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**ADHERENCE TO PNEUMONIA GUIDELINES FOR CHILDREN 2 – 59 MONTHS
AT GARRISA PROVINCIAL GENERAL HOSPITAL**

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ABSTRACT

Background: Clinical Practice Guidelines for childhood illnesses including pneumonia in Kenya are contained in the Ministry of Health Basic Paediatric Protocols. In the presence of a cough and/ or difficulty in breathing and increased respiratory rate for age, pneumonia is diagnosed. In addition to these the presence of lower chest wall indrawing denotes severe pneumonia; The presence of cyanosis, inability to drink/ breastfeed, grunting, level of consciousness using the AVPU scale less than A in addition to the aforementioned is classified as very severe pneumonia. Recommended management is intravenous Crystalline penicillin, gentamycin and oxygen for severe pneumonia, intravenous crystalline penicillin for severe pneumonia and oral amoxyl or cotrimoxole for pneumonia. These guidelines have been disseminated through the Emergency Triage And Treatment Plus (ETAT+) courses held since 2007. Implementation of guidelines into care has been shown to reduce case fatality from pneumonia by 36%. **Objectives:** To evaluate the level of adherence and factors affecting adherence to the National guidelines on management of pneumonia in children aged two to fifty nine months at Garissa provincial General Hospital, Kenya.

Design: Retrospective hospital based cross sectional study.

Setting: Paediatric Department of Garissa Provincial General Hospital (PGH) in Kenya.

Subjects: Hospital medical records of children aged two to fifty nine months diagnosed with pneumonia between January and June 2012 were reviewed. Data abstracted from the records included demographic information, recorded clinical signs and symptoms, disease classification and treatment.

Results: Records of 91 children were reviewed. Their median age was 12 months (IQR 6–18 months). There were more boys than girls with a male to female ratio of 1.25:1. Forty-eight of the participants (52.8%) had severe pneumonia. Guideline adherence was assessed at three levels; assessment of clinical signs and symptoms reflected by their recording, correct disease severity classification and correct treatment prescribed. There were a minimum of two and a maximum of six clinical sign and symptoms recorded. The average level of adherence was 42.9% (SD ±17.3). Documented correct classification of disease severity was 56.6% and recommended treatment of pneumonia was 27.7%. The presence of a co-morbidity and severe disease was associated with better adherence to the assessment tasks ($p = 0.033$ and $p = 0.021$ respectively). Disease severity was associated with better adherence to the disease classification task ($p = <0.001$) and treatment task ($p = 0.02$).

Conclusion: Adherence to guidelines was low at all assessed levels. Overall, disease severity was associated with better guideline adherence. Presence of co-morbidities improved disease assessment.

INTRODUCTION

Pneumonia continues to be a deadly disease in children accounting for 18 and 20% of deaths in children under five years, globally (1, 2). Despite the existence of effective interventions for prevention and treatment.

The World Health Organization (WHO) in the Global Action Plan for Prevention and Control of Pneumonia (GAPP) strategy identifies vaccination and case management as the most effective interventions for control and prevention of pneumonia (3). Case management of pneumonia with the use of clinical practice guidelines (CPGs) has been shown to reduce case fatality due to pneumonia by 36% (4). In Kenya the CPGs for management of pneumonia are contained in the Basic Paediatric Protocol (5). These protocols are an adaptation of the WHO guidelines and have been in existence since 1997 (6). They are disseminated in the country through the Emergency Triage and Treatment Plus (ETAT +) course (7-9).

In brief, a history of cough or difficulty in breathing signifies respiratory tract infection. An increase in respiratory rate for age identifies pneumonia in which oral amoxyl or cotrimoxazole is recommended. Increased respiratory rate and presence of lower chest wall in drawing identifies severe pneumonia. This is remedied by intravenous crystalline penicillin. In addition to the said signs, an altered level of consciousness, grunting, inability to drink or breastfeed and cyanosis quantify very severe pneumonia. The recommended treatment is crystalline penicillin, gentamycin and oxygen. In the absence of any of the mentioned clinical signs the child is classified as having upper respiratory tract infection and no treatment is recommended.

Health worker's competency in CPGs for pneumonia and other common childhood diseases is built through ETAT + training both at pre – service (residents in Paediatrics and medical officers) and in – service for all cadre of health personnel. The extent to which health workers have implemented the CPGs for pneumonia is unclear; we therefore sought to establish the level of adherence and factors associated to adherence to these guidelines.

MATERIALS AND METHODS

A retrospective cross sectional study at the Paediatric Department of Garissa PGH. The hospital serves as a referral hospital for the former North Eastern Province in Kenya. The under five mortality rate in this arid province is 80/1000, which is higher than the national average of 74/1000(10). The hospital has 248

beds with a bed occupancy rate of 90%, with 54 beds in the paediatric ward. The paediatric clinical team includes nurses, clinical officers, medical officers and a paediatrician.

The study looked into inpatient's clinical records of children admitted with pneumonia between January to June 2012. At admission children presenting with a wheeze and/or underlying chronic disease such as severe acute malnutrition, cardiac disease and cerebral palsy were excluded from the study. From the inpatient register a total of 220 patient identification numbers for patients admitted with pneumonia were extracted. These were given to the registry clerk who was able to locate 150 files, of these nine were not paediatric cases and three did not fulfill the inclusion criteria. From the remaining 138 consecutive sampling was done to achieve a sample size of 91. The sample size was calculated with a p-value of 37% which was the highest frequency of clinical signs for pneumonia documentation in a survey within Kenyan hospitals (11). The precision was set at 10%. Data were extracted from the clinical records using a pretested data extraction form.

The Childs' clinical record was assigned a unique study identification number. Data were then entered into Microsoft Access data base.

The level of adherence to guideline recommended care was determined at three levels; the documented clinical signs and symptoms, documented disease severity classification and documented treatment. There are a total of seven clinical signs and two symptoms, an indication of their presence or absence earned a point. Disease classification could only fall in one category of; no pneumonia (URTI), pneumonia, severe pneumonia or very severe pneumonia. A point was awarded only if the clinicians' diagnosis matched with the assessment. One point was awarded for recommended treatment according to classification given by the clinician and correct prescription of treatment (dose, route, units and frequency).

Data were analysed into frequency tables and chi – square test done to determine factors associated with better adherence at the different levels.

Ethical consideration: Study approval was obtained from the Kenyatta National Hospital – University of Nairobi Ethics and Research Committee and the Hospital Management Team (HMT) of Garissa PGH. Patient records were only identified by study number. Raw data were kept under lock and key by the principal investigator.

RESULTS

Ninety one clinical records were reviewed.

Description of the study participants: Most of the children were infants (60.4%). The median age was 12 months (IQR six to eighteen months). A majority 50 (55%) were boys. Forty-eight of the participants (52.8%) had severe pneumonia. These results are presented in Table 1 below.

Table 1
Description of the study population

Item	Frequency (%) n = 91
Age group	
2-12 months	55(60.4)
13-24 months	18(19.8)
25-59 months	16(17.6)
Gender	
Male	50(54.9)
Female	40(44.0)
Co – morbidity	
Present	36(39.5)
Absent	55(60.5)
Disease classification	
Very severe pneumonia	5 (5.5)
Severe pneumonia	48(52.8)
Pneumonia	29(31.9)
No pneumonia	1(1.1)
No classification	8(8.8)
Outcome	
Duration of hospital stay	4 days (IQR 3 – 6 days)
Mortality	0 (0)

Level of Adherence

Performance of the assessment task as per guidelines: The extent to which a clinical sign or symptom was assessed was determined by its documentation in the patients clinical record. Cough was the most commonly documented clinical symptom. This was documented in 87 of the 91 clinical records (95.6%).

As shown in Table 2 below, the danger signs were not recorded for most patients. This ranged from 72 % for level of consciousness to 92% for inability to drink /breastfeed. The health workers documented a minimum of two and a maximum of six clinical tasks. The mean adherence on clinical signs and symptoms documentation was 42.9% (SD±17.3).

Table 2
Clinical features of pneumonia as recorded in the patients' clinical records.

Pneumonia clinical signs and symptoms	Recorded n (%)	Not recorded n (%)
Symptoms		
Difficulty in breathing	68(74.7)	23(25.3)
Cough	87(95.6)	4(4.4)
Signs		
Cyanosis	21(23.1)	70(76.9)
Inability to drink/breast feed	7(7.7)	84(92.3)
Level of consciousness (AVPU scale)	25(27.5)	66(72.5)
Grunting	9(9.9)	82(90.1)
Chest indrawing	64(70.3)	27(29.7)
Respiratory rate	59(64.8)	32(35.2)

Performance of the disease classification and treatment tasks as per the guidelines: Guideline prescribed disease severity classification was documented in 83 (91.2%) cases. Of these 47/83 (56.6%) were correctly classified according to the clinical signs documented. The majority had severe pneumonia 38 (79.2%).

Treatment in tandem with the national guidelines was prescribed for 23 (27.7%) of the 83 patients. A large number (72.3%) of prescriptions were in

conflict with the national guidelines. Of these, (30 %) had intravascular medication for pneumonia or no pneumonia /URTI instead of oral antibiotics and no antibiotics respectively; 23(27.7%) prescribed gentamycin in the management of severe pneumonia instead of penicillin alone; 11(13.3%) had ceftriaxone prescribed as the first line drug and 1(2%) had very severe pneumonia and oxygen was not prescribed. See Table 3.

Table 3
Disease classification and treatment accuracy as recorded in the patients' clinical record

Classification	Treatment		Correct (%)	Incorrect (%)	Total
	Correct (%)	Incorrect (%)			
Very severe pneumonia	4(80)	1(20)	4(80)	1(20)	5
Severe pneumonia	38(79.2)	10(20.8)	14(29.2)	34(70.8)	48
Pneumonia	5(17.4)	24 (82.7)	5 (17.2)	24(82.8)	29
No pneumonia/URTI	0(0)	1(100)	0(0)	1(100)	1
Total	47(56.6)	36(43.4)	23(27.7)	60(72.3)	83(100)

Factors associated with adherence

Assessment task: The presence of a co – morbidity and severe disease was associated with better adherence to the assessment tasks $p = 0.03$ and $p = 0.021$ respectively.

Table 4
Factors associated to pneumonia assessment task (chi – square test)

	Assessment task median (IQR)	n	p
Disease severity			
Pneumonia	3 (2 -5)	29	0.021
Severe/ very severe pneumonia	4 (3 -5)	53	
Co-morbidity			
Present	3(2 -4.5)	36	0.033
Absent	4 (3 -4)	55	
Gender			
Male	4(3 -5)	50	0.19
Female	4(2-5)	40	
Age			
2 – 12 months	4(3 -5)	55	0.19
13 – 24 months	4(2-5)	18	
25 – 59 months	3.5(2 -5)	16	

Disease Classification and treatment: As is shown in Table 5 below, disease severity was associated with better adherence to the disease classification task ($p = < 0.001$). Co – morbidity like gender and age did not have an effect on the level of adherence to classification ($p = 0.9$). In severe disease adherence to the treatment guideline was better ($p = 0.02$).Co-morbidity had no significant relationship to treatment.

Table 5
Factors associated with pneumonia classification and treatment. (chi – square test)

Classification task	Classification task			Treatment task		
	Correct (%)	Incorrect (%)	p	Correct (%)	Incorrect (%)	p
Pneumonia classification						
Pneumonia	5 (17.4)	24 (82.7)	<0.001 (17.4)	5 (17.4)	24 (82.7)	0.02
Severe pneumonia	38 (79.2)	10 (20.8)		14 (29.2)	34 (70.3)	
Very severe pneumonia	4 (80)	1 (20)	(80)	4 (20)	1	
Co-morbidity						
Present	20 (55.5)	16 (44.4)	0.9	12 (33.3)	24 (66.7)	0.31
Absent	30 (54.5)	20 (45.5)		13 (23.6)	42 (76.4)	
Gender						
Male	29 (58)	21 (42.1)	0.67	15 (30)	35 (70)	0.64

Female	21 (52)	19 (47.9)		10 (25)	30 (75)	
Age						
2 – 12 months	32 (58.1)	23 (41.8)	0.29	16 (29.1)	39 (70.9)	0.33
13 – 24 months	7 (38.9)	11 (61.1)		6 (33.3)	12 (66.6)	
25 – 59 months	10 (62.5)	6 (37.5)		2 (12.5)	14 (87.5)	

DISCUSSION

Adherence to CPGs at Garissa PGH varied from low adherence to basic clinical assessment (43%), to modest average of 57% on disease classification and very low adherence to the treatment guidelines an average of 28%.

The most recorded presenting complaint was cough 87 /91 (97%). Chest wall indrawing was the most recorded clinical sign. It was recorded in 70% (64/91) of the cases. This finding is closer to Irimu's findings post CPGs introduction at Kenyatta National Hospital of 81.2% than those pre-CPGs of 18.5% for the clinical sign (12). The finding was consistent with that of English results that it was the most recorded pneumonia sign (11). This sign is a predictor of immediate death in this region and most clinicians concur in its identification (11). It is commendable that the clinicians could pick it though it is not clear whether it was more important to them in the younger patients. On average, patients who had chest wall in-drawing documented were eight months younger than those who did not (mean age = 12.7 months versus 20.7 months $p = 0.01$). Age as a factor influencing adherence to guidelines was identified in a study in Siaya by Rowe *et al* (12). In Tanzanian hospitals, it was the most recorded sign for children with pneumonia 62 of the 191 (32%) (14).

Inability to drink and grunting were poorly documented (8 and 10 % respectively). WHO considers these two signs as danger signs and are predictors for immediate and early deaths (6, 15). The question that arises is whether these were assessed and not documented due to the culture of poor documentation or the health workers who do not consider these as danger signs or are not able to recognise them. In Tanzania, recording of inability

to drink for a child with a diagnosis of pneumonia was also poor at 14/191 (7%) (14).

The child's respiratory rate is a starting point in the guideline for pneumonia classification (5).

Respiratory rate was better documented in this hospital compared to other Kenyan hospitals (65% vs.31%) (11). On average, of the nine clinical assessment tasks expected of the health workers four were done, mean adherence on clinical tasks was 42.9%.

A guideline recognised pneumonia classification was awarded to 83 of the 91 patients at admission (91%). Of the 83 only 46 (56%) were correctly classified according to the clinical signs documented. This finding is better than that from Benin where correct classification was in only seven out of one hundred and forty one (5%) (17). Outpatient management is recommended for pneumonia and no pneumonia/ URTI but 30 records that had the classification were managed as inpatients. It is clear that the clinicians recognise the different guideline classifications. However a disconnect exists between disease severity classification and the clinical tasks recorded as well as the settings in which to manage the patients.

Clinicians in their basic training are taught how to calculate dosages of the different antibiotics. The results are reflective of the same. However, on two occasions gentamycin was wrongly prescribed in a 10mg/kg dosage and three times a day frequency. English *et al* reported the same in the 13 district hospital assessment attributing it to the 1994 national guidelines which recommend the three times a day frequency (11) which lingers on.

Accurate treatment according to the disease classification given was documented in 23/83 (27.7%). Most clinicians had a tendency to over treat; 27 prescribed gentamycin in addition to penicillin

in severe pneumonia, 19 prescribed intravascular medication for pneumonia while oral medication is what is recommended and 13 used ceftriaxone as first line and one did not get oxygen prescribed for very severe pneumonia. It would be interesting to understand whether this trend is advised by their practice or it is indeed a knowledge gap. The process of healthcare delivery may lead to good outcomes not only due to correct care but in this study due to over treatment. This leads to loss of resources which in this setting are scarce.

These poor results may have been due to poor documentation. Introduction of standard structured admission record charts in other hospitals has had a positive impact (16).

In conclusion, the level of adherence to the National guidelines on management of pneumonia in this hospital is low. In-correct assessment, classification and management lead to poor outcomes and wastage of resources.

The outcome for children diagnosed with pneumonia at this hospital was good but their management contradicted what is recommended. Focus should therefore be put in exploring the reasons why patients were poorly assessed, classified and over medicated as this misuses resources that are scarce in the setting.

STUDY LIMITATIONS

The culture of poor documentation may have contributed to the poor results. Missing clinical records could have offered a great deal of information. The sampling method and the sample size with a precision of 10% reduced the power of this study.

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