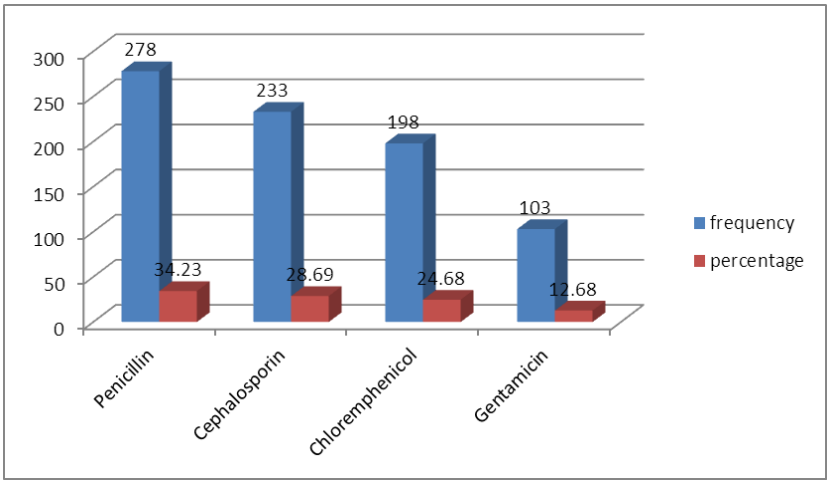

Fig. 1: Summary of pattern of injectable antibiotic prescription and its use in Ambo Hospital in patient pediatric ward from February, 2013 to February, 2014 GC.

Injectable antibiotics were the major drug prescribed in Ambo Hospital pediatric ward. Among them penicillins 278(34.23%) and Cephalosporin (Ceftriaxone) 233(28.69%) were most commonly used, this is greater than research done at Singapore where Penicillins accounts for 28.75% and Cephalosporins accounts for 17.50%. In this present study, Gentamicin 103(12.68%) was prescribed which was less than the result of study conducted at Singapore where aminoglycosides accounts for 23.33% .[31]

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Generally, we can conclude that there was high percentage of injectable antibiotic use. In the hospital most frequently antibiotic prescribed were ceftriaxone, CAF, and penicillin G

crystalline, and pneumonia was the most frequently diagnosed disease. More than half of admitted pediatrics were irrationally took combination of antibiotics, and also significant number of patients were prescribed with inappropriate over all injectable antibiotics as per WHO indicators.

5.2 RECOMMENDATIONS

To improve rational use and prevent the development of resistance, encourage all health workers to use standard treatment guidelines, intensification of short term trainings. And it needs giving training on awareness of medication administration. The nurse and physician as well as pharmacist good team sprit may decrease the inappropriate administration and use of medications. Hospital should have Drug therapeutic Committee (DTC) that can evaluate incorrect prescription; and antibiotic control systems are some of the possible solutions the hospital has to do.

REFERENCES

1. Jayakar B, Aleykutty NA and Mathews MS. Changes in daily defined doses of antibiotics after restricted use in medical inpatients. Journal of Applied Pharmaceutical Science, 2011; 01(06):220-222.
2. Moorthi C, Rachel PP, Srinivasan A and Senthil Ck. Irrational use of antibiotics in pediatric prescriptions. Journal of Scholars Research Library, 2011; 3(3): 171-177.
3. Dukes M. Drug utilization studies Methods and Uses. WHO Regional Publications. Last Accessed on July, 2012.
4. Abula T, Kedir M. The pattern of antibiotic usage in surgical in-patients of a teaching Hospital. Ethiop J. Health Dev, 2004; 18(1): 35-38.
5. Coffey P, Kelly K, Baqui A, Bartlett A et al. Case Study Injectable Antibiotics for Treatment of Newborn Sepsis. Prepared for the United Nations Commission on Commodities for Women's and Children's Health, 2012.
6. Ayinalem GA et al. Drug use evaluation of ceftriaxone in medical ward of Dessie North East Ethiopia. International Journal of Basic & Clinical Pharmacology, 2013; 2(6):711-717.
7. Kiivet KA, Kiivet RA, Dahl ML, Lerena A, Maimets M, Wettermark B, Berecz R. Antibiotic Use in 3 European University Hospitals. Scand. Journal Infect Dis.1998; 30:277- 280.

8. Food, Medicine and Health Care Administration and Control Authority (FMHACA), Ethiopia. Antimicrobial use, resistance and containment baseline survey, syntheses of findings, Addis Ababa, Ethiopia, 2009.
9. Shamshy K, Begum M, Perumal P. Drug Utilization of Antimicrobial drug in Pediatrics Population in a tertiary care hospital in Erode, Tamilnadu, India. Int. Journal Pharm Tech Res, 2011; 3(3).
10. Ghai, Vinod K Paul, Aravind Bagga. Disorders of respiratory system. Essential Pediatrics. 7th edition.2009; 351-352.
11. Aaron Glyn Sosola. An Assessment of Prescribing and Dispensing Practices in Public Health Facilities of Southern Malawi. 2007.
12. Ministry of Health. Master plan for the Ethiopian national drugs programme Addis Ababa, 1994.
13. Ansam S, Ghada AB, Laila A, Waleed S, Rowa AR, Nidal J. Pattern of Parentera antimicrobial prescription among pediatric patients in Al-Watani government hospital in Palestina. An-Najah Univ. Journal Res. 2006; 20:191-206.
14. Suleman S, Woldu et al. Retrospective Study of the Pattern of Antibiotic Use in Hawassa University Referral Hospital Pediatric Ward. Journal of Applied Pharmaceutical Science, 2013; 3 (02): 093-098.
15. Getachew E, Aragaw S, Adissie W and Agalu A. Antibiotic prescribing pattern in a referral hospital in Ethiopia. Global Science Research Journals, 2012; 1 (1): 078-082.
16. Resi D, Milandri M, Moro ML, Emilia R study group. Antibiotic prescriptions in children. Journal Antimicrob Chemother, 2003; 52:282-6.
17. Cetinkaya F, Gogremis A and Kutluk G. Comparison of Two Antibiotic Regimens in the Empirical Treatment of Severe Childhood Pneumonia. Indian Journal Pediatr ,2004; 71 (11): 969-972.
18. Ciofi ML, Raponi M, Tozzi AE, Ciliento G, Ceradini J, Langiano T. Point prevalence study of antibiotic use in pediatric hospital in Italy. Journal of Euro Surveillance 2008; 13(41):1-4.
19. Vishwanath M, Narayana SR. and Sahana D. Assessment of drug utilization in hospitalized children. Journal of Chemical and Pharmaceutical Research, 2014; 6(2):592-598.
20. Palikhe N. Prescribing Pattern of Antibiotics in Pediatric Hospital of Kathmandu Valley. Journal of Nepal Health Research Council, 2004; 2 (2).

21. Drug administration and control authority of Ethiopia. Standard treatment guidelines for general Hospital, Second edition January 2010; 1-434.
22. WHO. Guide lines for management of common illness with limited resources, 2005
23. Siby john. A study on review of aminoglcoside usage in pediatric population at J S S teaching hospital. 2002.
24. Siraj J, Ahmed MS. Evaluation of Crystalline Penicillin Use in Pediatrics Ward of Jimma University Specialized Hospital. CPECR an open access journal, 2013; 3(4).
25. Das BP et al. Antimicrobial utilization pattern in outpatient services of ENT department of tertiary care hospital of Eastern Nepal. Kathmandu University Medical Journal, 2005; 3:4.
26. Abdulkareem M, Al-Shami et al. The Quality of Prescriptions with Antibiotics in Yemen. Journal of Clinical and Diagnostic Research, 2011; 5(4): 808-812.
27. Jha V, Abid M, Mohanata GP, Patra A, kamalkishore, Khan NA. Assessment of antimicrobials use in pediatrics in Moradabad city. I. Journal O.P, 2010; 3(1): 19-24.
28. John SB, Ronald T, Wassel P, Lucia L , Sumathi N. Intravenous Ceftriaxone and Calcium in the Neonate. official Journal of the American academy of pediatrics, 2014;123(4).
29. http://www.hma.eu/fileadmin/dateien/Human_Medicines/CMD_h_/Product_ Information/PhVWP_Recomm.
30. http://www.fda.gov/Drugs/DrugSafety/Postmarket Drug Safety Information for Patients and Providers.
31. Shankar PR, Upadhyay DK, Subish P, Dubey AK, P Mishra. Prescribing patterns among pediatric inpatients. Singapore Med J, 2006; 47(4): 261 – 265.