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CLINICIANS' ADHERENCE TO NATIONAL PNEUMONIA MANAGEMENT GUIDELINES AT KITALE COUNTY HOSPITAL, KENYA
Christine Marete, Mbchb, Mmed (Child Health and Pediatrics) Pediatrician, Embu County Referral Hospital, P. O. Box 33-60100 Embu. Esther Clyde Nabakwe, Mbchb, Mmed (Child Health and Pediatrics), Phd Senior Lecturer, Moi University, School of Medicine, Department of Pediatrics, P. O. Box 4606-30100 Eldoret. Festus Muigai Njuguna, Mbchb, Mmed (Child Health and Pediatrics), Phd, Lecturer, Moi University, School of Medicine, Department of Pediatrics, P. O. Box 4606-30100 Eldoret. Henry Ruiru Mwangi, Msc Medical Statistics, Medical Statistician, Moi Teaching and Referral Hospital, P. O. Box 3-30100 Eldoret.

Corresponding author : Christine Marete Pediatrician, Embu County Referral Hospital. Email: cnmarete@gmail.com.

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C. Marete, E. C. Nabakwe, F. M. Njuguna and H. R. Mwangi

ABSTRACT

***Objectives*: To determine adherence to national pneumonia guidelines in children aged 2-59 months admitted at Kitale County Hospital.**
***Design*: Retrospective**
***Setting*: Pediatric wards of Kitale County hospital in Trans Nzoia County, Kenya.**
***Participants*: Children under 5 years admitted with a diagnosis of pneumonia to Kitale County Hospital Pediatric ward.**
***Interventions*: Data were collected from the participant's inpatient records upon discharge or death. All files were included till a sample size of 380 was achieved. Data on demographics and management was extracted from the pediatric admission form, daily ward round notes and treatment sheet. Data were then compared against the national guidelines to assess adherence. Main outcome measures: Adherence to the guidelines.**
***Results*: The median age was 12 months (IQR 7, 24). The males constituted 198 (52%) of the participants. The diagnosis was severe pneumonia in 213 (56%) and pneumonia in 167 (44%) of the participants. Adherence at admission was 121 (32%) of the cases. Appropriate diagnosis was made in 202 (53%), correct drug chosen in 212 (56%) and correct dosage prescribed in 270 (71%) of the participants. The proportion of the patients correctly managed in accordance with guidelines during the inpatient stay was 2 (0.6%). Complete adherence from admission to discharge was in 8 (2%) of the cases.**
***Conclusion*: The level of adherence to the guidelines was low, markedly decreasing from admission to discharge.**

INTRODUCTION

Pneumonia is an important cause of morbidity and mortality worldwide. There is an estimated 150 million new cases of pneumonia in children globally, with up to 13% severe enough to require admission. This translates to about 0.29 episodes per child per year globally. In the developed world, the incidence ranges from 0.06-0.1 episodes per child per year while in Africa, the incidence is three times higher (1)

Seventy five percent of all annual new cases worldwide are concentrated in only fifteen countries which include Kenya with nine percent of all children participating in the Kenya Demographic Health Survey 2014, having symptoms of an acute respiratory infection reported. Annual incidence of pneumonia in Kenya is estimated at 0.25 episodes per child per year with 11% progressing to severe pneumonia. The prevalence ranges from 24 -30% in rural and national hospitals (2, 3). Severe pneumonia is a common cause of admission to Kenyan hospitals with about eighteen thousand deaths occurring in children under 5 yearly due to pneumonia (2, 4).

Pneumonia is the leading cause of childhood mortality globally accounting for about two million deaths of children under five per year globally, out of a population of about 605 million children. The case fatality rate for pneumonia in children under five years is 1.3-2.6% worldwide. This translates to about 20% of all deaths in children under five years and is more than malaria, Human immunodeficiency virus (HIV) and pulmonary tuberculosis combined. Fifty percent of the worldwide deaths from pneumonia in children under 5 occur in Africa while in contrast less than 2% and 3% in Europe and America respectively (1,4).

The use of clinical practice guidelines is one of the most effective interventions in management of pneumonia. Clinical practice guidelines are defined by America Institute of Medicine as a set of statements that include recommendations informed by a systematic review of evidence to optimize patient care. These are strategies for quality improvement by utilization of evidence-based health care practices and are part of the pillars of quality-of-care framework (6). They have been shown to reduce mortality from pneumonia by 29-45% and total child deaths by 6% (6).

The Integrated Management of Childhood Illnesses (IMCI) strategy was developed by World Health Organization (WHO) in 1992 to address childhood illnesses and mortality that was on the rise. The IMCI set the standards for pneumonia management along with other childhood illnesses like malaria, HIV and malnutrition (7).

The Kenya Basic Pediatric Protocols are an adaptation of international best practices as outlined by WHO in IMCI and WHO Pocket Book of Hospital Care for Children. The protocols on pneumonia are a set of specific symptoms, signs, severity classification and treatment guidelines for children. These guidelines were adapted by the Kenya Ministry of Health (MOH) and first launched in the country in 2006 along with Emergency Triage Assessment and Treatment plus admission care (ETAT+), and a 5-day course for their dissemination. The course was adapted from WHO ETAT course (www.who.int/child-adolescent-health/publications) with extensions and linked to the structured pediatric admission record form (8). The guidelines were revised in 2010, 2013, 2015 and lately 2016 through a formal guideline development approach of grading of recommendations, assessment

development and evaluation (GRADE) while taking local contextual factors into account (9,10).

The guidelines were introduced to the national hospitals, former provincial hospitals, currently referred to as county hospitals and University of Nairobi medical school from 2008 and later made part of national health planning with training allocated as per demand and availability of funds (11).

Currently doctors, nurses and clinical officers are trained annually by ETAT+ trainers from four of the medical schools in the country. Undergraduate students in medical schools are trained on the use of the guidelines during their clinical years of training. Pocketbooks and job aides have been distributed over the years by Ministry of Health, KPA and KEMRI-KWTRP. A soft copy version is available on the websites of these institutions as well as a mobile application (11).

In Kitale County Hospital, all the clinical officers, medical officers and pediatricians based in the pediatric ward have undergone ETAT+ training. All new medical and clinical officers are given an induction course by an ETAT+ trained medical officer and issued with the Basic Pediatric Protocols before deployment to the pediatric wards.

There is need to determine clinicians' adherence to the national pneumonia management guidelines to evaluate the impact of ETAT+ training in Kitale county hospital.

MATERIALS AND METHODS

A retrospective study design was adopted through chart review of medical records of pediatric patients, aged 2-59 months, with an admission diagnosis of pneumonia at Kitale County Hospital from February to September 2016. The objective of the study was to determine adherence to national pneumonia guidelines in children aged 2-59 months admitted at Kitale County Hospital. This is the largest public referral facility in Trans Nzoia County, which is in North Western Kenya, ranked as a tier three facility with a 250-bed capacity.

Kitale County Hospital is part of the Clinical Information Network which is a partnership between KEMRI-KWTRP, MOH, KPA and fourteen county hospitals that has been set up to provide accurate information about provision of health care provided to pediatric patients. One of the ways to achieve this has been development and implementation of a medical record tool that enables clinicians to record patient and treatment data in a standardized format and enables use of routine treatment charts (12, 13). Other interventions include use of a structured pediatric admission form, audit of documentation and performance for management of common illnesses with frequent reports and provision of the new guidelines for management of common childhood illnesses (14, 15). The Pediatric Admission Record has been found to greatly improve documentation and enhance implementation of child health guidelines and IMCI (16). Kitale Hospital staff in the pediatric wards was trained on the new case management guidelines in February 2016 with provision of new guidelines. Monthly audit feedback on pneumonia case management has been provided to the hospital from February 2016 to November 2016 using the national pneumonia guidelines as the audit criteria (12).

Files of 380 patients with a recorded admission diagnosis of pneumonia were reviewed consecutively at discharge or death. A checklist adapted from MOH Basic Pediatric Protocols, February 2016 edition and the pediatric admission record was used during data extraction.

Data on demographic characteristics and management at admission were extracted from the pediatric admission record while data on subsequent patient management was obtained from the daily ward round notes and treatment sheet. This was done for management at admission, 24 hours, 48 hours, 5th and 7th day or up-to discharge or death, whichever came first. It was then compared against a checklist derived from pneumonia management guidelines and pneumonia treatment failure definitions, as outlined in the Basic Pediatric Protocols, to check for adherence. The checklist includes pneumonia classification, drug choice, dosages, and features to be assessed for treatment failure at 24 hours, 48 hours, 5th and 7th day and actions to be taken at these points. Designated points were chosen based on the treatment failure definitions in the Basic Pediatric Protocols.

Data were analyzed using STATA version 13 SE at 95% confidence level. Frequency listings and percentages were used for categorical data. For numerical data, median and inter quartile ranges were reported because Gaussian distribution was violated. Associations among categorical variables were tested using Fishers exact test. P value of less than 0.05 was considered statistically significant. Results are presented in form of graphs, tables and text.

Approval was sought from Institutional Research and Ethics Committee (IREC) of Moi University, College of Health Sciences/MTRH. Consent was waived by IREC. Permission to conduct the study was sought from Kitale County Hospital administration and Confidentiality was upheld throughout the study.

RESULTS

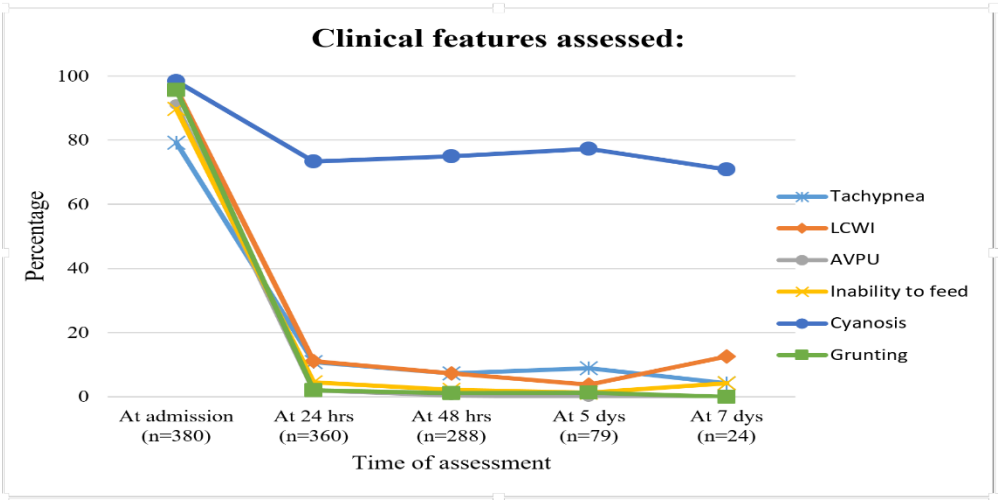
A total of 380 patient files were reviewed. Demographic and clinical characteristics are shown in table 1 below. The median age was 12 months (IQR 7, 24), where children below 12 months formed the majority (43.2%). Most had severe pneumonia (56%) as shown on table 1.

Table 1

Demographic and Clinical Characteristics (overall n=380)

Characteristic	Category	Frequency (%)
Sex	Female	182(47.9%)
	Male	198(52.1%)
	<12 months	164(43.2%)
Age	12 – 23 months	91(23.9%)
	24 – 59 months	125(32.9%)
Diagnosis severity	Pneumonia	167(43.9%)
	Severe pneumonia	213(56.0%)

Features assessed at Admission, 24hours, 48 hours, 5th day, and 7th day: All the required features were assessed in almost all the patients at admission, however in the subsequent reviews; all except cyanosis were mostly not assessed as shown in figure 1.



Key: LCWI=Lower Chest Wall In drawing, AVPU=Alert Voice Pain Unresponsive

Figure1. Line graph showing assessment of various clinical features during admission and in-patient period

About 53% of the diagnosis classifications, 56% drug choices and 71% dosages were correct at Admission as shown in Figure 2.

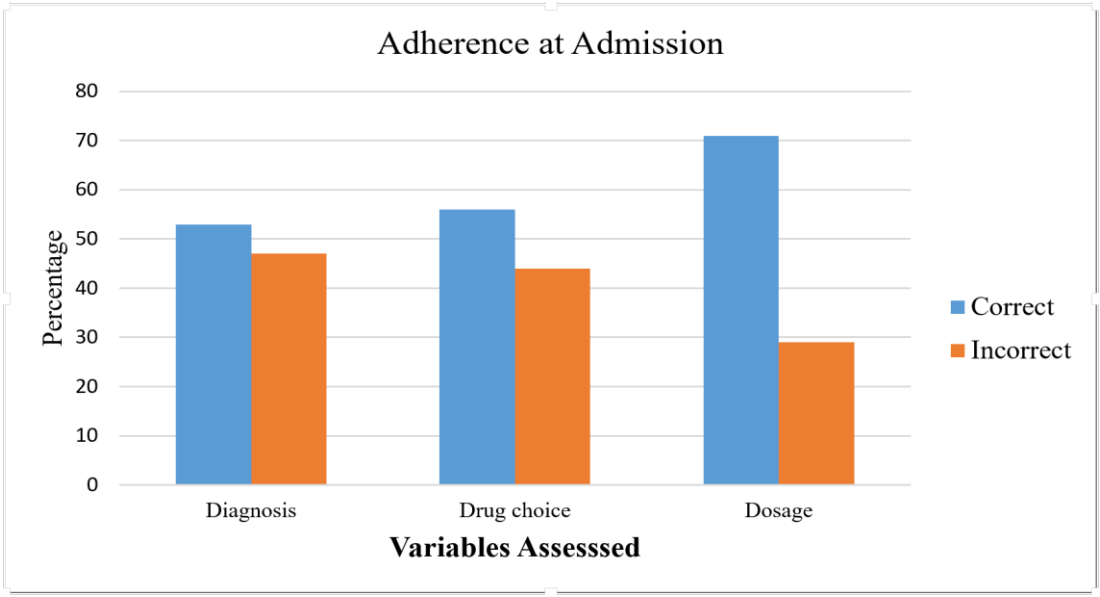


Figure.2. Graph showing adherence to diagnosis classification, drug choice and dosage at admission

The proportion of patients correctly assessed while hospitalized was 4.1% of the total and this declined to 3.7% at 48hours with a rise to 4% at 5th day and a drop to 0% at day 7 as shown in figure 3.

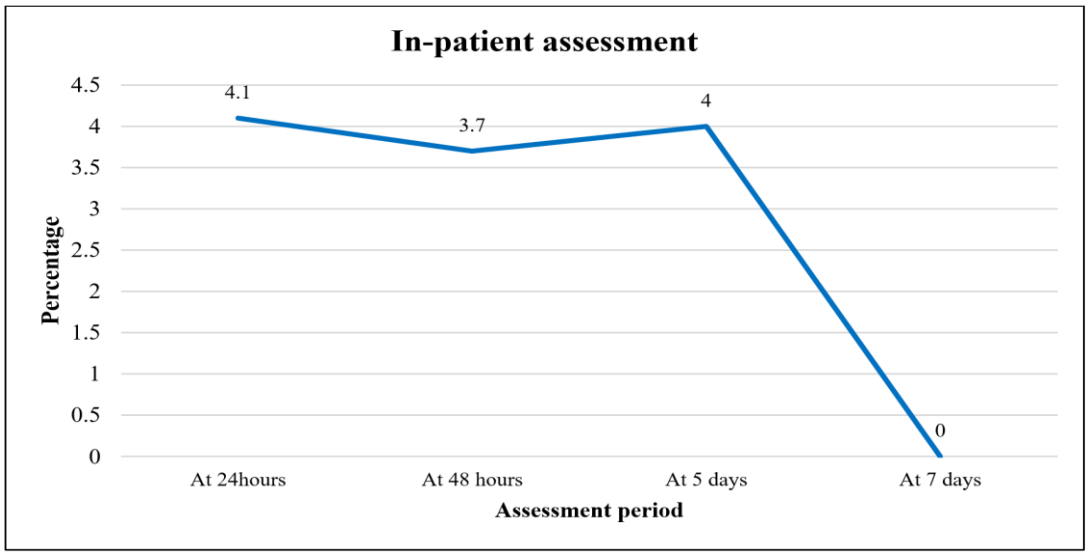


Fig. 3. Line graph showing the proportion of correctly assessed in-patients

The clinical actions taken during the in-patient period were incorrect according to the guidelines and treatment failure definitions in the majority of case as shown in Figure 4. At 24 and 48 hours, 1.4% and 1.7% of the actions taken respectively were correct, while it was at 1.3% on 5th day and none on day 7.

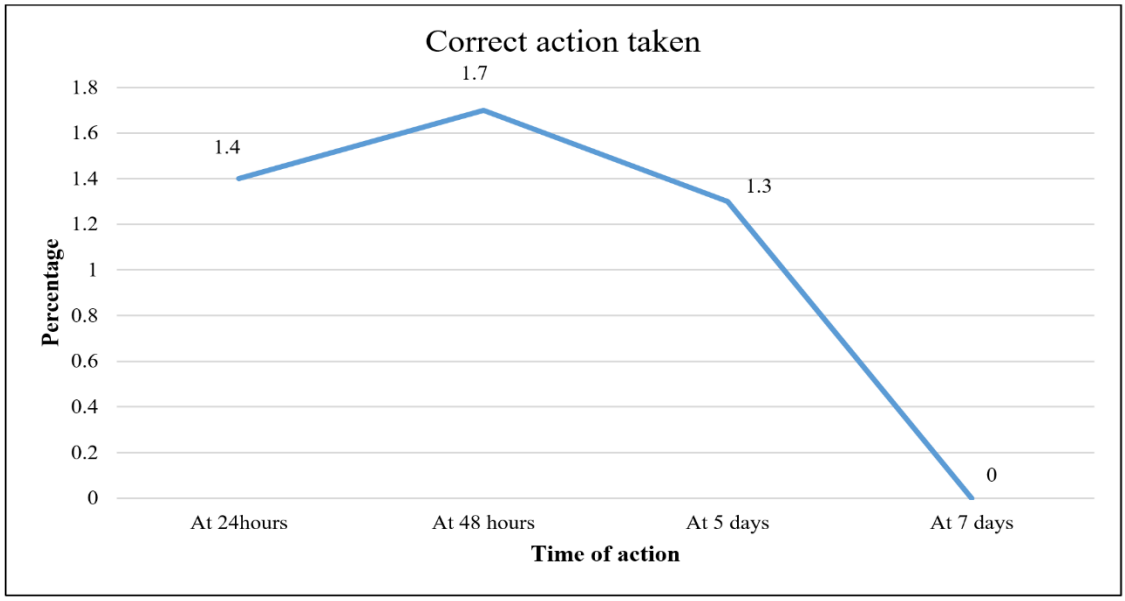


Figure 4. Line graph showing the proportion of correct actions taken after review of the patients during the in-patient period.

Complete Adherence to the National Pneumonia Management guidelines: Complete adherence to the guidelines was in 2.1% of the cases. At admission, adherence to the guidelines was observed in 32.6% of the patients while during in-patient period, 0.6% was managed according to the guidelines. There was no significant association between adherence and age, gender, diagnosis or admitting Clinician as shown in table 2.

Table 2

Association between complete adherence with demographic and clinical characteristics

Variable	Category	Non-Adherence	Adherence	p-value
Age	12-59 months	214(99.1%)	2(0.9%)	0.081
	<12months	158(96.3%)	6(3.7%)	
Diagnosis	Pneumonia	164(98.2%)	3(1.8%)	>0.999
	Severe Pneumonia	208(97.7%)	5(2.3%)	
Gender	Female	180(98.9%)	2(1.1%)	0.287
	Male	192(97%)	6(3%)	
Length of stay	≤72 hours	231(97%)	8(3%)	_
	>72 hours	141(100%)	0(0%)	
Admitting clinician	Clinical officer	181(97.9%)	4(2.1%)	0.711
	Medical officer	105(97%)	3(3%)	

Fishers exact test

DISCUSSION

This study demonstrated an adherence of 2.1% to the Kenya national pneumonia management guidelines at Kitale County Hospital. This finding is similar to a study in Tanzania, a low-income country with high disease burden comparable to Kenya. In the Tanzania study, adherence to the Referral Care Manual for treatment of pneumonia which is similar to Kenya national pneumonia management guidelines was found to be at 1%. This study, like ours, assessed adherence at admission as well as during in-patient care (16). There are studies that have found higher level of adherence to different pneumonia management guidelines both in Kenya and regionally. In a study in Khartoum, Sudan, the level of adherence to WHO pneumonia management guidelines at admission was at 18% (17) while in a Kenyan study at Garissa County Hospital, the level of adherence was at 43% (18). These high adherence figures are due to the fact that both studies assessed adherence at admission only. In this study, adherence to the guidelines was higher at admission (32%) as compared to in-patient stay (0.6%). We assessed adherence for a longer period of time extending to the patients discharge, death or a maximum of seven days. We found that adherence decreased with longer patient stay in the ward.

The higher adherence at admission in this study could be attributed to the use of standardized pediatric admission record form which was not in use in Garissa. A standardized pediatric admission record form has been shown in studies to improve documentation of patient care as well as management (15). Additionally, Irimu *et al.* (19) while developing and introducing evidence based clinical practice guidelines at Kenyatta National Hospital postulated that poor documentation is an explanation for many of observed omissions in patient management. The higher level of adherence at admission could also be due to the fact that the patients were sicker at admission than during their inpatient stay. A study done in Tanzania demonstrated that clinicians are more likely to comply with clinical practice guidelines when caring for

severely sick patients and patients at admission are often more sick than during in-patient stay (16).

Overall, the level of assessment and documentation for most of the symptoms and signs at admission was above 80 %. This is higher than the finding of 47% at Garissa County Hospital and it can be attributed to the presence of a structured admission record during this study while there was none at Garissa (18). Data from Kitale County Hospital and the Clinical Information network, several months after our study indicates that documentation of clinical signs and symptoms at admission has now improved to 95%. This is due to the ongoing feedback and audit sessions that are being conducted by KEMRI-KWTRP in conjunction with the Ministry of Health (20)

The most recorded danger sign was cyanosis. This is higher than the finding at KNH of 75.1% after introduction of clinical practice guidelines at the institution (19). At Garissa County Hospital, cyanosis was only reported in 18% and in Tanzania cyanosis was only assessed in 6% of patients that presented with cough or difficulty in breathing or had a diagnosis of pneumonia. The Tanzania study however used direct observations of clinicians as they assessed patients instead of chart reviews. Clinicians tend to perform better initially when observed but worsen thereafter (16, 18). In our study, we used documentation rather than observation and this may explain why Kitale has performed better.

There are few studies documenting adherence to pneumonia management guidelines during in-patient stay. This study documented an adherence of 0.6% during the inpatient period. Very few patients were assessed in accordance to the guidelines during reviews at 24 hours, 48 hours, and the fifth and seventh day in the ward. A Tanzania study has reported that clinical assessments of patients within 48 hours were few and uninformative (16). The study reported that about eight minutes are required for a complete assessment of a patient in accordance with the Referral care Manual which is akin to our national pneumonia management guidelines. The time available for patient review in a typical outpatient set-up or ward of comparable patient load is only four minutes and this could explain why most features are not assessed or documented (16). In Kenyatta National Hospital (KNH), review of the patients with pneumonia while in the ward was at 4.3% and had the least improvement (0.1%) of all indicators assessed despite intensive training. It was found that adherence was generally higher for tasks that rely on individual clinicians' performance such as diagnostic formulation at admission as compared to tasks based on sustained team efforts like patient review during in patient stay and therefore educational targets on individuals may not achieve improvements in team tasks (19). Additionally, Reyburn *et al* in Tanzania postulated that there is a tendency among clinicians to only record abnormal findings and leave out normal ones. This may give a false implication of not being assessed (16). As the normal findings increase as the patient continues to be in the ward, the level of documentation decreases and hence the observed reduced adherence.

The actions that were taken in the management of patients with pneumonia at all the assessed review points were considered inappropriate in almost all the patients. These actions included change of antibiotics, continuation of the same regimen of antibiotics or stoppage of

medication. The wrong actions stemmed from wrong or incomplete assessment recorded which meant that there lacked an obvious clinical basis for the action taken. Similarly, Agweyu *et al.* (2) while describing treatment failure found that in the majority of cases, the ward clinicians' decisions to revise treatment had no apparent supporting clinical evidence and therefore classified as treatment failure.

Our limitation was that adherence was based on documented management only and an assumption was made that the documented management is what was actually received by the patient.

CONCLUSION

Adherence to national pneumonia management guidelines was low, decreasing markedly from diagnosis to discharge or death. We recommend further research looking into the factors affecting adherence among clinicians to national pneumonia management guidelines, training for clinicians on the inpatient components of the national guidelines for management of pneumonia and introduction of structured forms for review of the pneumonia patient in the ward to improve documentation.

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