ASSEMENT OF PNEUMONIA MANAGEMENT AT UNDER – FIVE OPD OF BOLE BULBULA HEALTH CENTER, ADDIS ABABA ETHIOPIA: DRUG USE EVALUATION

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Abstract:

Introduction: - Pneumonia remains the leading cause of child mortality resulting from infectious diseases worldwide. Particularly in Ethiopia, pneumonia continues to be the primary cause of death among children under the age of five. The high prevalence of pneumonia and its significant financial implications highlight the importance of accurate diagnosis and appropriate management of patients. It is crucial to diagnose pneumonia precisely and use antibiotics judiciously to address the growing crisis of antibiotic resistance. Numerous studies have shown that adherence to treatment guidelines can reduce morbidity, mortality, and healthcare costs. Guidelines play a critical role in directing and standardizing the management of pneumonia.

Objective: - To assess the extent of adherence to treatment guidelines in the management of pneumonia in under-5 OPD of Bole Bulbula health center, Addis Ababa, Ethiopia, From January 2023 to January 2024.

Methodology: - The study involved the review of one hundred twenty charts of children under five at Bole Bulbula Health Center under 5 OPD as secondary data. Children's card numbers were selected using systematic random sampling from the under-five outpatient Department. Data were collected directly from the individual folders using a structured questionnaire through Kobo Toolbox data collection system.

Results: - The majority of the children (56, 46.7%) received treatment for pneumonia with Amoxicillin suspension, while another group of children (50, 41.7%) were treated with Amoxicillin dispersible tablets. A small number of children (3, 2.5%) were treated with Azithromycin syrup, and the remaining children (11, 9.2%) received other medications. All of the children (56, 100%) were managed with the standard dose of Amoxicillin suspension (30-50mg/kg), and all 50 (100%) children received the standard dose of amoxicillin dispersible tablets. All of children (106, 100%) were given Amoxicillin Dispersible tablet or suspension for 5-7 days, and there were no contraindications for this medication among any of the children. Additionally, there were no reported drug interactions with Amoxicillin suspension. The full names, qualifications, signatures, and dates of the prescribers were documented in the individual folders of 84 (70%), 63 (52.5%), 117 (97.5%), and 114 (95%) children, respectively.

Conclusion: The utilization of the first-line drug amoxicillin dispersible tablet at Bole Bulbula Health Center (BBHC) was found to be inadequate. However, the treatment approach for managing pneumonia in children under 5 years old at the OPD of BBHC through first line, 2nd line and alternative drug was relatively satisfactory. The Duration Of treatment for under-five children's treated with the recommended drugs duration were appropriate.

Keywords:-Adherence to management, Drug Use Evaluation, Amoxicillin, pneumonia

1 Introduction

1.1 Background

In the World, pneumonia remains the primary cause of child mortality resulting from infectious diseases, responsible for roughly 16 (900,000) % of the 5.6 million deaths of under five children in 2016. (1), (2)Over 90% of pneumonia-related deaths in children under five occur in 40 specific countries. The prevalence and seriousness of childhood pneumonia were most pronounced in 39 % in Africa and 39 % in South East Asia, contributing to severe cases Worldwide. Within these regions, 15 countries were responsible for the majority of childhood pneumonia cases and severe instances. (3) (4)

In the African region, there is a significant burden of global under-five mortality, with 50% of global deaths due to pneumonia occurring in this age group. In Sub-Saharan Africa alone, more than 490,000 children under the age of five died from pneumonia in 2016. (5) In contrast, the European region only accounts for less than 2% of these deaths, while the American region accounts for 3%. (6)Pneumonia continues to be the primary cause of death among children, especially in Ethiopia, where it is responsible for the deaths of children under the age of five. It is estimated that approximately 3.37 million children in Ethiopia experience pneumonia each year, contributing to 18% of child mortality and resulting in the deaths of over 40,000 children under the age of five annually. (3)

To combat child mortality in low-income countries, the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) developed the integrated management of childhood illness (IMCI) strategy in the mid-1990s. (7)This strategy was later expanded in 2003 to include care for newborns less than one week of age, known as the integrated management of neonatal and childhood illness (IMNCI). (8)

Several programmatic approaches have been put into place in Ethiopia to address the issue of child mortality, such as the Ethiopian integrated management of newborn and childhood illnesses (EIMNCI) method. The Ethiopian Federal Ministry of Health has recently formulated the National Newborn and Child Development Strategy 2021–2025. The primary objective of this strategy is to reduce the under-five mortality rate from 59 to 43, 47 to 35, and 33 to 21 for children under the age of 5, infants, and neonates per 1,000 live births respectively by the year 2025. (9)

Prevalence of pneumonia and its substantial financial implications emphasize the importance of accurate diagnosis and appropriate management of patients. Precise diagnosis of pneumonia and the judicious use of antibiotics are crucial in addressing the crisis of antibiotic resistance. When initial antibiotics lose their effectiveness due to microbial resistance, more expensive medications must be employed. Prolonged illness and treatment, often necessitating hospitalization, not only escalate healthcare expenses but also impose a significant economic burden on families and societies. (10) (11)

Numerous studies have demonstrated that adherence to treatment guidelines can reduce morbidity, mortality, and healthcare costs. Guidelines play a critical role in directing and standardizing disease management. However, there is evidence suggesting that national guidelines for pneumonia management are frequently disregarded in clinical practice. (11) Inadequate studies have been conducted in Addis Ababa (Bole Sub city) regarding the management of pneumonia in children under the age of five. Therefore, this study aims to evaluate and assess adherence to the IMNCI and Ethiopian Standard Treatment Guideline (ESTG 2021) at Bole Bulbula Health Center and collect and analyze data on the management of pneumonia in children under the age of five.

1.2 Significance of the study

Government will set policy regarding pneumonia management. In addition, it will give due concern to type of pneumonia with its management. Based on this, appropriate treatment will be given for the case. This study will be the source of information for future researches. Health care providers will gain additional knowledge regarding pneumonia management. The purpose of this study is to assess the pneumonia management at less than five OPD of Bole Bulbula Health center.

2. Literature Review

Based on a case study conducted on a specific health facility in Kenya, a total of 50 facilities were sampled and 289 case management observations of Integrated Management of Neonatal and Childhood Illness (IMNCI) were carried out. The findings revealed that the implementation of IMNCI at the facility level was significantly low. Specifically, the correct treatment rates for children with pneumonia, dehydration, and malaria were 63.3%, 76.5%, and 41.6% respectively. (12)

In the year 2017, a cross-sectional study was carried out in Namibia, Kenya, Tanzania, and Uganda to examine the adherence of health workers to the IMCI pneumonia guidelines. The study encompassed a total of 7304 assessments of sick children, with the distribution as follows: Namibia (21.6% or 1578), Kenya (28% or 2049), Tanzania (35.1% or 2565), and Uganda (21.6% or 1578). (13)

According to a cross-sectional study carried out in 2017 in South Sudan, regarding health workers' compliance with IMNCI guidelines for treating children with breathing difficulties or cough, it was found that out of the 232 participants from 36 health facilities, only 9.9% (23/232) (95%CI:6.4-14.5) strictly followed all the recommended steps outlined in the IMCI pneumonia guidelines. (14)

In 2018, a study was conducted in Malawi to assess the use of IMCI guidelines in diagnosing pneumonia among children aged 2-59 months. Health workers completed an average of 30% of the guidelines, with only 21% of children correctly diagnosed with pneumonia out of 573. (15)

In 2019, a study was carried out at KNH in Kenya to evaluate health worker adherence to new pneumonia guidelines for children admitted with childhood pneumonia. The study involved 390 children, where only 17% of those with Severe Pneumonia received the correct treatment based on the revised 2014 WHO guidelines. Additionally, none of the children diagnosed with non-severe pneumonia received the recommended oral high-dose amoxicillin as per the 2018 Kenya MOH IMNCI guidelines. (16)

The research carried out in Ethiopia at health facilities in Lanfero and Shebedino Districts, SNNPR, indicates that there were restrictions in implementing IMNCI, with challenges revolving around drug and supply availability. The insufficient budget and irregular provision of essential medications such as Zinc and antibiotics by FMOH present notable obstacles to service delivery. (17) Compliance of service providers have its own influence on implementation of IMNCI program, End line survey in 2008 revealed that most children were not checked for general danger signs, nutritional status or vaccination. There was over classification of pneumonia and under classification of malaria in all three regions and the percentage of children treated correctly was low. Supplies were available for most health facilities but there was inadequate supervision. (18).

In 2021, a study was conducted at the Semen Health Center in Arada sub-city of Addis Ababa to assess the utilization patterns of amoxicillin in under-5 out-patient departments based on IMNCI criteria. Out of the total 79 prescribed amoxicillin drugs, indications (n=57, 72.15%), dose (n=72, 91.14%), duration (n=72, 91.14%), and both drug interaction and contra-indication (n=79, 100%) were correctly prescribed. However, a proportion of the sample had incorrect prescriptions for indications (n=22, 27.85%), and both dose and duration (n=7, 4.8.9%). (19)

In 2022, a study was conducted at Akaki Health Center in Addis Ababa to evaluate the level of adherence to treatment guidelines in managing pneumonia in children under the age of 5. None of the children received treatment with Amoxicillin dispersible tablets. A total of 110 children (91.7%) were treated with the recommended dose of Amoxicillin suspension (30-50 mg/kg). Additionally, 117 children (97.5%) were prescribed Amoxicillin suspension for duration of 5-7 days. There were no contraindications to the use of amoxicillin, and no other medications were administered that could interact with it. The full names of the prescribers were documented in 108 patient charts (90%). (20)

3 Objective of the study

3.1 General Objective

To assesstheextentofadherencetotreatmentguidelinesinthemanagementof pneumonia in under-5 children of Bole Bulbula health center, Addis Ababa, Ethiopia, from January 2023 to January 2024 G.C.

3.2 Specific objectives

To assess the drug used for management of pneumonia at under 5 –OPD of Bole Bulbula health center, Addis Ababa, Ethiopia, From January 2023-January 2024.

To assess appropriateness of pneumonia management in under-5 children in Bole Bulbula Health center, Addis Ababa, Ethiopia, 2024.

4. Methodology

4.1 Study area and period

The research was conducted at Bole Bulbula Health Center among children under the age of 5 diagnosed with pneumonia from January 2023 to January 2024G.C. Bole Bulbula Health Center is one of the five governmental health centers located in Bole sub-city of Addis Ababa. It was established in 2004 with a limited number of employees including nurses, health officers, druggists, and others. However, it is now well-equipped with both staff and infrastructure. As a result, the health center offers a wide range of services such as outpatient department, emergency service, triage, delivery, antenatal care, laboratory service, pharmacy service, under-5 OPD, and a newly opened inpatient department. Pneumonia is the most common condition among the cases seen at the under-five OPD of the health center. Therefore, out of the 402 pneumonia cases that got treatment at the BBHC, 120 of them were randomly selected and studied on adherence to treatment guidelines.

4.2 Study design-

Institutional based descriptive cross-sectional study design was used.

4.3 Populations

4.3.1Target population

All under-5 Children attendants at Bole Bulbula Health Center.

4.3.2Study population

Under five children attendants who have pneumonia cases in the specified period.

4.4 Eligibility criteria

4.4.1InclusionCriteria

All under five children pneumonia cases who were managed for Pneumonia at under 5 OPD of Bole Bulbula health center.

4.4.2 Exclusion criteria

Poor hand writing which is unable to read and difficult to interpret.

4.5 Sample size calculation and sampling technique

During the study period, a total of 402 pneumonia cases were treated at Bole Bulbula Health Center, out of which 120 were selected randomly for the study. This method is considered a standard procedure in drug use evaluation. The card numbers of the selected cases were recorded on paper in the sequence of their treatment. Subsequently, a systematic random sampling technique was done to select the 120 cards, which were then retrieved from the Card room.

4.6 Study variables

Dependent variable

Appropriateness of management of pneumonia

Independent variable

Age, sex, weight, length, head circumference, type and qualification of prescribers

4.7 Data collection

The data collection technique was using structured questionnaire. Hence, secondary data were collected from client's card using this questionnaire. It has two parts. These are socio-demographic characteristics (patient identifier) and Process Indicator. The questionnaire was prepared in English. The data was collected by the staff working in the health center after they got orientation. Thus, the one-year data was collected. The pharmacist working in the unit reviewed the one-year data in one week. Therefore; the study period was from January 2023-January 2024.

4.8 Data processing and Analysis

Data was entered using Epi info version 7 and exported to and analyzed using SPSS version 20.

4.9 Ethical considerations

Letter of cooperation from Bole Bulbula Health Center Chief Executive Officer was written and give to Disease prevention and Health promotion, Curative Service delivery and card room. No personal identifiers were used during analysis and result presentation. Data kept confidential.

4.10 Operational definitions

Immunization status-updated

Child who goes the vaccination expected from him/her at her/him age allowed.

Immunization status-not updated

Child who misses one or more vaccine expected from him/her at his/her age.

5. Results
5.1 Results of Socio-demographic characteristics of the subjects
Table 01: source of data, sex, age, weight and length Bole Bulbula Health Center, 2024

Variables		Frequency	Percentile
Source of Data	Out Patient	120	100
Age	<1	90	75
	1-2	20	16.7
	2-5	10	8.3
Sex	Male	66	55
	Female	54	45
weight	Not Weighed	24	20
	2-6	13	10.8
	6-12	71	59.2
	>12	12	10

In this study, a total of 120 medical records were reviewed from under-5 OPD. Sixty six (55%) were male & fifty 54 (45%) female. The majority age groups (90, 75%) were in the age category of less than 1 year. The average age of the individuals was 1.3 years (95% CI: 0.1-2.59). Their average weight was 8.3 (95% CI: -4.5-18).None of child's length, head circumference and MUAC were measured as shown in (**Table 01).**

One hundred ten children's (110, 91.7%) had updated immunization status. All (100%) children's serological statuses for RVI were not determined. Thirty seven (30.8%) children's respiratory rate was in the category of 35-50 beats per minute. Respiratory rate was not measured for 14 (11.7%) children's. The mean respiratory rate of them was 46.62(95% CI: 30.90– 62.34) beats per minute. Nine (7.5%) children's body temperatures were not measured. Therefore, the mean body temperature of them was 26.28(95% CI: -8.39 – 60.95) degree cilices. White blood cells, with differentials, were not requested for all (120, 100%) as shown in the **(Table 02).**

Table 02: Immunization status, serological status, Respiratory rate and body temperature Bole Bulbula Health center, 2024

Variables		Frequency	Percentile
Immunization Status	Updated	110	91.7
	Not Updated	10	8.3
Serological Status	Not Determined	120	100
	Positive	0	0
	Negative	0	0
Body Temperature	Not Measured	9	7.5
	<35	0	0
	35-37.9	108	90
	38>=	3	2.5
Respiratory Rate	Not Measured	14	11.7
	<35	17	14.2
	35-50	37	30.8
	50-60	32	26.7
	>60	20	16.7

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Table3: number of previous treatment of pneumonia, ADR, Concomitant disease, recent treatment with similar drug for same disease, diagnosis of pneumonia, Bole Bulbula health Center, Addis Ababa, Ethiopia, 2024

Variables		Frequency	Percentile
Number Of Previous Treatment For Pneumonia	0	95	79.2
	1	20	16.7
	2	4	3.3
	3	1	0.8
Occurrence Of ADR	Yes	0	0
	No	120	100
Occurrence Of Concomitant Disease	Yes	3	2.5
	No	117	97.5
Name Of Concomitant Disease	No Concomitant	117	97.5
	AGE &SAM	1	0.83
	Conjunctivitis	1	0.83
	Conjunctivitis &Tonsillitis	1	0.83
Diagnosis Of Pneumonia	Sever Pneumonia	0	0
	Pneumonia	117	97.5
	Atypical Pneumonia	3	2.5
	No Pneumonia	0	0
Recent Treatment for Similar Illness	Yes	18	15
	No	102	85

Ninety five (79.2) children's were not previously treated in Pneumonia from the specific period of study, However (20, 16.7%) (1, 3.3%) (4, 8%) children's were previously treated for pneumonia at least once, two times & three times respectively in the time of study. Adverse drug reaction was not happened to all of them (120,100%). 3(2.5%) children had concomitant diseases in addition to pneumonia case. Out of these diseases, one (0.83) AGE (Acute Gastro Enteritis) & SAM (Sever Acute Malnutrition), 1(0.8%) Conjunctivitis and, 1(0.8%) Conjunctivitis and Tonsillitis. Eighteen (15%) children recently treated with the same drugs for similar illness. One hundred seventeen (97.5%) children's diagnoses were pneumonia and the remains were three (2.5%) were Atypical Pneumonia as shown in the **(Table 3).**

5.2 Results of Indicators of the study

Majority of the children (56, 46.7%) were treated for pneumonia with Amoxicillin suspension and also children (50, 41.7%) were treated for pneumonia with Amoxicillin dispersible tablet. Three (2.5%) children's were treated in Azithromycin syrup and the remains eleven (9.2%) children's were treated with other drugs. Fifty six (100%) children were managed with the standard dose of Amoxicillin suspension (30-50mg/kg). Similarly, 50 (100%) children were treated with the standard dose of amoxicillin dispersible tablets. 106 (100%) children's were given Amoxicillin

suspension for 5-7 days. To none of the children Amoxicillin suspension was contraindicated. Similarly, Amoxicillin suspension was not given with other drugs having drug interaction. Full names, Qualifications, Signature and date of the prescription were written for Eighty four (70%), sixty three (52.5%), one hundred seventy (97.5% and, one hundred forty (95%)   children's respectively **(Table 4).**

Table 4: treatment of pneumonia, dose of Amoxicillin, duration of Amoxicillin, occurrence of contraindication, drug interaction

Variables		Frequency	Percentile
Treatment of pneumonia by	Amoxicillin DT	50	41.7
	Amoxicillin suspension	56	46.7
	Azithromycin	3	2.5
	Other	11	9.2
Prescribing of amoxicillin DT as standard (125-250 mg)	Yes	50	100
	No	0	0
Prescribing of Amoxicillin suspension as standard (30-50 mg/kg)	Yes	56	100
	No	0	0
Duration Of Treatment By amoxicillin DT/Suspension (From 5-7 days)	Yes	106	100
	No	0	0
Duration Of Treatment By Azithromycin (For 3 days)	Yes	0	0
	No	117	97.5
Presence of Prescriber Full name	Yes	84	70
	No	36	30
Qualification	Yes	63	52.5
	No	57	47.5
Signature	Yes	117	97.5
	No	3	2.5
Date	Yes	116	95
	No	4	5
Occurrence of Drug Interaction	No	120	100
Occurrence of Contra indication	No	120	100

6. Discussion

This research revealed that the use of the first-line drug amoxicillin dispersible Pneumonia treatment for under five children's at Bole Bulbula health center was inadequate. Despite the availability of ESTG and IMNCI management guidelines for prescribers, the study showed that the use of amoxicillin dispersible tablets as the first-line treatment was below 50%. In contrast to a study carried out in Kenya (16)and at Akaki health center in Addis Ababa, Ethiopia in 2022 (20) where no children were treated with amoxicillin dispersible tablets, this study demonstrated relatively better outcomes. However, in comparison to the standard, there was poor adherence to treatment protocols. (21) (22)

On the other hand, the management approach for pneumonia in children under 5 years old, which involved the use of second-line and alternative drugs based on guideline recommendations, showed a relatively satisfactory outcome. According to the findings, amoxicillin suspension was utilized as a second-line drug in 56% of cases, while alternative medications were prescribed in 3% of cases.

The first-line treatment with amoxicillin dispersible tablets accounted for 41.7% of cases, resulting in a total of 90.83% of cases being treated in accordance with the guideline recommendations. (21) (22). When compared to a study conducted at Akaki health center in Addis Ababa in 2022, where a total of 110 children (91.7%) received the recommended dose of Amoxicillin suspension, this result was slightly lower. (20)

Nevertheless, a small percentage (11, 9.1%) of cases was treated with prescribed drugs that did not align with the recommended guidelines. This performance exceeded the results of a study conducted in Kenya, where only 63.3% of cases adhered to the guidelines. (12) Similarly, this study demonstrated better outcomes compared to a study conducted at Semen Health Center in Addis Ababa, Ethiopia, where appropriate treatment for pneumonia was observed in terms of indications (n=57, 72.15%), dose (n=72, 91.14%),and duration (n=72, 91.14%)for children. (19)

Furthermore, our study reveals that there is poor practice in correctly assessing and documenting weight, respiratory rate, temperature, and vaccination status and other laboratory finds that are crucial to correctly assess and diagnose. This is similar with the study conducted in Kenya and Namibia, Tanzania and Uganda. This may be to the poor adherence of health workers or due to unavailability of necessary medical equipment. (13) (14)

The practice of including the prescriber's signature and the date of prescription was satisfactory, although there was problem in providing the full name and qualifications of the prescriber. Overall, completeness of the information regarding the prescriber that should be included on the prescription was lacking.

7. Conclusion

The utilization of the first-line drug amoxicillin dispersible tablet at Bole Bulbula Health Center was found to be inadequate. However, the treatment approach for managing pneumonia in children under 5 years old at the outpatient department of Bole Bulbula Health Center through first line, 2nd line and alternative drug was relatively satisfactory. The Duration Of treatment for under-five children's treated with the recommended drugs duration were appropriate.

8. Recommendation

Our findings indicate a consistent adherence to these guidelines in pneumonia management. However, there is a notable limitation in the utilization of the first-line drug, amoxicillin dispersible tablet. Despite the availability of alternative second and third-line drugs, the optimal use of amoxicillin dispersible tablet is not being achieved. Based on these results, it is crucial to raise awareness among professionals working in the under 5 OPD and provide training on the appropriate use of the first-line drug as per the guidelines, before resorting to second-line drugs. Therefore, health centers should provide training, supportive supervision, and feedback to improve this practice.

Furthermore, our study reveals poor practices in accurately assessing and documenting weight, respiratory rate, temperature, vaccination status, and other crucial laboratory findings necessary for correct assessment and diagnosis. This highlights the need for improvement in documentation practices through training and ensuring the availability of necessary medical equipment. Health centers should train professionals on proper documentation and measurable assessments, as well as ensure the availability of all essential medical equipment, supplies, and drugs in accordance

with the guidelines

9. Acknowledgment

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