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RETROSPECTIVE DRUG USE EVALUATION OF ANTIBIOTICS IN PEDIATRIC WARD OF SHAMBU GENERAL HOSPITAL, OROMIA REGION, WEST ETHIOPIA

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ABSTRACT

Background: Antimicrobial agents are among the most used therapeutics and widely misused of all drugs. These irrational and uncontrollable uses of antibiotics will increases resistance, potential adverse effects and cost. The pediatric medication use process is complex and error prone because of multiple steps requires in calculating, verifying, preparing and administering doses. Bioavailability, pharmacokinetics, Pharmacodynamics, efficacy and adverse effect information can differ markedly between pediatric and adult patients as well as among pediatric patients. Thus through drug use evaluation this issue will be addressed rationally **Objective**:-To evaluate the rationality of antibiotics use in Pediatric ward of Shambu General Hospital. **Methods:** A retrospective descriptive cross-sectional study design was conducted based on patient medical records to evaluate the antibiotic drug use. Data was collected using pre-tested questioner which was adapted from different literatures. The collected data was analyzed manually by using scientific calculator after it was edited and checked for error, and organized. The results was presented using tables, graphs and texts as based on the types of data **Result**: Out of 248 study populations during the study period 144(58.1%) were males and 104(41.9%) were females. Majority of the study populations were aged between 1-12 months which accounts 78(31.95%) followed by (0- 1months) with 72(28.1%). Regarding to body weight majority of pediatric patients of the study populations were weighing between 4-9.99kg comprising 92(37.1%) followed by 2.5-3.99 kg which accounts 54(21.77%). Severe pneumonia 68(24.11%) was the commonest infection diagnosed. Gentamycin 152 (25.33%) and Penicillin 206(34.33%) were the most commonly prescribed individual and classes of antibiotics respectively. From the prescribed dosage regimen 496(88.57%), 42(75.35%) and 518(92.5%) were prescribed with appropriate dose, frequency and duration respectively. 577(96.17%) were prescribed in generic name and high dose of chloramphenicol was the contraindicated antibiotic prescribed during the study. **Conclusion and recommendation**: Similar to other settings there was irrational use of antibiotics during prescribing regarding to dosage regimen appropriateness, drug interaction and contraindication. Thus all should be responsible including the physician, pharmacist, hospital administrator, DTC,Ministry of health and patients in reducing the extent of irrational use of antibiotics at every dimension.

KEYWORDS: Antibiotics, Pediatrics, Drug use evaluation, Shambu General Hospital.

INTRODUCTION

Irrational use of medicines in a way that is not compliant with, patient receive medications appropriate to their clinical needs, in dose that meet their own individual requirements for an adequate period of time and at low price cost them and their community. Worldwide more than 50% of all medicines are prescribed, dispensed or sold inappropriately, while 50% of patient fail to take them correctly, more than one third of world population lacks access to essential medicines.[3]

Antibiotics are among the most commonly used and misused of all drugs. Reducing inappropriate antibiotic use is thought to be the best way to control resistance. Although awareness of the consequences of antibiotic misuse is increasing, overprescribing remains widespread, driven largely by patient demand, time pressure on clinicians, and diagnostic uncertainty. It has been estimated by world health organization (WHO) that about half all medicines are inappropriately prescribed, dispensed and sold, and half of all patients fail to take their medicines properly.[1,2]

Excessive and irrational use of antimicrobial drugs is common in all countries. It is particularly troublesome in developing countries where there is a heavy burden of infectious diseases. Therefore promising method should be developed to assure appropriate antimicrobial drugs use.[4]

Infants and children are among the most vulnerable population groups to contract illnesses. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of pediatrics illnesses. The key role of antibiotics for the treatment of infectious diseases that are prevalent everywhere in developing countries may not be denied. However, there are also reports of an irrational use of antibiotics which may even lead to infections that are worse than the originally diagnosed ones.[5,6]

The pediatric medication use process is complex and represents many challenges. For some agents, there is paucity of pediatric data regarding pharmacokinetics and optimal dosage. Clinician must consider important differences among various age groups and the pathogenic species responsible for pediatric infections. Appropriate antibiotic dosing and toxicities must also be considered .The complexity is due to the need of multiple steps requires in calculating, verifying, preparing and administering doses. Bioavailability, pharmacokinetics, pharmacodynamics, efficacy and adverse effect information can differ markedly between pediatric and adult patients as well as among pediatric patients because of differences in age, organ function and disease state.[7,8]

The rational use of drugs demands prescription of appropriate drugs, availability of drugs at right time, in right dose, in right intervals, for the right duration of time, for the right patient and at affordable price Worldwide more than half of all medicines are prescribed inappropriately, while half of patient fail to take them correctly, more than one third of world population lacks access to essential medicines.[3]

Emergence of resistant bacterial pathogens has increased concern about antibiotic prescribing patterns. During the last decades, antibiotics resistance is on the rise; this is mainly due to the abuse of broad spectrum anti biotic in the first line treatment, or erroneous use e.g. treatment of viral respiratory tract infection. Growing misuse of antibiotics has been reported in hospitals, causing untoward toxic effects and various infections due to resistant microorganisms that increase the cost and duration of hospitalization. Increased cost of health care will definitely jeopardizes the capacity of the poor population to seek the modern health care. There is a pressing need to develop appropriate measures to curtail misuse of drugs in general and antibiotics in particular .Besides; a drug use in hospitals has a considerable influence on further drug use outside the hospitals.[10,16] Nosocomial infection cause morbidity, and mortality, and increase the cost of health care. The attributable mortality rate is about 15% for nosocomial blood stream infections, making these infections the eighth cause of death in United States.[11]

The use of antibiotics has become a routine practice for treatment of pediatric illness and no much thought is given to their need, use, their side effects and precautions to be observed during the treatment. There are reports of irrational use of antibiotics may even lead to infections that are worse than that are originally diagnosed. Pediatricians and other health care providers of infants and children in developing countries encounter a number of challenges due to the shortage of the appropriate drugs and other facilities. However; indiscriminate use of antibiotics has to be totally avoided as it is the major factor for the development of microbial resistance to antibiotics.[12,13]

Children are at the three fold greater risk for medication errors than adults and up to 19% of these errors are deemed to be preventable. Information or guidelines for use of medications in children, the miscalculation of doses and the need to either compound oral dosage forms or to dilute commercially available formulations contribute to this proportionate available formulations contribute to this disproportionate rate medication errors in children.[14,15]

Misuse of antibiotic therapy may have an influence on its effectiveness and can potentially expose patients to suboptimal doses which can result in insufficient antibiotic exposure for eradicating infectious bacteria. This may potentially create environment that promotes antibiotics resistance. Misuse of antibiotics therapy has an effect on health care costs, antibiotic resistance, treatment failure, hospitalization time, wasted medication and increased return visits to the physician.[17]

Penicillin resistance *staphylococcus arouses* leads to the need to develop and design other effective drug to them called Methicillin. Again resistance developed to Methicillin by strain called MRSA was a result, shitting to Vancomycin was necessitude. But still there are strains of this bacteria which are resistance to vancomycin (VRSA and VREC) this makes the problem serious, because people infected with strain of this bacteria will transmitted to others and continue suffering from illness, since there is a few option for treatment.[18]

Now a day, antibiotics are the most widely prescribed and used drugs in pharmacotherapy. These groups of drugs have been used irrationally for along as they have been available. Growing misuse of antibiotics have toxic effects, reducing quality of care and various infections due to resistant microorganisms that increase the cost and duration hospitalization unless the drug is investigated, measured and documented. Infants and children are mostly suffering from such problems and it is important to primarily to evaluate antibiotic use at hospital and primary health care levels.

The most challenging in our world today is the development of antibiotics resistance both nosocomial and in the community due to irrational use of drugs which may leads to treatment failure and difficult to manage and control different infectious diseases. Retrospective antibiotics use evaluation will halt in a great extent the problem of development of antibiotics resistance related to irrational use of antibiotics. Therefore the result of this study will provide preliminary data to further investigate the use of antibiotics including under taking of susceptibility test to keep the drugs effectively without the development of resistance by improving and facilitating their rational use.

More over the finding may call for attention of concerned bodies to make decision and take measure in the spirit of improving the rational use antibiotics in Shambu General Hospital at pediatric ward by assessing prescribing pattern, most frequently prescribed antibiotics, drug interaction, duration of treatment, dosage regimen, contraindication issues, common indications and by forwarding necessary recommendations to responsible body.

1. METHOD AND MATERIALS

1.1. Study Area and Period

Shambu hospital has different departments and wards like Outpatient department (OPD), medical ward, gynecology and obstetrics ward, pediatrics ward and surgical ward. It delivers diversified health services and clinics including the emergency services, mother and child health (MCH). laboratory, X-ray, Physiotherapy and follow up of chronic disease like TB ,DM and HIV AIDS. The Hospital possesses outpatient, inpatient, emergency and ART pharmacies. The study was conducted in west Ethiopia, Oromia region, Shambu General Hospital, which is found at 314km from the capital city, Addis Ababa. The study was conducted from January 27, 2018 to February 7, 2018.

1.2. Study design

Hospital based retrospective descriptive cross-sectional study design was used.

1.3. Population

1.3.1. Source population

All pediatrics patient medical history cards in Shambu General Hospital.

1.3.2. Study population

All pediatrics patient medical history cads with antibiotics in Shambu General Hospital at inpatient ward in 2018 G.C.

2.3.3 Eligibility criteria Inclusion criteria

- All complete Pediatrics patient medical history cards with at least one antibiotic of last one year.

Exclusion criteria

- Patient medical history record cards of patients who are admitted for less than 24hrs.
- Patient received topical antibiotics like ointment and drops.
- Patient received ant TB drugs only.

1.4. Sample size determination

The required sample size was calculated using single population proportion formula by considering 44.9% proportion correct antibiotic use in hospitals

$$n = \frac{Z^2 pq}{d^2}$$

$$n = \frac{(1.96) * (1.96) * 0.449(0.551)}{(0.05) * (0.05)}$$

$$= \mathbf{380}$$

Where

N= the required samples size calculated by using single population proportion formula.

Z= Standard score corresponding to 95% CI.

P= Assumed proportion of correct antibiotic use to be 0.5 as p=0.5 gives a maximum sample for the desired CI add degree of precisions because there was no study conducted on the same topic in the hospital.

Q= 1-P =0.5

D= the margin of error tolerable, i.e. 5%

The number of pediatric patients is 625 per year which is less than10, 000, therefore it

Needs to be adjusted using finite population correction formula

Adjusted n = n*N/n+N
= 380*625/380+625
= 236

Where n is calculated sample size and N is the number of pediatric patients per year which is 625 To compensate for incomplete prescription and errors 5% of the size will be added and a total of 248 patient cards will be taken from study population.

1.5. Sampling Technique

Systematic random sampling technique was used to select pediatrics patient medical records with antibiotics by using drug use evaluation method. Every third pediatrics patient medical records were selected from average total pediatrics patient medical records of one year. The first number was selected randomly using lottery method.

2.5.1 Study Variables

2.5.1.1 Dependent variable

- Contraindication
- Drug interaction
- Routes of administration
- Common ailments

2.5.1.2 Independent variables

- Weight of pediatric
- Age
- Sex

1.6. Data Collection procedures

2.6.1 Data Collection Instruments and Methods

Checklists or format was adapted from reviews of different standard literatures and was pretested in the one of the health center out of the Shambu town. Data was collected by using data collection format.

2.6.2. Pre-test

Pre- test was done out of the study population in one of rural health center before the actual data collection at the Shambu Hospital before the actual data collection and some correction was made on the format or checklist.

2.7. Data Quality Assurance

The appropriately designed data collection instrument was used. The checklist or format was pretested and Clarity of language of checklists was checked. Every day the collected data were reviewed and checked for completeness and consistency of the response.

2.8. Data Processing and Analysis

The collected Data was analyzed manually by using scientific calculator after it was edited and checked for the completeness and consistency.

2.9. Ethical Consideration

Ethical clearance was obtained from the Ethical Review Board of Metu University, College of Health and Medical Science. Then officials at different levels in the study area were communicated through letters from Metu University, College of Health and Medical Science departments of pharmacy. Letters of permission were presented to shambu town health Beuaro and Shambu General Hospital. Verbal informed consent was obtained from responsible body of hospital prior to the collection after the purpose of the study is explained. Confidentiality of the information was assured.

2.10. Problem encountered

- Incompleteness nature of some of the patient cards while documentary review used.
- Patients card were not documented for study purpose.
- The anthropometry of the pediatrics were not recorded in their cards

OPERATIONAL DEFINITION

- **Antibiotics:** Chemotherapeutic agents with activity against micro organisms
- **Children:** Age between 1year and 15 years.
- **Dose:** The amount of drug to be taken at a time.
- **Drug use evaluation:** Is an ongoing systematic process designed to maintain the appropriate and effective use of drugs
- **Empiric treatment:** Antibiotics administration without identification of sensitive bacterial pathogen (antibiotic therapy initiated prior to the first positive culture)
- **Infants**: Age between 1 month to 12 months
- **Judicious use of drugs:** Using drugs with a sound judgment according to present and validated treatment protocol.
- **Inetic treatment:** Treatment undertaken after definitive identification of the causative agent (antibiotic therapy directed at final organism).
- **Neonate:** Age less than 30 days
- **Nosocomial infection:** An infection that is acquired in the hospital settings
- **Pediatric**- A population segment that are under 15 years age
- **Prophylactic treatment:**Administration of drugs to prevent possible infection before its occurrence
- **Rational use of drugs:** Is a process which involves appropriate prescribing of drugs
- **Appropriate:** With in the range of WHO guide lines of dosage regimens for pediatrics
- **In appropriate:** Above or below range of WHO guide lines of dosage regimenfor pediatrics.

2. RESULTS

The study reviewed 248 patient record cards from pediatric ward of Shambu General Hospital in which 600 antibiotics were prescribed.

2.1. Socio Demographic Characteristics

Among 248 study participants 144 (58.1%) were males and 104(41.9%) were females. Majority of the patient were aged between 1-12 months which accounts 31.95 % (78) followed by 0- 1month with 28.1%(72). Regarding to body weight majority of pediatric patients of the study populations were weighing between 4-9.99kg comprising 92(37.1%) followed by 2.5-3.99 kg which accounts 54(21.77%). Eight pediatric patients with 3.3%, their weight were not measured or mentioned. Regarding weight, the number of male patients in each weight category was greater than female patients except in case of weight category greater than$\geq$25kg in which the female number exceeds the male number and it was comparable in case of weight not mentioned or measured(Table1).

Table 1: Socio demographic distribution of pediatric patients in pediatric ward of Shambu General Hospital, 2018 (N = 248).

Back ground characteristics		**Male N(%)**	**Femal e N(%)**	**Total N(%)**
	<1month (neonate)	**48(19.35)**	**24(9. 68)**	**72(29.1)**
Age	1-12 month (infant)	44(17.74)	34(13.71)	78(31.45)
	1-2 years (toddler)	22(8.87)	14(5. 65)	36(14.52)
	2-5years (preschool)	12(4.87)	12(4. 84)	24(9.68)
	5-12 years (school)	14(5.65)	18(7. 23)	32(12.9)
	12-15years (early adolescent	4(1.62)	2(0.81)	6(2.43)
	Total	144(58.1)	104(41.9)	248(100)
	<2.5	10(4.03)	2(0.81)	12(4.84)
	2.5-3.99	36(14.52)	18(7. 26)	54(21.77)
Body Weight(Kg)	4-9.99	50(20.16)	42(16.9)	92(37.1)
	10-14.99	24(9.68)	18(7. 26)	42(16.9)
	15-19.99	10(4.03)	8(3.22)	18(7.26)
	20-24.99	8(3.22)	2(0.81)	10(4.03)
	≥25	2(0.821)	10(4. 03)	12(4.84)
	Not mentioned	4(1.62)	4(1.62)	8(3.3)
	Total	144(58.1)	104(58.1)	248(100)

3.2 Most Common Pediatric Ailments and Prescribed Antibiotics

Out of the 10 diagnosed diseases in pediatric patient; severe pneumonia was the most common diseases which accounts 125(27.72%) followed by Neonatal sepsis and Acute gastro enteritis 54(11.97%) and 52(11.53%) respectively. (Table 2).

The most commonly prescribed classes of antibiotics were penicillin's which includes ampicillin, crystalline-penicillin, cloxacillin and amoxicillin overall accounting 206(34.33%) of the prescribed classes of antibiotics for different purpose. Then followed by cephalosporin, aminoglycoside, chloramphenicol, sulphonamides and tetracycline with 178(29.63%), 152(25.33%), 40(6.67%), 16(2.67%) and 2(0.3%) respectively. No macrolides and flour quinolones were prescribed during the period.

Gentamycin was the most commonly prescribed antibiotics for different proposes accounting 152(25.33). Following gentamycin the most widely prescribed antibiotics was ceftriaxone 120(20%), ampicillin 84(14%), cephalexin 58(9.67%), crystalline penicillin 48(8%) and chloramphenicol 40(6.7%).

Table 2: Distribution of top-10 diagnosis of pediatric ward of Shambu General Hospital, 2018 G.C.

Diagnosis	**Frequency**	**%**
Severe pneumonia	68	24.11
Neonatal sepsis	56	19.86
Acute gastro enteritis	48	17.02
Typhoid fever	20	7.09
Meconium-aspiration syndromes	18	6.38
Severe acute malnutrition	14	4.96
Skin infections	12	4.26
Trauma	8	2.84
Pyogenic meningitis	6	2.13
Tetanus	4	1.42
Others	28	9.93
Total	282	100

Table 3: Most commonly prescribed individual and classes of antibiotics in pediatric ward of Shambu General Hospital, 2018 GC.

Parameter	Antibiotics	Number	Percentage
Class of antibiotics	Penicillin	206	34.33
	Cephalosporin	178	29.67
	Aminoglycosides	152	25.33
	Chloramphenicol	40	6.67
	Sulphonamides	16	2.67
	Tetracycline	2	0.3
	Others	6	1
	Total	600	100
Individual antibiotics	Gentamycin	152	25.33
	Ceftriaxone	120	20
	Ampicillin	84	14
	Cephalexin	58	9.67
	Crystalline penicillin	48	8
	Chrompenicol	40	6.67
	Amoxicillin	36	6
	Cloxacillin	30	5
	Cotrimoxazole	16	2.67
	Others	16	2.67
	Total	600	100

From 600prescribed antibiotics 577(96.17%) of them were prescribed by their generic name and the rest 23(3.83%) were brand named.

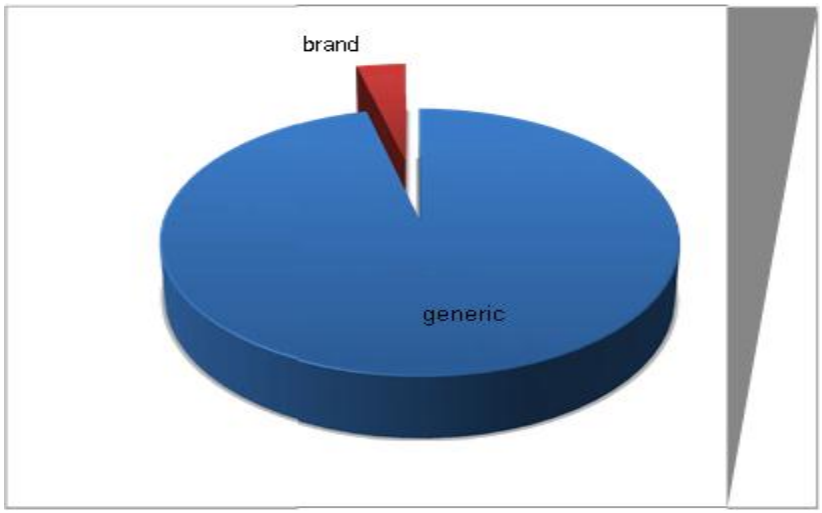

Figure 1: The extent of genetic prescribing at pediatric ward of Shambu General Hospital, 2018 GC.

From 68 patients having severe pneumonia ceftriaxone was prescribed for 48 patients i.e 70.59% of the patients with severe pneumonia had received ceftriaxone for their cases. All patients with EONS, LONS and MAS received ampicillin and gentamycin combination for their cases. From fourteen patients with SAM 8(57.14%) had received amoxicillin for suspected infection in phase I of treatment. Ceftriaxone was more prominently prescribed for patients with severe pneumonia, AGE and typhoid fever compared to other antibiotics. All patients with pyogenic meningitis and tetanus received chloramphenicol and TAT respectively.

Table 4: Common cases with respective types of antibiotics prescribed in pediatric ward of Shambu General Hospital, 2018 G.C.

Common cases /infection/ diseases	Majorly Prescribed antibiotics	Number of cases treated by drugs (%)
Severe pneumonia	Ceftriaxone	48(70.59)
Neonatal sepsis	Ampicillin+gentamycin	56(100)
Acute gastro enteritis	Ceftriaxone	24(50)
Typhoid fever	Ceftriaxone	16(80)
Me conium aspiration	Ampicillin+gentamycin	18(100)
syndrome		
Severe acute malnutrition	Amoxicillin	8(57.14)
Skin infection	Cloxacillin	12(100)
Trauma	Gentamycin	6(75)
Pyrogenic meningitis	Chloramphenicol	6(100)
Tetanus	Tetanus ant toxoid	4(100)

3.3. Route of administration of antibiotics

The largest number patients, i.e. 152(61.29%) received antibiotics by IV only. It was followed by IV+ PO 62(25%), PO only 30(12.1%) and IM+PO 4 (1.61%) (Figure 2).

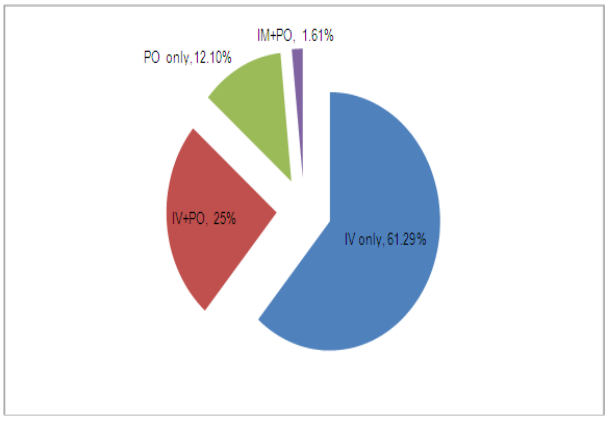

Figure 2: Route of Administration of Antibiotics for Different Purposes in Pediatric Ward of SHGH, 2018.

Appropriateness of Dosage Regimen of Antibiotics

In order to assess the appropriateness of dosage regimen of antibiotics it was required to review each antibiotic prescribed for the different purpose. Then to say appropriate or inappropriate it was compared with standard guidelines of WHO antibiotics dosing for pediatrics, Ethiopian pediatric drug formulary and different books dealt with antibiotics in pediatrics.

From the prescribed dosage regimen 496(88.57%), 42(75.35%) and 518(92.5%) were prescribed with appropriate dose, frequency and duration respectively. By combination of dose, frequency and duration, 513 (85.5%) of drugs were prescribed appropriately whereas 87(14.5%) were prescribed inappropriately.

Table 5: Appropriateness of dosage regimen of overall antibiotics prescribed according to Ethiopian in pediatric ward of SHGH, 2018 G.C.

Parameters	Antibiotics regimen		Number	Percentage
Dose	Appropriate		496	88.57
	Inappropriate	Under dose	10	1.79
		Over dose	54	9.64
Frequency	Appropriate		422	75.35
	Inappropriate	Less frequent	134	23.93
		More frequent	4	0.71
Duration	Appropriate		518	92.5
	Inappropriate	shortened	12	2.14
		prolonged	30	5.35

3.5 Contraindication of antibiotics

Regarding contraindications of antibiotics in pediatric ward of SHGH during the study period, the contraindicated prescribed antibiotic was chloramphenicol accounting 10(100%) of the total contraindications noted. No high dose of chloramphenicol was given for neonate but for pediatric age patients of 1-8 years, it was given for four patients accounting 40% of the total contraindications of chloramphenicol. (Table 6).

Table 6: Antibiotics prescribed in the presence of contra indication in pediatric ward of SHGH, 2018 G.C.

Contraindication age group	Number	Percentage
< 1month	0	0
1-12 month	2	20
1-8 years	4	40
8-15 years	2	20
8-15 year	2	20
Total	10	100
C/I antibiotics High dose		
chloramphenicol		

3.6. Drug Interactions Associated With Antibiotics

Majority of drug interactions during the study period with antibiotics were other non-antibiotic drug with 46(60.53%) of the total interactions with antibiotics and drug interactions of antibiotics with other antibiotics accounts 30(39.47%).

Table 7: Drug –drug interaction associated with antibiotics in pediatric ward of SHGH, 2018G.C.

Drug-drug interaction	Number	Percentage
Antibiotics interacting with other antibiotics	30	39.47
antibiotics interacting with other drugs	46	60.53
Total	76	100

In table 7 below, the most antibiotic that interacts with other antibiotics or with non-antibiotic drug was chloramphenicol with 36(34.62%) followed by ceftriaxone, cloxacillin, crystalline penicillin and gentamycin with 32(30.77%), 16(15.38%), 8(7.69%) and 8(7,69%) respectively. The most non antibiotic drug prescribed for pediatric patients receiving antibiotics causing drug interaction with antibiotics was ringer lactate with 18(39.13%) followed by quinine, F-75 and furosemide with 12(26.09%), 8(17.39%) and 4(8.7%) respectively.

Table 8: Prescribed antibiotics and other non-antibiotics prescribed for pediatric patients responsible for drug –drug interaction with antibiotics in pediatric ward of SHGH, 2018GC.

Category Individual drug list	Number	Percentage
Chloramphenicol	36	34.62
Antibiotics Ceftriaxone	32	30.77
Cloxacillin	16	15.38
Crystalline penicillin	8	7.69
Gentamycin	8	7.69
Ampicillin	2	1.92
Metronidazole	2	1.92
Total	104	100
Ringer lactate	18	39.13
Quinine	12	26.09
F-75	8	17.39
Non antibiotic drugs Furosemide	4	8.7
Phenytoin	2	4.35
Phenobarbitone	2	4.35
Total	46	100

From the total 248 pediatrics patients, 76 (30.65%) of them were prescribed with drugs, which had possible potential interaction. The drugs with possible potential interaction were ringer lactate drugs and ceftriaxone.

3. DISCUSSION

Irrational use of medicines is a way that the patient receive medications appropriate to their clinical needs, in dose that meet their own individual requirements for an adequate period of time and at low price cost them and their community. Worldwide more than 50% of all medicines are prescribed, dispensed or sold inappropriately, while 50% of patient fail to take them correctly, more than one third of world population lacks access to essential medicines.[3]

The most commonly prescribed individual antibiotics in SHGH during study period for patients was gentamycin 152(25.33%) followed by ceftriaxone 120(20%) and ampicillin 84(14%). Study in Jimma by Mengistu shows the most commonly prescribed antibiotics was crystalline penicillin, gentamycin and ampicillin.[9] Study in Nepal by Rehana showed the most commonly prescribed antibiotics were cloxacillin followed by ampicillin.[27] The variety of individual antibiotic use in variety of setting was mostly due to availability and preference of the physicians.

Concerning classes of antibiotics the most commonly prescribed antibiotics during the study period in SHGH were penicillins 206(34.33%) followed by cephalosporins 178(29.67%) and aminoglycosides 152(25.33%). The study was comparable with the study conducted by lauser et al in Taiwan (23) as penicillin's were the most commonly prescribed classes of antibiotics. However, the result was different with study conducted by Palikhe et al in Nepal.[28] and Orett et al in China,[28] showing cephalosporins were the most commonly prescribed classes of antibiotics. This great variance might be due to their availability, cost and physician preferences.

In the study severe pneumonia was the most common cases/infection which accounts 68(24.11%) followed by

neonatal sepsis 56(19.86%) and AGE 48(17.02%). This finding was similar with the study of Burke et al.[29] and Palikhe Kathmandu valley hospital with severe pneumonia comprising 29(24%) of the total cases.[28] However the study was not similar with the study by Lauser in Taiwan,[23] identified that as common cold was the common infections during their study in that set up. This variety of infections in different areas may be due to difference in epidemiology of the disease.

Majority of patients receiving antibiotics for treatment purposes have received by IV only accounting 152(61.29%), from all patients 218(87.9%) patients received at least one antibiotic parent rally. In this study parent rally administration of antibiotics contributed to higher proportion of route of administration. This far exceeds the WHO indicator of percentage of prescription with an injection which accounts 22.63%. Excessive use of injectables was common in many developing countries as shown by study by palikhe et al 75% of antibiotics were given by injection.[28] This may be because of two reasons. The first major reason is that children especially neonates and infants are not voluntary to take the medication orally. Secondly because of the fact that admitted patients due to severity of infections mostly administered with IV or IM medications and some may be unconscious to take oral drugs. It seems necessary for pediatric patients to be treated by parenteral route of administration but consideration should be taken care for the syringes used to administer different antibiotics.

From the total prescribed gentamycin 84(28.7%) was not indicated and from the indicated 118(56.7%) was prescribed within appropriate frequency. Gentamycin was prescribed most of the time at inappropriate frequencies with the accepted guidelines. This finding is different with the study done in jimma by mengistu which is 6% of gentamycin is prescribed with inappropriate duration.[9] From the indicated crystalline penicillin 24(54.54%) and ampicillin 20(11.2%) were prescribed with inappropriate duration. However study conducted by Mengistu et al in Jimma showed that crystalline penicillin 3%, gentamycin 6% and ampicillin 3% were prescribed with inappropriate duration.[9] This revealed that SHGH less follow the duration of antibiotics compared to Jimma Hospital.

Despite the ability of antimicrobial therapy to prevent or control infection, in adequate consideration of potential drug interaction, side effects and contraindications limit the effectiveness of antimicrobial therapy. In this case high dose chloramphenicol was prescribed for ten children's even though it is contraindicated according the guidelines. Off label drug use can cause significant damage in the developing fetus or child, one of the best examples being the grey baby syndrome due to chloramphenicol. According to study conducted by Alexandro et al in three European countries off label was almost related to dose and indication. The only antibiotic used off label for age in pediatric ward was meropenem.[29] But in this study chloramphenicol was off label antibiotics regarding to age and dose. This may be due to carelessness and lack of other appropriate drugs to cover the infections/cases by high dose drugs.

Drug interactions were some of the most common causes of ADR. The interaction of antibiotics with other drugs accounts 46(60.53%) and that of antibiotics with other antibiotics accounts30 (39.47%). From the prescribed antibiotics the most antibiotic responsible for the drug - drug interaction was chloramphenicol accounting 36(34.62%). Ringer lactate was the major non antibiotic drug responsible for drug interaction with antibiotics comprising 18(39.13%). Thus it is always important to note the possible drug interaction prior to concomitant drug administration.

Majority of the antibiotics prescribed during the study period were prescribed in generic names accounting 577(96.17%) and less extent in brand names 23(3.83%). This is almost similar with the WHO indicator of the percentage of antibiotics prescribed by generic name which accounts 100%.[3] Prescribing antibiotics in generic names in SHGH and selection of essential drugs helps to save life of humans and decrease the amount of money paid for drugs i.e. cost effective antibiotics were prescribed.

4. CONCLUSION

The results of this study shown that, Severe pneumonia was the common infection for which antibiotics was prescribed followed by neonatal sepsis and AGE. Majority of the patients received antibiotics by IV only and have received at least one antibiotics parentrally. Thus the number of an injection antibiotics prescribed in shambu General Hospital is above the normal range of WHO guide lines. Almost all of the antibiotics were prescribed with their correct indication, eventhough, high dose of chloramphenicol was prescribed for those it is contra indicated. The majority of the antibiotics were prescribed with their appropriate dosage regimens according to WHO dosage regimen guide lines for pediatrics. Most of the drug-drug interaction was between antibiotics and non-antibiotic drug as compared of the drug interaction of antibiotics with other antibiotics. From antibiotics chloramphenicol was responsible for drug- drug interaction with antibiotics or other drugs and ringer lactate was the most non antibiotic drug responsible drug interaction with the prescribed antibiotics. Almost all of the total prescribed antibiotics was in generic names which is acceptable.

5. RECOMMENDATION

Hence, the following specific recommendation has been made based on the finding of the study so as to give a clue about the possible direction to follow and focus to alleviate the problems of antibiotics resistance occurred due to drug misuse.

- The governing body should disseminate relevant

information to the hospital to raise the level of awareness about rational use of drugs, prescribing and dispensing of drugs through a continuous in services training, seminars and workshops.

- To produce a clear picture of the pattern of drug use in the hospital, farther study should be conducted by the responsible body.
- Continuous on job training should be given for profession on appropriate prescription and drug use.
- In this study empiric diagnosis and treatment were common which can increase risk of drug resistance. Therefore, laboratory service should be strengthened to identify specific strain of pathogen for definitive treatment.
- Presence of clinical pharmacist plays pivotal role in order to facilitate and promote rational use of drugs by intervening different problems in prescribing, dispensing and providing necessary advices for the patients and health professionals regarding the overall issues related to drugs.

Abreviation

ADR: Adverse Drug Reaction
AFI: Acute Febrile Illness
AGE: Acute Gastro Enteritis
AZ: Azithromycin
CPX: Ciprofloxacin
DUE: Drug Use Evaluation.
DUR: Drug Utilization Review
EONS: EarlyOnset Neonatal Sepsis
LFX: Levofloxacin
LONS: Late Onset Neonatal Sepsis
MAS: Meconium Aspiration Syndrome
MRSA: Methicillin Resistant Staphylococcus Aureus
PMHR: Patient Medical History Record
RDU: Rational Drug use
SAM: Severe Acute Malnutrition
SHGH: Shambu General Hospital
SRP: Student Research Project
STG: Standard Treatment Guideline
URTI: Upper Respiratory Tract Infection
UTI: Urinary Tract Infections

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