

**TITLE**

**PRE-ADMISSION CARE-SEEKING BEHAVIOUR FOR SEVERE AND  
VERY SEVERE PNEUMONIA IN CHILDREN AGED 2 TO 59  
MONTHS AT KENYATTA NATIONAL HOSPITAL**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE AWARD OF MASTER OF  
MEDICINE IN PAEDIATRICS AND CHILD HEALTH.**

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**AUGUST 2010**

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## DECLARATION

I declare that this dissertation is my original work and has not been presented in any other university.

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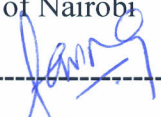
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## **DEDICATION**

*To my parents*

*Onyancha Bw'omote and Esther Onyancha (in memoriam) for their personal sacrifices that privileged me to come this far. I am greatly indebted to them.*

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## Abbreviations

KNH	- Kenyatta National Hospital
UON	-University of Nairobi
MDG	- Millennium Development Goals
IMCI	- Integrated Management of childhood Illnesses
UNICEF	- United Nations Childrens' Educational Fund
ARI	- Acute Respiratory Infection
PEU	- Pediatric Emergency Unit
WHO	- World Health Organization
GOK	- Government of Kenya
MoH	- Ministry of Health
ETAT+	- Emergency Triage Assessment and Treatment plus admission care
SHO	- Senior House Officer
OR	- Odds Ratio
CI	- Confidence Interval

## Operational definitions

**Primary care-giver:** This term was used to refer to the mother or father, or other family member who spent the most time caring for the sick child during the current illness.

**Formal healthcare:** Doctors, clinical officers or nurses in government sponsored centers or posts (dispensaries/ health centers/ hospitals) or in private hospitals or private clinics.

**Informal healthcare:** Use of home-remedies, traditional herbs or over the counter drugs (from general stores or from specialist drug stores without consultation with a formal healthcare provider) OR contact with a traditional healer or herbalist after the caregiver noticing signs of acute lower respiratory tract infection.

**Appropriate care seeking :** The number of days from the caregiver first noticing signs of acute lower respiratory tract infection (fast breathing or difficulty breathing) until contact with a formal health provider being < 3days AND no use of informal care.

**Inappropriate care seeking :** The number of days from the caregiver first noticing signs of acute lower respiratory tract infection (fast breathing or difficulty breathing) until contact with a formal health provider being  $\geq 3$  days OR use of informal care as the first action.

### **World Health Organization Pneumonia Case definitions: [28]**

**Severe pneumonia:** cough or difficulty in breathing with chest wall in drawing with or without tachypnoea  $\geq 50$ /min for infants 2-11months,  $\geq 40$ /min for children 12- 59months.

**Very severe pneumonia:** Cough or difficulty in breathing plus one of the following danger signs: central cyanosis, altered consciousness, inability to drink or breastfeed or grunting (infants 2-11months) ; with or without tachypnoea  $\geq 50$ /min for infants 2-11months,  $\geq 40$ /min for children 12months to 59months or chest wall in drawing.



## Abstract

**Background:** Pneumonia is a leading cause of childhood mortality globally, with 17-26% of deaths in children under 5 years in sub-Saharan Africa being attributed to pneumonia. Many of these deaths are attributed to delay in seeking care and inadequacies in health facilities and the referral mechanisms. Thus care-seeking interventions have the potential to substantially reduce mortality. There are no studies done in Kenya to inform on the pattern of pre-admission care-seeking behavior for severe and very severe pneumonia in children less than 5 years.

**Objectives:** To describe the pattern of health care sought and types of treatment received prior to admission at Kenyatta National Hospital (KNH), for 2-59month old children, admitted with severe and very severe pneumonia.

**Methods:** A hospital-based cross-sectional survey was conducted between June and September 2009 at KNH Pediatric Emergency Unit. Subjects were 2-59 month old children with severe and very severe pneumonia and their caregivers. Formal care was considered as healthcare sought from doctors, clinical officers or nurses in government or private health facilities. Informal care was considered as use of home remedies, traditional herbs, over the counter drugs or healthcare sought from a traditional healer or herbalist. Care seeking was classified as appropriate if interval between the caregiver first noticing signs of acute lower respiratory tract infection and contact with a formal health provider was <3days, and no informal care was used.

**Results:** A total of 385 caregivers and their children were recruited and interviewed. There were 171/385(44.4%) children with severe pneumonia. About half, 204/385(53%) of the children were female. The median age of the patients was 8.8months, and that of the caregivers was 26.1 years. Prior to admission, most (80.6%) patients had sought care at other formal health facilities. A minority (22.6%) of patients had used informal care. Less than half, 174/385(45.2%) of the patients recruited had appropriate care seeking behavior. Antibiotics were used by 245/330(77.3%) of patients, and the commonest antibiotic used was amoxicillin-clavulanate (51.6%). KNH was the first point of formal care for 73/382(19.1%) of patients. Appropriate care seeking was found to be associated with previous admission (OR=0.53, 95%CI=0.32-0.88), prior

treatment with antibiotics for the current illness (OR=0.46, 95%CI=0.25-0.83), the presence of wheeze (OR=0.54, 95%CI=0.33-0.88) and with respiratory rates of  $\geq 70$  per minute (OR=0.65, 95%CI=0.42-1.00).

**Conclusion:** Most of the children with severe and very severe pneumonia are treated at other formal health facilities prior to admission (80.6%). Half of the caregivers of 2 to 59 month old children with severe and very severe pneumonia, have inappropriate care seeking behaviour (52.5%). Amoxicillin-clavulanate and macrolides are commonly prescribed antibiotics in the out-patient setting.

## Introduction and Literature Review

Pneumonia is the leading cause of childhood mortality globally, accounting for more than 2 million deaths annually [1]. Although Africa holds about 20% of the world's population aged less than 5 years, it has 50% of the deaths from pneumonia in this age group [2]. In sub-Saharan Africa, the estimated proportion of death in under 5 year old children attributed to pneumonia is 17–26% [3]. Prompt recognition and treatment with an effective drug is crucial, as the case-fatality rate in untreated children is high (sometimes exceeding 20%) [4].

At Kenyatta National Hospital, approximately 20% of paediatric admissions have pneumonia and mortality rates are high at approximately 15% [5]. In the year 2000, the under 5's mortality rate in Kenya was 120/1000 live births. This ranked Kenya 18<sup>th</sup> of 42 countries with the highest mortality rates worldwide. Ninety percent of worldwide deaths in under 5's occur in 42 countries; and 21% of these deaths are attributed to pneumonia [3]. In light of the priority to achieve the fourth MDG by 2015, reductions in child mortality through improved health care access will benefit from a focus on additional measures.

The family and community component of IMCI centers on enabling communities to address 16 key practices (UNICEF 1999), among which there is considerable variation in intervention experience. Ensuring prompt and appropriate care-seeking for sick children is one of the practices for which there is the least intervention experience [6]. Where the quality of care at health facilities is adequate, care-seeking interventions have the potential to substantially reduce mortality. This is illustrated by the large number of children who die in developing countries without ever reaching a health facility. Amongst those who are taken to health facilities but then die, many deaths are attributed to delays in seeking care [7]. Appropriate care-seeking is of particular importance in areas where access to health services is limited, because it is in these areas that caregivers would benefit most from being able to discern which episodes require care at a health facility, and which can be successfully treated at home.

Appropriate care-seeking requires that a caregiver recognizes when a child is ill, can interpret when an illness needs to be treated outside the home, and seeks timely and appropriate medical care. Several studies have identified symptom recognition, local illness beliefs and other

logistical problems as barriers to care-seeking [8]. Interventions that promote appropriate care-seeking for severely ill children have the potential to substantially reduce child mortality in developing countries, but little is known about the best approach to address this issue.

Symptom recognition has been identified as a barrier to care-seeking. In Ghana, caregiver recognition that an illness was severe did not always result in the child being taken to a health facility. Only 50% of episodes recognized as 'severe/could have killed' were taken to a health facility indicating that poor recognition is not the only care-seeking barrier [9]. In that study, it was found that care-givers did not recognize chest in drawing as a symptom of acute respiratory infection (ARI). Some symptoms were seen but rarely considered abnormal or dangerous, for example, fast breathing. While symptom recognition is an identified barrier to care-seeking, there are also other significant barriers to care-seeking and interventions must move away from a narrow symptom recognition focus.

Studies investigating care-seeking behaviour have mostly looked at malaria [10-12]. In areas with endemic malaria, symptom overlap has led to mistreatment with anti-malarials. Most children who died from pneumonia were reportedly first treated at home with anti-malarials. The common practice of treating children with respiratory symptoms with anti-malarial drugs has been shown previously to cause delays in care-seeking for children with pneumonia [13].

In a study on health seeking behaviour for child illness in Guatemala, Goldman et al found that 90% of the children received some form of treatment, with the vast majority being given medicines and a small proportion, herbs. About one third of the sick children visited a healthcare provider and pharmacists were the healthcare providers most likely to have been consulted. Doctors and staff of government-sponsored health centers were seen more frequently than traditional practitioners. However, children with respiratory symptoms were least likely to seek healthcare providers, while those with fever were especially likely to visit healthcare providers [14].

Researchers are increasingly recognizing that treatment-seeking involves a series of complex behaviours. In Cameroon, a study was done providing a detailed description of treatment sequences for 429 illnesses, 66% of which involved fever. The sequences noted were clearly not

random and the predominant tendency was for the first options to be pharmaceuticals and home remedies. Waiting was also considered as a treatment step, and was described as a way to reduce uncertainty. The most common sequence found was waiting followed by using a pharmaceutical(14%) [15].

Factors found to influence pre-admission care include pre-treatment at home. In a Ugandan study on fatal pneumonia in under 5year old children, 70% of children who died from suspected pneumonia had been treated with antibiotics at home, and that was the only independent risk factor for delayed care-seeking outside the home more than two days after illness recognition [16]. In the same study, referral was found to be common, with most children reportedly referred to get better care. Geographic barriers, gender aspects of decision-making and other responsibilities at home were found to be factors compelling the first use of home treatment with drugs before seeking formal care.

In Ghana, traditional treatments were considered effective, appropriate and were particularly attractive because they were accessible and affordable [9]. Financial constraints often resulted in delays in care-seeking, but when children were considered potentially fatally ill, these were overcome by borrowing money or selling assets. Care-seeking was found to be sequential, beginning with home treatment, followed by care from druggists or healers and eventually medical care was sought.

Education level is consistently found to be associated with healthcare seeking behaviors. In Tanzania, higher education level was associated with ability to link symptoms with severity of illness and with promptness in seeking care from a healthcare provider [30]. In comparison of two communities in Accra, Ghana, the poorer community with lower education levels was more likely to engage in self-treatment [17].

In Nairobi, Kenya, Irimu *et al* in a community based cross-sectional study, found that caretakers of children with pneumonia were found to prefer to seek healthcare from modern health facilities especially Nairobi City Council, while others sought care from private clinics and missionary health facilities. Traditional healers and community-based health workers were not consulted for management of pneumonia in this community. Several reasons were given for delay in seeking

appropriate health care in this community, namely, ignorance, financial, geographical, social and religious barriers [18]. However, these findings cannot be generalized at the national level.

In a study to assess the quality of emergency care and outcome of severely ill children at KNH, Kimilu found that of the severely ill children presenting to the Paediatric Emergency Unit, pneumonia was among the most common illness (30%), only second to gastroenteritis (35%). The mortality from pneumonia was also high at 23% at the end of one week [19]. A contradiction was found between the fairly well equipped PEU facility and the high mortality, suggesting that other factors not investigated in the study could have been contributory. Such factors may include care-seeking behaviour, notably, late presentation of patients to the hospital.

In a hospital-based case-control study by Gitau to describe factors associated with late presentation to KNH for acutely ill children, the route to seeking care, the initial step taken by the caregiver when the child was unwell and symptoms of cough and diarrhea were the only factors likely to lead to late healthcare seeking at KNH. The use of herbal care was significantly associated with likelihood of late presentation [20]. The study however, looked at all severely ill children presenting to KNH, and therefore did not conclusively describe the pattern of care seeking behaviour for those with pneumonia.

In recent years, epidemiologists and social scientists have devoted increasing attention to studying health-seeking behaviour associated with ARI in children. Yet, knowledge about how and when families in developing countries seek treatment for ARI remains seriously incomplete due to limitations of the samples used in existing studies and lack of sufficiently detailed information about the nature and timing of illness and treatment behaviour [14]. Many of these studies of morbidity in developing countries are community-based and thus seriously compromised by selection biases. For this study, KNH was chosen on the basis of diversity in ethnic and social composition of the patients attended to in this tertiary health facility.

Health interview surveys appear to offer the best vehicle for analyzing treatment behaviour in a large representative sample of children [14]. These surveys typically involve a cross-sectional interview, based on a random sample of a defined population, in which caregivers are asked to

report about the illnesses experienced and health services or treatment used within a specified period prior to interview. This approach was adopted in this study.

Previous studies on care seeking behavior have mostly looked solely at symptom recognition for pneumonia. This study aims to describe the pattern of care-seeking with focus on the types of actions and treatments used prior to admission in KNH, for 2-59 month old children presenting with severe and very severe pneumonia.

## **Study Question**

What is the pathway to care and pattern of pre-admission care-seeking behaviour for 2-59month old children with severe/ very severe pneumonia admitted at Kenyatta National Hospital?

## **Study Justification**

In the family and community component of the IMCI, one of the priority problems and practices affecting child survival is inappropriate care-seeking for acute respiratory infections. Timely and appropriate care-seeking combined with adequate treatment could reduce acute respiratory infections mortality by over 20% [21].

Interventions to reduce child mortality following acute respiratory infections have mainly focused on improved vaccine coverage, community education and improved nutrition. Of the few care-seeking interventions that have been implemented, focus has been on symptom recognition [22].

Caregiver's interpretation of symptoms of severe or very severe pneumonia, the initial actions taken by the caregiver, and the duration before seeking appropriate care all have an influence on the severity of illness at presentation to the healthcare provider.

No studies have been done in Kenyatta National Hospital, to describe the path taken and the timing of actions by caregivers of children with severe or very severe pneumonia, prior to presentation at KNH.



## **SPECIFIC OBJECTIVES**

### ***Primary Objective***

To describe the actions taken and the types of treatment received prior to admission in Kenyatta National Hospital for 2 to 59 month old children with severe and very severe pneumonia as per World Health Organization classification.

### ***Secondary objectives***

1. To determine the proportion of care-givers who seek treatment at Kenyatta National Hospital as the choice of first provider of health care for 2 to 59 month old children with severe and very severe pneumonia.
2. To describe social factors and clinical characteristics associated with inappropriate care-seeking outside the home for 2 to 59 month old children with severe and very severe pneumonia.

## **Methodology**

### ***Study Design***

This was a hospital-based cross-sectional survey.

### ***Setting***

Participants were recruited at the Pediatric Emergency Unit at the Kenyatta National Hospital, Nairobi.

KNH is the largest public hospital in Kenya, and is located in the capital city, Nairobi. It is a National referral centre and, in reality, also serves as a primary health facility, mostly serving the residents of Nairobi. KNH is also a medical teaching hospital.

PEU is the clinical unit where sick children below 12 years first encounter the clinicians, before admission to the wards or treatment as outpatients. In KNH, about 30 children are admitted every day and of these 20% have ARI. Pneumonia cases account for 20% of all admissions and 15% of all deaths in children under 5 years at KNH (source: Central records, KNH).

KNH has four general children's wards each with a bed capacity of 60, and bed occupancy of 150-200%. In the paediatric wards, the admitted children are managed by ward clinicians who include medical officer interns, residents in paediatrics, paediatricians as well as paediatricians with subspecialisation in various fields of paediatrics. KNH has embraced MoH 'Basic Paediatric Protocol'. These protocols have been adopted from WHO guidelines of care of seriously ill children in a limited resource setting. Most clinicians attending patients in the paediatrics unit have been trained in Emergency Triage Assessment and Treatment plus Admission care (ETAT+) and are thus familiar with the WHO case management of pneumonia. ETAT+ is a five-day course developed by MoH to facilitate dissemination of the 'Basic Paediatric Protocol' [18].

## ***Study Population***

Participants were

- (1) Two to 59 month old children with classified WHO categories of severe/very severe pneumonia, presenting to the PEU at KNH, and admitted to the Paediatric wards.
- (2) The primary care-givers of 2 to 59 month old children with classified WHO categories of severe/ very severe pneumonia, presenting to the PEU and admitted to the Paediatric wards.

## ***Study size***

From 2007 KNH PEU records, 250 cases of severe and very severe pneumonia are admitted per month. It was assumed that approximately 200 would meet inclusion criteria.

Assuming 42% of enrolled participants would have sought formal care prior to admission( C Kristiansson *et al* 2008), and a level of precision set at no greater than 5% i.e. 0.05 for a 95% confidence interval, applying the formula for single proportions,

$$n \geq \frac{\pi (1-\pi)}{e^2}$$

where:

n is desired sample size

$\pi$  is proportion of patients seeking formal care as the first action

e is the required size of standard error

$$n \geq \frac{0.42 (1-0.42)}{0.025^2} = 376$$

A sample size of 376 or more would make it possible to achieve greater precision.

## ***Sampling Method***

Twenty-four hour sampling was done at the PEU, seven days a week for the entire study period. The study participants were selected over a 4 month period after initial screening for inclusion and exclusion criteria. Their consenting caregivers were then interviewed. This study was part of a larger study on pneumonia in children, which was carried out in KNH. The data collection was done by the principal investigator with the help of seven other senior house officers (SHO's) who were also paediatric residents involved in the larger study. All the study SHO's had been trained in use of WHO guidelines in case management for pneumonia.

## ***Inclusion/exclusion criteria***

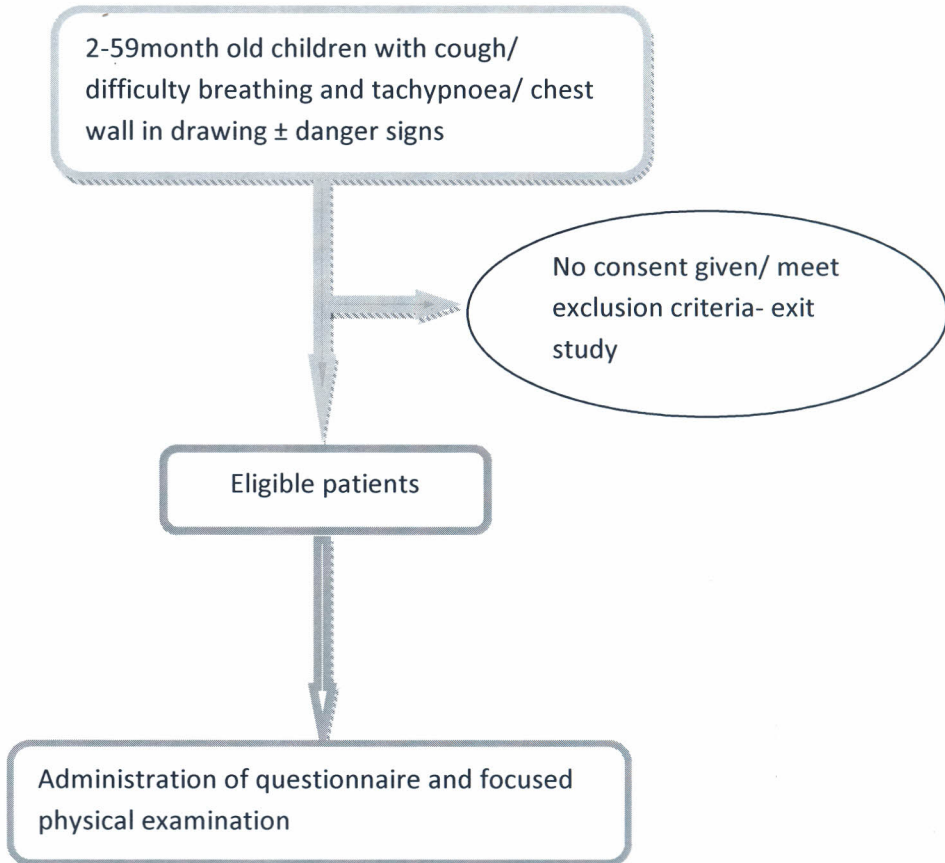
### General inclusion criteria

- Attendance at KNH PEU with clinical picture indicative of community acquired, acute severe or very severe pneumonia according to WHO guidelines (refer to *appendix 3*)
- Age  $\geq 2$  months to  $\leq 59$  months

### General exclusion criteria

- Known chronic renal or cardiac disease
- Presence of a primary neurological abnormality such as cerebral palsy
- Established bronchiectasis or congenital abnormality of the lower respiratory tract
- Upper airway obstruction producing stridor
- Admission from outpatient clinic specifically for treatment of pulmonary tuberculosis
- Referral from another inpatient facility because of treatment failure after prior treatment with parenteral antibiotics
- Failure to obtain informed consent

## Recruitment Process



## ***Study Procedure***

Two to fifty nine month old children who presented to the PEU in the study period with cough/difficulty breathing were identified and screened by the principal investigator or co-investigators at the triage station, for signs of acute severe/very severe pneumonia. Comprehensive sampling with data collection occurring 24 hours a day throughout the week was adopted to minimize the likelihood of selection bias.

Any child requiring emergency care in PEU received treatment as a first priority with study data collected only after stabilization of the child and if it was deemed possible to obtain consent.

The principal investigator or co-investigators then reviewed the patient and with a brief history-taking and clinical examination, was able to ascertain if inclusion criteria were met. For those meeting inclusion criteria and with no exclusion criteria, a brief explanation of the study was given to the caregiver. The caregiver was then given a consent form to read and sign (see consent form-*appendix 2*). If the caregiver was unable to read, the study explanation was done in the presence of a witness, and the caregiver's thumb printed for consent. The witness was also required to sign.

A questionnaire was then administered. Each questionnaire had a serial number (see study questionnaire- *appendix 1*). Patients' hospital numbers were also recorded for ease of follow up in the wards, but this data was excluded during analysis. Personal details of the admitted child were collected including age, gender and immunization status. A brief medical history of the present illness was obtained from the caregiver. This included duration of illness, number of days that elapsed before seeking treatment, history of fever (axillary temperature  $\geq 37.5^{\circ}$ ), history of difficulty in breathing, diarrhea, vomiting and convulsions.

Details of pre-admission treatment were obtained from the caregiver, including details of informal and formal care received prior to admission at KNH, and the chronological order from the first form of care accessed to the last. Other information collected on pre-admission care included: the main symptom necessitating care seeking, history of referral and primary reason for referral, patients' main mode of transport to KNH and duration of travel to KNH in hours.

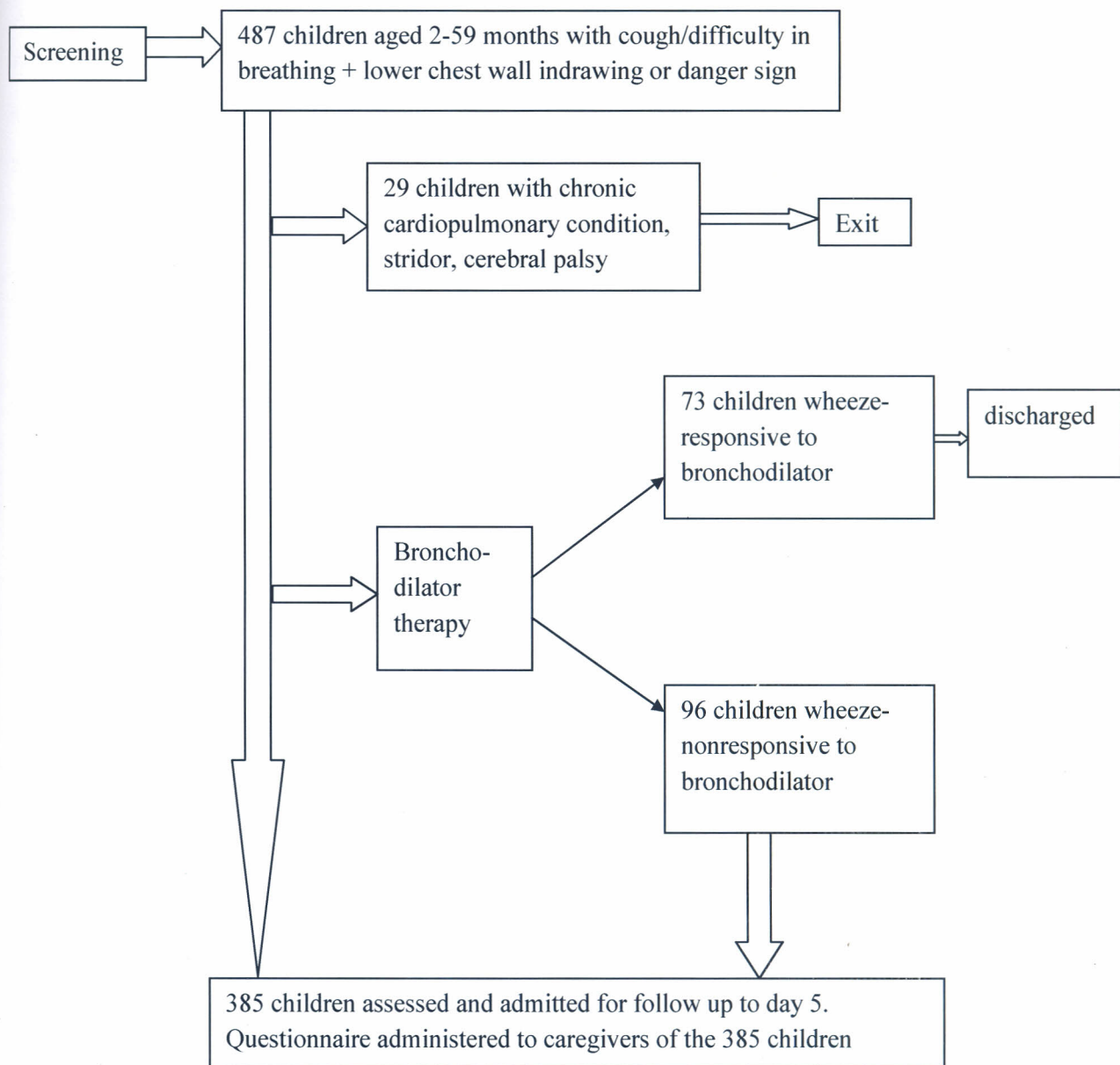
Data were collected on treatments given prior to admission and that was facilitated by requesting the caregiver for any records including referral notes, prescriptions and/or containers of medication given. The caregiver's data included their gender, age, relationship to the patient, marital status (if the biological parent), and level of formal education. A clinical documentation of the signs and symptoms was made using a structured assessment form, and outcome of illness at day 5 was recorded as alive or dead. Physical examination was done at admission and recorded on a clinical assessment form. This included measurement of respiratory rate and pulse rate over one minute, measurement of oxygen saturation with a pulse oximeter (see *appendix 4*) and examination of the respiratory system.

The attending resident at PEU was responsible for clerkship and initiation of treatment according to the WHO guidelines, for which they have received training. The principal investigator was not directly involved in administration of care, but followed up the patient in the ward until discharge, and the outcome was noted as alive or dead.

Children were treated according to WHO guidelines for severe or very severe pneumonia that are also recommended for use in KNH (refer to *appendix3*). Management after admission was guided by a clinical care pathway applied at the discretion of the ward-based consultant team who remained responsible for ongoing treatment decisions.



*Study flow chart*



## ***Ethical considerations and Confidentiality***

Approval to carry out the study was sought from the KNH Ethics and Research Committee and from the Department of Paediatrics and Child Health. Informed consent from the caregivers was sought prior to administration of the questionnaire. To ensure confidentiality, every child was allocated a study serial number linking them to their clinical database which was only accessible to the investigators.

## ***Data Analysis***

Data were collected using pre-formatted data collection sheets (refer to *appendix 1*) with great care taken to preserve the confidentiality of the participants. The data were entered into a purpose-designed database (EpiData version 3.1) with participants identified by only a study code. At the point of data entry, range and validity checks were incorporated to minimize data entry errors.

Data analysis was performed using EpiInfo version 3.4.3. For the primary objective, frequencies were reported as percentages. Means and medians were calculated for continuous data. For the secondary objectives, percentages were reported. For the factors associated with delayed care seeking, univariate analysis was done on each of the variables, comparing their significance on a singular basis. The odds ratios with their respective 95% confidence intervals were calculated. The respective P- values were calculated using Fischer's exact test.

## RESULTS

In the study, 385 children and their caregivers were recruited and interviewed. One caregiver was interviewed for every child recruited. About half of the children, 171(44.4%) had severe pneumonia. There were 204(53%) female children. Overall 240(65.4%) children were aged between 2-11months, 76(20.7%) were aged between 12-23months and 51(13.9%) were aged between 24-59months.

Some of the questions asked did not receive a response from the caregivers, and thus the number of overall responses varied for some of the questions. This is depicted in the tables.

### ***Socio-demographic characteristics of study patients and their caregivers***

Of the 385 caregivers, 97.6% were the biological parents of the children recruited. Most (97.6%) caregivers were female; and one third of the caregivers, (32.7%) were aged less than 25years. Married caregivers were 84.5% and half (49.3%) of the caregivers had received primary school education. This is shown in table 1.

**Table1: socio-demographic characteristics of patients and caregivers**

Characteristics	Frequency, (%)
<b>Gender of children</b>	
Male	181/385 (47.0)
Female	204 /385(53.0)
<b>Age group of children</b>	
2-5mths	114/367 (31.1)
6-11mths	126 /367(34.3)
12-23mths	76/367 (20.7)
24-59mths	51/367 (13.9)
<b>Parent as caregiver</b>	
No	9 /383(2.4)
Yes	374 /383(97.6)
<b>Gender of caregiver</b>	
Male	9 /383(2.4)
Female	374 /383(97.6)
<b>Age group of caregiver</b>	
<25yrs	126/297 (42.4)
>/=25yrs	171 /297(57.6)
<b>Marital status of caregiver</b>	
Married	315 /373(84.5)
Single	36/373 (9.7)
Widowed/ Separated	22/373 (5.8)

<b>Education of caregiver</b>	
None	13/385 (3.5)
Primary (class 1 to 8)	185/385(49.3)
Secondary(form 1 to 4)	141/385(37.6)
Tertiary(college/ university)	36/385 (9.6)
<b>Parity of caregiver</b>	
1 child	125/381 (32.8)
More than 1 child	256/381(67.2)
<b>Mother of child alive</b>	
No	3/383(0.8)
Yes	380/383 (99.2)
<b>Father of child alive</b>	
No	10/375(2.7)
Yes	365/375(97.3)
<b>Relationship of caregiver to patient</b>	
Mother	368/382(96.3)
Father	5/382(1.3)
Other	9/382(2.4)

### ***Clinical characteristics of the patients***

In this episode of illness, majority of patients were reported to have cough (97.4%) and difficulty in breathing (96.6%). Fever was reported in 85.6% of patients. The median nights of fever were three (IQR 2.0-6.0) for all children. Overall, on clinical examination, 99.4% of the children had lower chest wall in drawing and 24% had wheezing. The clinical characteristics of the patients are shown in table 2.

**TABLE 2: Clinical characteristics of the patients**

<b>Characteristics</b>	<b>Frequency, (%)</b>
<b>History of cough</b>	
No	10/380(2.6)
Yes	370/380 (97.4)
<b>Difficulty breathing</b>	
No	13/379 (3.4)
Yes	366/379 (96.6)
<b>Lower chest wall in drawing</b>	
No	6/383 (1.6)
Yes	377/383(99.4)
<b>Wheeze</b>	
No	291/383 (76.0)
Yes	92/383(24.0)

<b>Grunting</b>	
No	287/383 (74.9)
Yes	96/383 (25.1)
<b>Head nodding</b>	
No	267/380 (70.0)
Yes	114/380 (30.0)
<b>Level of consciousness</b>	
A-alert child	337/383 (88.0)
V,P or U-responds to voice, pain or unresponsive	46/383 (12.0)
<b>Previous wheeze (in the past, prior to this illness)</b>	
No	276/359(76.9)
Yes	83/359(23.1)
<b>Wasting on admission</b>	
No	352/371(94.9)
Yes	19/371(5.1)
<b>Edema on admission</b>	
No	369/371(99.5)
Yes	2/371(0.5)
	<b>Median (IQR)</b>
<b>Respiratory rate in 1 minute(n=375)</b>	66.0 (58.0-76.0)
<b>Temperature in degrees celsius(n=357)</b>	38.0 (37.3-39.0)
<b>Oxygen saturations, sPO2 (n=343)</b>	89.0 (84.0-94.0)
<b>Nights of illness(n=380)</b>	4.0 (2.0-6.0)
<b>Nights of fever(n=278)</b>	3.0 (2.0-5.0)

### ***Pre-admission care-seeking behaviour***

Overall, 174/385(45.2%) patients had appropriate care seeking behaviour. Prior to admission, majority of patients had sought formal care (80.7%), while 23% had used informal care. The main symptoms reported by caregivers as resulting in care-seeking were difficulty in breathing (49.6%), cough (27%) and fever (10.4%). About one quarter (22%) of the children admitted, had been admitted in the recent past ( $\geq 2$  weeks prior to recruitment) and 3.5% had been admitted within the 2weeks prior to the time of recruitment.

Approximately two thirds (60.9%) of children were referred to KNH from other formal health facilities. Most of the patients, (84.2%), used buses and *matatus* (local term for minibuses) to travel to KNH. Many of the children received drugs prior to admission: 245(79.5%) had used

antibiotics and 46(17.4%) had used antimalarials. A summary of pre-admission care seeking is shown in table 3.

**Table 3: Pre-admission care-seeking behaviour**

Characteristics	Frequency, (%)
<b>Appropriate care seeking</b>	
No	203/385(52.5)
Yes	174/385(45.2)
Unknown	8/385(2.1)
<b>Time to seek formal care</b>	
<3 days	224/376 (59.6)
>/=3 days	152/376 (40.4)
<b>Main symptom resulting in care-seeking</b>	
Difficulty breathing	138/278 (49.6)
Cough	75/278 (27.0)
Fever	29/278 (10.4)
Other	36/278 (12.9)
<b>Admission ≥ 2weeks ago</b>	
No	290/372 (78.0)
Yes	82/372 (22.0)
<b>Admission &lt;2weeks ago</b>	
No	299/310 (96.5)
Yes	11/310 (3.5)
<b>Informal care prior to admission</b>	
No	295/381 (77.4)
Yes	86/381 (22.6)
<b>Formal care prior to admission</b>	
No	74/382 (19.4)
Yes	307/382 (80.6)
<b>Transport to KNH</b>	
Bus/matatu	320/380 (84.2)
Taxi/ private car	38/380 (10.1)
Ambulance	20/380 (5.3)
Walking	1/380 (0.3)
<b>Referral to KNH</b>	
No	117/299 (39.1)
Yes	182/299 (60.9)
<b>Treatment for current illness with antibiotics</b>	
No	63/308 (20.5)
Yes	245/308 (79.5)
<b>Treatment for current illness with antimalarial</b>	
No	218/264 (82.6)
Yes	46/264 (17.4)

## **Pattern of care seeking behavior**

### ***a) Pathway to care at KNH***

On the whole, 80.8% of patients sought formal care at other health facilities prior to admission at KNH and a smaller proportion, 22.6%, had used informal care, which included home remedies, herbal medication and drugs obtained over the counter. The commonest action sequence was to seek formal care first and then attendance at KNH (65.3%), as shown in table 4.

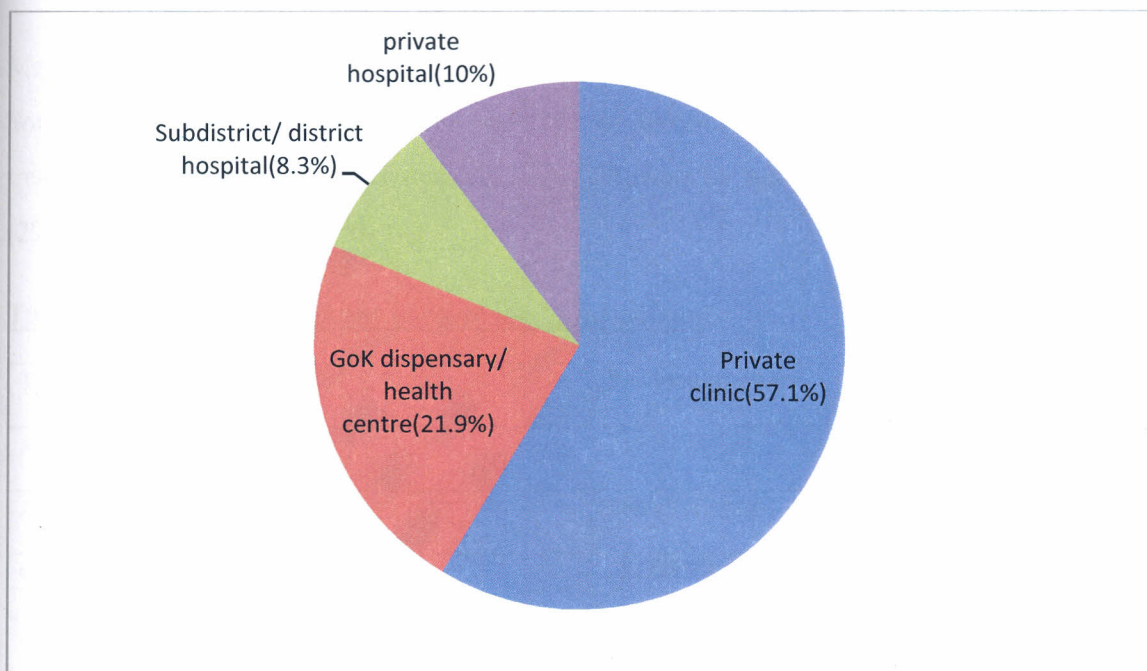
**TABLE 4: Sequence of actions taken prior to admission**

<b>Path taken</b>	<b>Frequency, (%)</b>
Formal care→ KNH	248(65.3%)
Informal care→ formal care→ KNH	59(15.5%)
Informal care→ KNH	27(7.1%)
Straight to KNH	46(12.1%)

### **Types of formal care sought prior to admission**

Private clinics were the type of formal care most attended prior to admission (57.1%), followed by GoK dispensaries and health centres (21.9%), private hospitals (10%) and sub-district and district hospitals (8.3%) respectively, as shown in figure 1.

**Figure 1: Types of formal care sought prior to admission**



**(b) Transit time to KNH**

The median time taken by the patients to reach KNH (from home or health care facility on day of admission) was 1hour (IQR 1.0-2.0). Of all the patients with appropriate care seeking behaviour, 41(24.6%) took less than one hour to travel to KNH. Less than one quarter (19.8%) of patients with inappropriate care seeking behaviour took less than one hour to travel to KNH. No significant difference in transit time to KNH was found between those with appropriate care seeking and those without. This is shown below in table 5.

**Table 5: Transit time to KNH and appropriateness of care seeking**

Transit time	Care seeking behaviour		Odds Ratio	95% CI	P value
	Appropriate ,	Inappropriate			
<1hour	41/166 (24.6%)	38 /192(19.8%)	1.34	0.81-2.21	0.25
≥1hour	125/166 (75.3%)	154/192 (80.2%)			



**c) Treatment used prior to admission**

Majority, 330/385(86.4%) of patients used some form of treatment before admission into KNH. Some patients received more than one type of treatment. Antibiotics were the most common treatment used prior to admission (77.3%), followed by antipyretics (55.0%) and cough syrups (29.5%), as shown in table 6.

**Table 6: Types of treatment used prior to admission**

Type of treatment	Frequency, (%)
Antibiotic	245/317 (7.3)
Antipyretic	160/291(55.0)
Cough Syrup	81/245(29.5)
Antimalarial	46/267(13.9)
Antihistamine	39/264(14.8)
Steroid	3 /258(1.2)
Herbal	3/258(1.2)

Of the antibiotics given prior to admission, half (51.6%) of the patients used amoxicillin-clavulanate while one third of them (34.7%) used macrolides. The macrolides included clarithromycin and azithromycin. In contrast, there was low rate of utilization of amoxicillin (19.6%) and cotrimoxazole (13.2%) as shown in table 7.

**Table 7: Types of antibiotics used prior to admission**

Type of antibiotic	Frequency, (%)
Amoxicillin-clavulanate	110/213(51.6)
Macrolide	74/213(34.7)
Amoxicillin	39/199(19.6)
Co-trimoxazole	34/258(13.2)
Cephalosporin	11/195(5.6)
Crystalline penicillin	6/194(3.1)

### ***Choice of KNH as first provider of formal care***

About a quarter of care givers (19.1%) sought care at KNH as the choice of first provider of formal care, as shown in table 8.

**Table 8: choice of first provider of formal care**

Choice of first provider of formal care	Frequency (%)
KNH	73 (19.1)
Other formal care	308 (80.6)
Unknown	1 (0.3)

### ***Factors associated with inappropriate care seeking behaviour***

#### ***a) Social factors associated with inappropriate care seeking outside the home***

An association between social factors and inappropriate care seeking behaviour was explored. The social factors considered included gender and age of the child and caregiver, marital status, level of education and parity of the caregiver as well as the caregiver's relationship to the patient.

There was no statistically significant association between any of the social factors and inappropriate care seeking behaviour. Table 9 shows these results.

**TABLE 9: Social factors associated with inappropriate care seeking**

Characteristics	Total frequency, (N)	Appropriate care seeking, frequency, (%)	Inappropriate care seeking, frequency, (%)	Odds Ratio	95% confidence interval	P value
<b>Gender of the child</b>	377					
Male		78(44.8)	100(49.3)	0.84	0.56-1.26	0.39
Female		96(55.2)	103(50.7)			
<b>Age group of the child</b>	362					
2-11mths		115(68.8)	122(62.5)	0.76	0.49-1.17	0.21
12-59mths		52(31.2)	73(37.5)			
<b>Gender of the caregiver</b>	375					
Male		6 (3.5)	3 (1.5)	2.38	0.58-9.72	0.21
Female		167 (96.5)	199 (98.5)			
<b>Age group of caregiver</b>	376					
<25yrs		61(35.1)	63(31.0)	reference	reference	ref
>=25yrs		78(44.8)	89(43.8)	1.10	0.69-1.76	0.68
Unknown		35(20.1)	51(25.1)	1.41	0.81-2.46	0.23
<b>Marital status of caregiver</b>	365					
Married		144(86.2)	163(82.3)	0.74	0.42-1.32	0.31
Single/Widowed/ Separated		23(13.8)	35(17.7)			
<b>Education of caregiver</b>	366					
None/ Primary		79(47.6)	114(56.7)	0.70	0.46-1.06	0.09
Secondary/ Tertiary		87(52.3)	87(43.3)			
<b>Parity of caregiver</b>	373					
1 child		55(31.8)	68(34.0)	0.90	0.59-1.40	0.65
More than 1 child		118(68.2)	132(66.0)			
<b>Mother of child alive</b>	374					
No		2 (1.2)	1 (0.5)	2.37	0.21-26.57	0.47
Yes		170 (98.3)	202(99.5)			
<b>Father of child alive</b>	374					
No		2(1.2)	8(4.0)	0.28	0.06-1.37	0.09
Yes		167 (98.8)	189 (95.9)			
<b>Relationship to patient</b>	375					
Parent		166(96.5)	199(98.0)	2.41	0.59-9.83	0.21
Other		6(3.5)	4(2.0)			

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**b) Preadmission care seeking behaviour and appropriateness of care seeking**

Characteristics of preadmission care seeking behaviour in association to appropriateness of care seeking were also investigated. Those who had inappropriate care seeking behaviour were more likely to use buses and *matatus* as the means of transport (OR=0.35, 95%CI=0.19-0.65). This difference was statistically significant (P=0.0005). Of those with appropriate care seeking, 46/166(27.7%) had previously been admitted, while 34/201(16.9%) of those with inappropriate care seeking behaviour had previously been admitted (OR=0.53, 95%CI= 0.32-0.88). This difference was statistically significant (P=0.01). On the contrary, the use of antibiotics prior to admission was significantly less likely among those with inappropriate care seeking behaviour [(OR=0.46, 95%CI=0.25-0.83),P=0.01]. Table 10 displays these results.

**Table 10: Preadmission care seeking behaviour and appropriateness of care seeking**

Characteristic	Total frequency (N)	Appropriate care seeking, frequency, (%)	Inappropriate care seeking, frequency, (%)	Odds Ratio	95% CI	P value
<b>Transport to KNH</b> Bus/ <i>matatu</i> Taxi/Private car/Ambulance	372	133(76.9) 40(23.1)	182(91.0) 19(9.0)	0.35	0.19-0.65	0.0005
<b>Referral to KNH</b> No Yes	293	61(42.1) 84(57.9)	53(35.8) 95(64.2)	1.30	0.81-2.09	0.27
<b>Pre-treatment antibiotics</b> No Yes Unknown	309	20(13.5) 123(83.1) 5(3.4)	41(25.5) 116(72.0) 4(2.5)	Reference 0.46 0.72	Reference 0.25-0.83 0.36-1.46	Ref 0.01 0.37
<b>Pre-treatment antimalarials</b> No Yes Unknown	259	102(85.7) 16(13.4) 1(0.8)	111(79.3) 27(19.3) 2(1.4)	Reference 1.55 1.83	Reference 0.79-3.04 0.16-20.57	Ref 0.20 0.62
<b>Previous admission</b> No Yes	367	120(72.3) 46(27.7)	167(83.1) 34(16.9)	0.53	0.32-0.88	0.01

### ***C) Clinical characteristics and appropriateness of care-seeking***

Respiratory rates of  $\geq 70$ /minute were significantly more likely among those who had appropriate care seeking behaviour [(OR=0.65, 95%CI=0.42-1.00), P=0.05]. The presence of wheeze was also significantly associated with appropriate care seeking [(OR=0.54, 95%CI=0.33-0.88), P=0.01]. Other clinical characteristics had no association with appropriateness of care seeking. These included, fever, grunting, head nodding, oxygen saturation, level of consciousness and history of difficulty in breathing. A summary of these results is shown in table 11.

**Table 11: Clinical characteristics and appropriateness of care-seeking**

<b>Clinical Characteristics</b>	<b>Total frequency, (N)</b>	<b>Appropriate care seeking, frequency, (%)</b>	<b>Inappropriate care seeking, frequency, (%)</b>	<b>Odds Ratio</b>	<b>95% CI</b>	<b>P value</b>
<b>History of cough</b>	373					
No		7 (4.0)	3 (1.5)	2.77	0.70-10.94	0.13
Yes		166 (96.0)	197 (98.5)			
<b>Difficulty in breathing</b>	372					
No		3(1.7)	9(4.5)	0.38	0.10-1.42	0.13
Yes		169 (98.3)	191(95.5)			
<b>Fever</b>	371					
No		26 (15.2)	28 (14.0)	1.10	0.62-1.96	0.74
Yes		145(84.8)	172 (86.0)			
<b>Oxygen saturations</b>	336					
SpO <sub>2</sub> $\leq$ 90%		104(67.5)	106(58.2)	0.67	0.44-1.04	0.07
SpO <sub>2</sub> $>$ 90%		50(32.5)	76(41.8)			
<b>Respiratory rate</b>	368					
$\geq 70$ per minute		76(44.7)	77(38.9)	0.65	0.42-1.00	0.05
$< 70$ per minute		94(55.3)	121(61.1)			
<b>Grunting</b>	374					
No		126(72.8)	153(75.7)	0.86	0.54-1.37	0.52
Yes		47(27.2)	49(24.3)			
<b>Head nodding</b>	371					
No		114(67.1)	145(71.8)	0.80	0.51-1.25	0.32
Yes		56(32.9)	57(28.2)			
<b>Lower chest in drawing</b>	374					
No		1 (0.6)	5 (2.5)	0.23	0.03-2.00	0.14
Yes		172 (99.4)	197 (97.5)			
<b>Wheeze</b>	374					
No		120 (69.4)	163 (80.7)	0.54	0.33-0.88	0.01
Yes		53 (30.6)	39 (19.3)			
<b>Consciousness (AVPU)</b>	374					
Alert		157 (90.8)	172 (85.1)	0.58	0.31-1.12	0.10
V,P,U		16(9.2)	30(14.9)			

## DISCUSSION

This study described the pattern of pre-admission care seeking behaviour among 2 to 59 month old children with severe and very severe pneumonia admitted at KNH. The main focus was on the actions taken and the types of treatment received. Majority of patients (80.6%) had sought health care at other formal facilities prior to admission at KNH. Less than one quarter (22.6%) had used informal care. The most common action sequence observed was to seek formal care first and then attendance at KNH (65.3%). More than half (57.1%) of those who sought formal care, attended private clinics. Most of the patients (86.4%) had used some form of treatment prior to admission at KNH, with antibiotics being the most common form of treatment used (77.3%).

On the whole, 97.6% of the caregivers were the biological parents of the children recruited. Most of the children, (96.3%) were accompanied by the mothers, who were the primary caregivers during the episode of illness. Only 42.4% of caregivers were aged less than 25years. While half 49.3% of all the caregivers had received primary education, only 37.6% had received secondary education. A study done in Mongolia on the effects of social variables on medical care seeking behaviour for ARI in infants in an urban population of the developing country, found the average age of caregivers to be 26years, which was comparable to this study. However, in Mongolia, 62.1% of the caregivers had received high school education as compared to 37.6% in this study [23]. Both in Mongolia and in this study, the level of education had no association with appropriate care seeking. In contrast, Biritwum and colleagues found higher education level to be associated with promptness in seeking care from a healthcare provider [17]

Difficulty in breathing was the main symptom necessitating care seeking, present in half (49.6%) of the children enrolled. This was followed by cough and fever present in (27%) and (10.4%) of children recruited respectively. Caregivers were able to interpret these symptoms as requiring health care seeking. In the Mongolian study mentioned above, fever and cough were found to be the main symptoms that triggered caregivers to contact a healthcare giver for acute lower respiratory tract infections in children [23]

The median number of nights from symptom onset to presentation at a formal health facility or KNH was 2 (IQR 1.0-3.0) for all patients in this study. This is analogous to what was reported in Uganda by Kallander et al in a study on delayed care seeking for fatal pneumonia in children under 5 years [16], in which the median duration of illness before care was sought outside the home was 2 days (IQR= 0.0-4.0).

In this study, the median time taken by caregivers of children hospitalized for treatment with pneumonia, to arrive at KNH was one hour (IQR= 1.0-2.0) and those with appropriate care seeking were more likely to travel to KNH in less than one hour. Taxis, private cars and ambulances were used by 23.1% of those with appropriate care seeking and by 9.0% of those who practiced inappropriate care seeking. This difference was statistically significant (OR=0.35, 95%CI=0.19-0.65), suggesting that those with access to taxis, private cars and ambulances were less likely to engage in inappropriate care seeking. Those with inappropriate care seeking behaviour may have lacked money for faster means of transport.

Prior to arrival at KNH, 80.8% of patients had received some form of formal healthcare prior to presentation at KNH, with over half of them attending private clinics (57.1%). Other formal facilities attended were GoK dispensaries and health centers (21.9%), private hospitals (10%), and sub-district and district hospitals (8.3%). A study done by Gitau in 2008 also in KNH, found that caregivers attending government facilities had concerns about long queues and this may have been a contributory factor to the greater likelihood of attending private clinics rather than government facilities in this study [20].

About one quarter (22.6%) of patients sought informal care, and of these, 15.5% proceeded to seek formal care elsewhere before presentation to KNH. The forms of informal care sought included home remedies (6.8%), herbal medication (1.2%) and drugs obtained over the counter without consulting a medical professional (14.6%). It is possible that some of the caregivers may have withheld information on utilization of informal care. This is supported by previous studies which report that patients and caregivers are often reluctant to discuss use of alternate providers and self treatment due to fear of bullying, accusations or belittling from healthcare staff [29]

Prior to presentation at KNH, 79.5% of patients had received antibiotics and 17.4% had received antimalarials. Amoxicillin-clavulanate was the most frequently used antibiotic, reported by 51.6% of caregivers, followed by macrolides (34.7%), amoxicillin (19.6%), cotrimoxazole (13.2%), and cephalosporins (5.6%). Other treatments given included cough syrups (29.5%), antihistamines (14.8%) and antipyretics (55.0%). In the Ugandan study by Kallander *et al* referred to above, cotrimoxazole was the most common antibiotic used at home [16] while in Peru, in a study on antibiotic use and health seeking behaviour in children under 5 years, amoxicillin (41%) was reported as the most frequently used antibiotic followed by cotrimoxazole (21%) [24]. This study did not assess the competence of the health workers in the lower level health facilities on the WHO ARI algorithm and antibiotic use. However, the use of amoxicillin-clavulanate and macrolides for treatment of ARI in the outpatient setting is contrary to the widely disseminated WHO and Kenyan guidelines. This raises concern on the rational prescription of antibiotics.

KNH was the choice of first provider of formal care for almost one quarter (19.1%) of caregivers in this study. This finding suggests that these patients by-passed primary healthcare facilities. The paediatric casualty at KNH is operational 24 hours a day all week. This may have been a contributing factor to its choice as first provider of formal care for some caregivers. A similar pattern was reported in a study in India by Bapna and colleagues who found that 55.7% of caregivers sought care for illnesses that could be treated at the primary care level directly at the referral facility [25]. This pattern of care seeking can overburden the referral facility and is often more costly for the healthcare system.

In this study, two thirds (60.9%) of patients had been referred to KNH. Of these, 85.2% had referral letters and the most common reason given for referral was due to the severity of the illness (74.7%), followed by poor response to treatment (16.5%), and financial limitations (7.1%). In contrast, in Tanzania, a study done at a referral hospital found that only 3% of patients seen in the out patient department had been referred [26]. A similar finding was noted in Ghana at a referral hospital, and of the children admitted there only 11% had been referred to the hospital [27]. The high rate of referral noted in this study is in keeping with the status of KNH as a tertiary referral Hospital.



This study looked into social factors associated with inappropriate care seeking. Of the social factors explored (gender and age of child and caregiver, marital status, level of education and parity of caregiver), none were found to have any significant association with inappropriate care seeking behaviour. Social factors that have been found in other studies to be associated with inappropriate care seeking include younger age of caregivers, absent father, lower level of education of caregivers and primiparity of caregivers [23].

Pre-admission care seeking behaviour in relation to appropriateness of care seeking was investigated. Those with appropriate care seeking were significantly more likely to have been pre-treated with antibiotics ( $P=0.01$ ). This may have been contributed to, possibly, by the timely use of formal care. Previous admission more than two weeks before recruitment in this study was reported by 27.7% of those with appropriate care seeking behaviour as compared to 16.9% of those with inappropriate care seeking behaviour. This difference was statistically significant ( $P=0.01$ ), and may be attributed to the pre-sensitization of the caregivers to signs of severe disease.

The presence of wheeze was significantly associated with appropriate care seeking ( $P=0.01$ ), as well as a respiratory rate of more than or equal to 70 per minute ( $P=0.05$ ). Other clinical characteristics investigated but for which no association with appropriateness of care seeking was found included fever, grunting, history of difficulty in breathing, level of consciousness, head nodding and oxygen saturation level. In contrast, in Ghana, in a study seeking to explore options for care seeking interventions, it was found that much as caregivers were able to recognize fast breathing, the symptom was rarely considered dangerous and did not result in care seeking [9].

This study clearly describes the path taken by children with severe and very severe pneumonia prior to admission at KNH. Most of the children were treated at other formal health facilities prior to admission (80.6%). Informal care was used by a small proportion of children (22.6%). Care seeking was found to be sequential, with the most common path taken being to first seek formal health care elsewhere and then present to KNH if there is no improvement (65.3%). Appropriate and timely care seeking behaviour was observed in only 45.2% of caregivers of children with severe and very severe pneumonia admitted at KNH. Previous treatment with

antibiotics, previous admission more than 2 weeks before recruitment and access to taxis or private cars were the factors found to be significantly associated with appropriate care seeking behaviour in this study. These findings suggest that previous sensitization on severity of symptoms as well as access to faster and more efficient transport facilities resulted in appropriate care seeking behaviour.

This study also provides information on the types of antibiotics given to children with pneumonia prior to admission, with a majority of children being treated with amoxicillin-clavulanate and macrolides. The wide variety of antibiotics being used in the outpatient setting, including cephalosporins and macrolides, raises a question on the rational prescription of antibiotics in the background of widely disseminated WHO guidelines in Kenya.

### ***Study Limitations***

Recall bias may have influenced the results as caregivers were required to provide self-reported retrospective information concerning the illness. This was minimized by careful structuring of questions so as to limit their liability to recall bias. Reports from patients could not be validated with more objective data. This reporting bias was minimized by requesting for referral letters, prescriptions and medicine containers.

The relationship between care-seeking and availability of money varies with time of the year and as this study ran for only four months, there was possible seasonal bias.

Some of the questions asked did not receive a response from the caregiver and thus the number of overall responses varied for some of the questions.

## CONCLUSIONS

- (1) Appropriate and timely care seeking behaviour was observed in only 45.2% of caregivers of 2-59 month old children admitted with severe and very severe pneumonia at KNH. The most common action sequence observed was to first seek formal care and then present to KNH if there was no improvement (65.3%).
- (2) Antibiotics are the most common treatment given (77.3%) to 2-59 month old children with severe and very severe pneumonia prior to admission at KNH, with majority of children receiving amoxicillin-clavulanate (51.6%) and macrolides (34.7%).
- (3) KNH is the choice of first provider of formal health care for one quarter (19.1%) of caregivers of 2-59 month old children with severe and very severe pneumonia. Two thirds (60.9%) of all patients admitted had been referred to KNH.
- (4) No social factors were found to be associated with inappropriate care seeking behaviour. Previous admission more than 2 weeks before recruitment, treatment with antibiotics prior to admission and access to taxis, private cars or ambulances were found to be significantly associated with appropriate care seeking behaviour ( $P=0.01$ ,  $P=0.01$  and  $P=0.0005$  respectively). The presence of wheeze and respiratory rates of  $\geq 70$  per minute were significantly associated with appropriate care seeking behaviour for 2-59 month old children with severe and very severe pneumonia admitted to KNH.

## **RECOMMENDATIONS**

- (1)The government should facilitate community health education programs that teach caregivers of under 5year old children on interpretation of respiratory symptoms that require care at a health facility, and that promote appropriate and timely care seeking behaviour.
- (2)Further studies are required to look into the use of case management protocols in accordance with Kenyan and WHO guidelines, especially in the primary healthcare facilities.

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## Budget

ITEM	COST (KSh)
Office Costs / Data Entry	4,000
Stationery	6,000
Personnel/ Salaries	0
<b>TOTAL</b>	<b>10,000</b>

### Justification of the budget

The budget covers stationery such as printing paper and simple office costs for data entry. The investigator will not receive salaries as the study is part of the MMed programme.



## Appendices

### Appendix 1: Questionnaire

Questionnaire serial No.		Patient's hospital No.		Date (dd-mm-yy)	
Admission time (24hr clock)		Ward of Admission	[1]3A [2]3B [3]3C [4]3D		

#### 1. 2. Personal details

1.2.1 Gender	<input type="checkbox"/> 0 Male	<input type="checkbox"/> 1 Female
1.2.2 Date of birth (dd/mm/yy)	<input type="checkbox"/> Don't know	[ ]-[ ]-[ ] [ ]
1.2.6 Immunization status up to date as per KEPI schedule? Derive from caregiver history and child's card if available	BCG (0-1) (check for scar)	<input type="checkbox"/> Don't know [ ]
Enter the number of doses received for each vaccine	OPV (0-4)	
	Pentavalent (0-3)	
	Measles (0-1)	

#### 1.3 Medical History ( present illness)

1.3.1 Duration of present illness in days	<input type="checkbox"/> Don't know	[ ] [ ]
1.3.2 Number of days of illness elapsed before seeking treatment outside the home	<input type="checkbox"/> Don't know	[ ] [ ]
1.3.3 History of cough	<input type="checkbox"/> Don't know	[ 0 ] No [ 1 ] Yes
1.3.4 History of difficulty in breathing	<input type="checkbox"/> Don't know	[ 0 ] No [ 1 ] Yes
1.3.5 Fever?	<input type="checkbox"/> Don't know	[ 0 ] No [ 1 ] Yes
1.3.5.1	<i>If yes indicate the number of nights</i>	<input type="checkbox"/> Don't know [ ] [ ]
1.3.6 Difficulty feeding?	<input type="checkbox"/> Don't know	[ 0 ] No [ 1 ] Yes

1.3.7 Abnormally sleepy?	<input type="checkbox"/> Don't know	<input type="checkbox"/> No	<input type="checkbox"/> Yes
1.3.8 Diarrhoea?	<input type="checkbox"/> Don't know	<input type="checkbox"/> No	<input type="checkbox"/> Yes
1.3.9 Vomiting everything?	<input type="checkbox"/> Don't know	<input type="checkbox"/> No	<input type="checkbox"/> Yes
1.3.10 Convulsions?	<input type="checkbox"/> Don't know	<input type="checkbox"/> No	<input type="checkbox"/> Yes

#### 1.4 Pre-admission treatment history

1.4.1 Did the patient receive informal care prior to arrival at KNH? If no, proceed to 1.4.4	<input type="checkbox"/> Don't know	<input type="checkbox"/> No	<input type="checkbox"/> Yes
1.4.1.1	<p><i>What was the nature of informal care received? Indicate all forms of care reported in <b>chronological order</b> from first form of care to last.</i></p>	<input type="checkbox"/> Don't know <input type="checkbox"/> Home-made remedies <input type="checkbox"/> Herbalist <input type="checkbox"/> Traditional healer <input type="checkbox"/> Over the counter drugs (general shop) <input type="checkbox"/> Over the counter drugs (specialist drug store/pharmacy) <input type="checkbox"/> Other (specify)	[ ][ ][ ][ ][ ]
1.4.2 Did the patient receive any form of formal healthcare prior to admission at KNH?(If no, proceed to 1.4.3)	<p><i>What was the nature of formal care received? Indicate all forms of care reported in <b>chronological order</b> from first form of care accessed to last.</i></p>	<input type="checkbox"/> Don't know <input type="checkbox"/> Private Clinic <input type="checkbox"/> GoK dispensary/health centre <input type="checkbox"/> sub-district/district hospital <input type="checkbox"/> Private Hospital <input type="checkbox"/> Other (specify)	[ ][ ][ ][ ][ ]

1.4.2.1	<i>What symptoms made you seek care in the 1<sup>st</sup> formal health facility attended?</i>	<input type="checkbox"/> cough <input type="checkbox"/> difficulty breathing <input type="checkbox"/> fever <input type="checkbox"/> poor feeding <input type="checkbox"/> diarrhoea <input type="checkbox"/> vomiting	<input type="checkbox"/> other(specify)
1.4.2.2	<i>Was the patient admitted for any of the above?</i>	<input type="checkbox"/> No	<input type="checkbox"/> Yes
1.4.2.3	<i>If yes, how many nights of in-patient care did the patient receive at all other facilities attended prior to presenting at KNH? (enter the total number)</i>	<input type="checkbox"/> Don't know	<input type="text"/> <input type="text"/>
1.4.2.4	<i>Was the patient referred to KNH? (if no, proceed to 1.4.3)</i>	<input type="checkbox"/> Don't know	<input type="checkbox"/> No <input type="checkbox"/> Yes
1.4.2.4.1	<i>If yes, does the patient have a referral letter?</i>		<input type="checkbox"/> No <input type="checkbox"/> Yes
1.4.2.4.2	<i>If yes to 1.4.2.4, specify the primary reason for referral</i>	<input type="checkbox"/> Poor response to treatment <input type="checkbox"/> Severity of the illness	<input type="checkbox"/> Convenience <input type="checkbox"/> Financial limitations <input type="checkbox"/> Other (specify)
1.4.3	<i>What symptoms made you seek care at KNH?</i>	<input type="checkbox"/> cough <input type="checkbox"/> difficulty breathing <input type="checkbox"/> fever <input type="checkbox"/> poor feeding <input type="checkbox"/> diarrhoea <input type="checkbox"/> vomiting	<input type="checkbox"/> other (specify)
1.4.4	<i>What was/were the patient's mode(s) of transport to KNH?</i>	<input type="checkbox"/> Foot <input type="checkbox"/> Bicycle <input type="checkbox"/> Private car	<input type="checkbox"/> Bus/matatu <input type="checkbox"/> Taxi <input type="checkbox"/> Ambulance <input type="checkbox"/> Other (specify)
1.4.5	<i>How long in</i>		

hours did the patient take to travel from home/ hospital (if admitted) to KNH?	<input type="checkbox"/> Don't know	[ ][ ]
1.4.6 What is the walking distance to the nearest govt health facility to your home?	<input type="checkbox"/> Don't know	[_0_] ≤1hr      [_1_] ≥1hr

1.5 Treatments given for presenting illness prior to admission (please request patient for any records including referral note, prescriptions, containers etc)					
1.5.1 What kinds of medication did the patient receive?	<input type="checkbox"/> Don't know	[_1_] cough syrup	[_2_] Antibiotic	[_3_] Antipyretic	[_4_] Antimalarials
		[_5_] Herbal medicines	[_6_] Traditional treatments	[_7_] Anti-histamine	[_8_] Other (specify)
1.5.1.1 If antibiotics were given for 1.5.1, which one(s)	<input type="checkbox"/> Don't know	[_1_] Co-trimoxazole	[_2_] Amoxicillin	[_3_] Other penicillin	
		[_4_] Macrolide	[_5_] Cephalosporin	[_6_] Other (specify)	

2.0 Caregiver's data		
2.1 Gender	[_0_] Male	[_1_] Female
2.2 Date of birth (dd/mm/yy) Enter at least year	<input type="checkbox"/> Don't know	[ ][ ]-[ ][ ]-[ ][ ]
2.3 Administrative location		
2.4 Relationship to patient. If not mother, proceed to 2.5; if mother, proceed to 2.6	<input type="checkbox"/> Non-relative	[_1_] Mother    [_2_] Father    [_3_] Sibling
		[_4_] Grandparent    [_5_] Other relative

2.5 Is the patient's biological mother alive?	<input type="checkbox"/> Don't know	[_0_] No	[_1_] Yes	
2.6 Is the patient's biological father alive?	<input type="checkbox"/> Don't know	[_0_] No	[_1_] Yes	
2.7 If caregiver is biological parent, what is his/her marital status?	<input type="checkbox"/> Don't know	[_1_] Married [_3_] Widowed	[_2_] Single [_4_] Separated	
2.8 Number of children (including the patient)	<input type="checkbox"/> Don't know		[_ ][_ ]	
2.9 What is the level of formal education of the child's primary caregiver?	<input type="checkbox"/> Don't know	[_1_] None [_4_] Secondary not completed	[_2_] Primary not completed [_5_] Secondary completed	[_3_] Primary completed [_6_] Tertiary and beyond
2.10 Does the caregiver live with the patient?	<input type="checkbox"/> Don't know	[_0_] No	[_1_] Yes	
2.10.1	<i>If yes for 2.10, how long in years has the caregiver lived with the patient?</i>	<input type="checkbox"/> Don't know	[_ ][_ ]	

### 3.0 Clinical Assessment

<b>Time of initial assessment</b>	0 hours (1 <sup>st</sup> review) Date: Time:		
<b>Sign</b>			
3.1 Respiratory rate (breaths per minute)	<input type="text"/>	3.12 Level of consciousness (AVPU) <input type="checkbox"/> A <input type="checkbox"/> V <input type="checkbox"/> P <input type="checkbox"/> U	<input type="checkbox"/>
3.2 Temperature (°C)	<input type="text"/>	3.13 Neck stiffness	<input type="checkbox"/>
3.3 Oxygen saturation (%)	<input type="text"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
3.4 Pulse (beats/min)	<input type="text"/> <input type="checkbox"/> Weak <input type="checkbox"/> Normal	3.14 Ability to drink/breastfeed	<input type="checkbox"/>
3.5 Central cyanosis (Examine after at least 3min on ambient air)	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> No <input type="checkbox"/> Yes		3.15 Severe pallor	<input type="checkbox"/>
3.6 Nasal flaring	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> No <input type="checkbox"/> Yes		3.16 Sunken eyes	<input type="checkbox"/>
3.7 Grunting	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> No <input type="checkbox"/> Yes		3.17 Capillary refill	<input type="checkbox"/>
3.8 Head nodding	<input type="checkbox"/>	<input type="checkbox"/> <2sec <input type="checkbox"/> 2 – 3sec <input type="checkbox"/> ≥3sec	
<input type="checkbox"/> No <input type="checkbox"/> Yes		3.18 Visible severe wasting	<input type="checkbox"/>
3.9 Lower chest wall in drawing	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> No <input type="checkbox"/> Yes		3.19 Edema of kwashiorkor	<input type="checkbox"/>
3.10 Wheeze audible/auscultatory	<input type="checkbox"/>	<input type="checkbox"/> No <input type="checkbox"/> Yes	
<input type="checkbox"/> No <input type="checkbox"/> Yes		<b>Admission diagnosis</b>	<input type="checkbox"/> severe pneumonia <input type="checkbox"/> very severe pneumonia
3.11 Crepitations	<input type="checkbox"/>	<b>Other diagnosis</b>	(specify)
<input type="checkbox"/> No <input type="checkbox"/> Yes		<b>Illness outcome</b>	<input type="checkbox"/> Alive (date of discharge) <input type="checkbox"/> Dead (date of death)

## ***Appendix 2: Consent form***

Study No. -----

Hospital No. -----

### Investigator

Dr Sarah N Onyancha-Muma

Cell: 0722612480

### Investigators statement

I am asking you to take part in a research study. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be in this study.

### Introduction and procedure

Your child has features of pneumonia severe enough to indicate that admission is necessary. The study being done is on such severe forms of pneumonia, and we are requesting to include him/her.

We are interested in knowing more about the actions you took and the health care your child received prior to coming to KNH. We would also like to find out more about the symptoms that prompted you to seek care at other health facilities and at KNH. Through this study we are trying to understand the influence of all these factors on the severity of your child's illness.

You will be asked a number of questions that will take on average about 30 minutes of your time and your child will be examined to determine the severity of his illness.

The information obtained may help us provide better treatment for this illness in future.

All the care your child needs will not be interrupted by your agreement to take part in the study. No form of monetary compensation will be availed to you for participation.

### Voluntariness

The study will be fully voluntary. You are free to decline to participate or withdraw from the study at any time, and this will not compromise your child's care in the hospital.

Benefits

The study will help doctors understand the various forms of care given to children with pneumonia prior to admission and how this influences the severity of their disease on presentation to this hospital. This will help us put into place systems to address some of the issues so as to provide better health care for children in the future.

Risks

No direct or indirect risks are anticipated in the study, and the care of your child is paramount all the time.

Confidentiality

All the information you provide will be handled with utmost confidence. All the research records are stored securely without the name of you or your child and only the researchers will be able to view this information.

Questions

Please feel free to ask any questions about the study. If there is any part of this form that you do not understand, be sure to ask questions about it.

Caregivers statement

I, being a guardian of ----- (name of child) have had the research explained to me. I have understood all that has been read and had my questions answered satisfactorily. I understand that i can change my mind at any stage and it will not affect me/my child in any way.

I agree to take part in this research.

CAREGIVER'S SIGNATURE----- DATE-----



CAREGIVER'S NAME----- TIME-----

I certify that i have followed all the study specific procedures for obtaining informed consent.

INVESTIGATOR'S SIGNATURE----- DATE-----

INVESTIGATOR'S NAME----- TIME-----

*Only necessary if the caregiver cannot read*

I\* attest that the information concerning this research was accurately explained to and apparently understood by the caregiver and that informed consent was freely given by the caregiver.

WITNESS' SIGNATURE----- DATE-----

WITNESS' NAME----- TIME-----

\*A witness is a person who is independent from the trial or a member of staff who was not involved in gaining the consent.

THUMBPRINT OF CAREGIVER AS NAMED ABOVE-----

### ***Appendix 3: Case definitions and treatment guidelines***

#### **WHO pneumonia Case definitions:**

**Severe pneumonia:** cough or difficulty in breathing with chest wall in drawing with or without tachypnea >50/min for infants 2-11 months, >40/min for children 12- 59 months

**Very severe pneumonia:** Cough or difficulty in breathing plus one of the following danger signs: central cyanosis, altered consciousness, inability to drink or breastfeed or grunting (infants 2-11 months) with or without tachypnea >50/min for infants 2-11 months, >40/min for children 12mo to 60mo chest wall in drawing

#### **WHO 1<sup>st</sup> line antibiotics treatment for pneumonia cases.**

Severe pneumonia: parenteral benzylpenicillin at 50,000 units/kg/dose 6 hourly

Very severe pneumonia: Combination of parenteral Benzyl penicillin at 50,000 units/kg/dose 6 hourly + gentamicin at 7.5mg/kg/dose daily\*

#### **2<sup>nd</sup> Line antibiotics treatment:**

Use of 2<sup>nd</sup> or 3<sup>rd</sup> generation Cephalosporin with or without Aminoglycoside or, Amoxicillin-clavulanate, cloxacillin, flucloxacillin, vancomycin or macrolide for either severe or very severe pneumonia\*

\* World Health Organization. *WHO Programme for the Control of Acute Respiratory Infections: Acute Respiratory Infections in Children: Case Management in Small Hospitals in Developing Countries*. Geneva, Switzerland: World Health Organization; 1990. Publication WHO/ARI/90.5

#### ***Appendix 4: Standard Operating Procedure for Pulse Oximetry***

Oxygen saturation will be measured using a pulse oximeter (Nellcor NPB-40). Pulse oximetry works by placing a pulsating arteriolar vascular bed between a dual light (red and infrared) source and a photodetector. The photodetector records the relative amount of each color absorbed by arterial blood and transmits the data to a monitor, which displays the information with each heartbeat.

#### **Procedure**

1. Explain to parent or guardian briefly on pulse oximetry and its value
2. Ensure the child is comfortably positioned and calm
3. Select an appropriate sized sensor probe for patient age and weight
4. Ensure a good capillary refill at a point closest to the selected site
5. Attach the probe on the selected site (toe, finger or earlobe)
6. Hold the probe in position until a steady reading is obtained, observing to ensure a strong pulse wave and a heart rate
7. Document the pulse oximeter reading in the questionnaire
8. Repeat the measure after one minute and document the value
9. Record average value of the two readings on the questionnaire.

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13<sup>th</sup> August 2009

Ref: KNH/UON-ERC/ A/279

Dr. Sarah N. Muma  
Dept. of Paediatrics & Child Health  
School of Medicine  
University of Nairobi

Dear Dr. Muma

**RESEARCH PROPOSAL: "PRE-ADMISSION CARE-SEEKING BEHAVIOUR FOR SEVERE AND VERY SEVERE PNEUMONIA IN CHILDREN AGED 2 TO 59 MONTHS AT KENYATTA N. HOSPITAL."  
(P234/7/2009)**

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This is to inform you that the Kenyatta National Hospital Ethics and Research Committee has reviewed and **approved** your above cited research proposal for the period 13<sup>th</sup> August 2009-12<sup>th</sup> August 2010.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimen must also be obtained from KNH-ERC for each batch.

On behalf of the Committee, I wish you fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of database that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

**DR. L. MUCHIRI**  
**AG. SECRETARY, KNH/UON-ERC**

c.c. The Chairperson, KNH/UON-ERC  
The Deputy Director CS, KNH  
The Dean, School of Medicine, UON  
The Chairman, Dept. of Paediatrics & Child Health, UON  
Supervisors: Dr. Irimu G., Dept. of Paediatrics & Child Health, UON  
Dr. Laving A. R., Dept. of Paediatrics & Child Health, UON