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Facilitating Adherence to Amoxicillin Dispersible Tablets for the Treatment of Childhood Pneumonia:

Piloting a Job Aid and User-Friendly Product Presentation of Amoxicillin Dispersible Tablets for Treatment of Childhood Pneumonia in DRC

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Acronyms

CHW:	Community Health Worker
DPM :	Direction de la Pharmacie et des médicaments (Drug regulatory authority)
DPS :	Direction de la Province Sanitaire (Director of health Province)
DRC:	Democratic Republic of Congo
DT:	Dispersible tablets
FGD :	Focus group discussion
HA:	Health area
HC :	Health Centre
HPP:	Health of the Poorest Populations
HZMT:	Health Zone Management Team
iCCM	Integrated Community Case Management
MoH :	Ministry of Health
MSH :	Management Sciences for Health
PNAM :	Programme National d'Approvisionnement en Médicaments (Medicine Procurement Agency)
PNIRA :	Programme Nationale de la lutte contre les Infections Respiratoires Aigües (ARI Program)
PNLMD :	Programme Nationale de la Lutte contre les Maladies Diarrhéiques (Diarrhea program)
SIAPS :	Systems for Improved Access to Pharmaceuticals and services
UNICEF :	United Nations Children's Fund
WHO :	World Health Organization

1.0 Introduction

Pneumonia is the leading cause of infectious diseases death among children less than five years of age. Estimates indicate that 936,000 children died from pneumonia in 2013, accounting for 15 percent of child deaths globally (Wang et al., 2014). Despite a reduction in childhood pneumonia mortality over the last ten years, progress is inconsistent between countries and the burden is concentrated in 15 countries in sub-Saharan Africa and Southeast Asia (Walker et al., 2013).

The high burden of childhood pneumonia deaths belies the fact that pneumonia-related mortality is preventable with simple interventions and appropriate treatment. Case management is a critical element of pneumonia control strategies (WHO & UNICEF, 2013). It consists of classifying the severity of illness using simple clinical signs and then applying the appropriate treatment. Treatment includes home care advice, antibiotics for home therapy, or referral to a higher-level health facility. The World Health Organization (WHO) integrated community case management (iCCM) strategy recommends that children between two months and five years of age diagnosed with fast-breathing pneumonia are treated with an oral antibiotic. The recommended first-line treatment of pneumonia is oral amoxicillin. Despite these recommendations, only one-third of pneumonia cases receive antibiotics as part of the treatment regimen (Unicef Supply Division, 2013). Many cases of pneumonia go undiagnosed or are diagnosed incorrectly. The integrated Global Action Plan for Pneumonia and Diarrhea reports that only 31 percent of children with suspected pneumonia receive antibiotics. Even when antibiotics are available, evidence indicates that the full course of antibiotics is not consistently taken (Graham, 2014).

1.1 Background

Amoxicillin dispersible tablets (DT) are a broad-spectrum antibiotic recommended as first-line treatment for childhood pneumonia in the WHO Model List of Essential Medicines and Priority Medicines List for Children (WHO, 2013). Studies have demonstrated a greater efficacy in the treatment of children with severe cases of pneumonia with amoxicillin compared to co-trimoxazole by 4% to 15% (WHO, 2013). A recent noninferiority trial conducted in 6 Kenyan hospitals concluded that amoxicillin DT is as effective as benzyl penicillin (Agweyu et al., 2015). Amoxicillin is both a low cost and highly effective antibiotic treatment. Additionally, according to a 2013 UNICEF report, DT confer several advantages over other formulations of amoxicillin.

Amoxicillin DT:

- are cheaper than amoxicillin oral suspension;
- have logistical and supply chain advantages in terms of volume and weight;
- are designed to accommodate patients with difficulty swallowing;
- facilitate and simplify iCCM with greater dosage accuracy compared to oral suspension which must be manually measured and mixed; and
- do not require refrigeration.

Adherence to and completion of treatment with amoxicillin DT is dependent on an understanding of how to take the medicine as prescribed. One barrier to achieving the rational and appropriate use of amoxicillin is the lack of caregiver and health care provider knowledge regarding the preparation and administration of amoxicillin DT. Caregivers need to have a clear understanding of how to administer amoxicillin DT to their children including the dosage, frequency, and timing of treatment as well as preparation of the DT. Additionally, health care providers also need better guidance on how to dispense amoxicillin DT and explain to caregivers how to continue the treatment at home. Failure to understand

the steps to complete the course of amoxicillin DT treatment as prescribed can lead to treatment failure, pneumonia relapse, and the potential for the development of drug resistance.

Job aids and clear instructions for medicine preparation and administration can facilitate better treatment adherence. When used by health care providers, job aids can improve performance, promote compliance with standards and recommendations, and reduce the costs of training and re-training (Knebel, Lundahl, Raj, & Abdallah, 2000). Medicine labels using pictograms have been shown to improve understanding of and adherence to treatment regimens among patients and caregivers (Mansoor & Dowse, 2007) (Yin et al., 2011) (Dowse & Ehlers, 2001).

1.2 Intervention

To increase the capacity of community and facility based providers to prescribe and dispense amoxicillin DT and increase the ability of caregivers to understand amoxicillin DT administration instructions for childhood pneumonia, PATH has developed a job aid and user-friendly product presentation for amoxicillin DT in collaboration with other partners at the global level such as SIAPS of MSH. The job aid is a one-page document that depicts the appropriate use of amoxicillin DT to treat pneumonia for children under five years of age for both community level health workers and facility health workers. The user-friendly product presentation is secondary packaging for amoxicillin DT blister packs. The product presentation will be printed on an envelope in which the amoxicillin DT blister(s) will be placed and given to a caregiver. The design concepts for these tools were developed through an iterative design process that included consultation with a designer, manufacturers, and key stakeholders in the amoxicillin supply chain and field-testing design in Kenya and India.

The materials resulting from this design process are those that were used in this pilot test by end-users in DRC to determine their feasibility, usability, and acceptability for the management of childhood pneumonia.

DRC is an ideal setting in which to introduce and evaluate these tools as pneumonia is a leading childhood killer and acute respiratory infections are the main cause for consultation of children under 5 years (DHS 2013-2014). Child mortality remains high (104 children per 1000) and pneumonia can account for about 16% of that mortality. The MoH in DRC has recently included amoxicillin for childhood pneumonia on the EML and introduced it to the standard treatment guidelines using the same dose and age bands in facility as at the community level:

- Children aged 2-12 months 250mg twice a day for 5 days
- Children aged 1-5years 500mg twice a day for 5 days.

This is still a relatively new development and the guidelines have not been widely disseminated yet. However in the sites where the UNICEF project Health for the Poorest Populations (HPP) or USAID ProSani

projects both implemented by MSH, operate, amoxicillin DT is already available together with a technical sheet developed by the MoH and partners to guide the health care providers in the use of amoxicillin DT.

MSH in collaboration with the National Center for Pharmacovigilance conducted this evaluation in two health zones: one where Prosani was working and one where the UNICEF HPP implemented by MSH had recently ended allowing access to both health facilities and community health workers.

2.0 Study objectives

The purpose of this study is to determine the feasibility, acceptability and user friendliness of job aids and dispensing envelopes for facilitating increased adherence to amoxicillin dispersible tablets (DT) for treatment of childhood pneumonia among community health workers (CHWs), facility based health workers and caregivers of children.

The primary objectives of the study are:

1. To understand the feasibility of introducing the amoxicillin DT job aid and dispensing envelope into the health care system in DRC. Feasibility refers to how possible, easy, and convenient it is to integrate these tools into current standards and systems of care, at both the individual provider and health system level.
2. To assess the acceptability of amoxicillin DT job aids and dispensing envelopes among providers and caregivers of children over 2 month and under 5 years of age when used for community management of childhood pneumonia. Acceptability refers to the degree to which these tools are tolerated and/ or appreciated by providers and caregivers.
3. To evaluate the user friendliness of amoxicillin DT job aids and product presentations among providers and caregivers of children over 2 months and under 5 years of age. User friendliness refers to extent to which health care providers and caregivers understand and can recall the meaning of the job aid and product presentation and actually use the job aid.
4. To understand how the job aid and product presentation influence caregiver adherence to the treatment regimen.

The hypothesis is that caregivers receiving treatment from provider using the job aid, in a dispensing envelope will be better equipped to adhere to the amoxicillin treatment than caregivers using standard packaging and not receiving advice.

The study was designed to gather evidence on whether these tools will improve the understanding and adoption of national standard treatment policies. Understanding the perspective of providers and caregivers, their understanding and recall of the tools were essential parts of the evaluation as well as the impact of the tools on adherence to treatment with amoxicillin DT.

3.0 Study design

We used qualitative methods to assess key indicators of feasibility, acceptability, and user friendliness of the job aid and product presentation. Interviews and focus group discussions were used to gather data on whether or not they find the tools feasible, acceptable, and usable but also how and why they reported as such. Observation of the use of the job aids was conducted during consultations and analyzed quantitatively. Adherence behavior and influences on adherence behaviors were measured through self-reports and qualitative inquiry into regarding how caregivers administered amoxicillin DT to their children. Baseline data was collected prior to the training of the providers and community health workers. User- feedback data was collected from caregivers and health care providers after the study products were introduced and used.

3.1 Study materials

The Amoxicillin DT job aid for providers and community health workers (Annex 1) contains information on dose, administration of amoxicillin DT, advice to caregivers, follow up and side effects.

The dispensing envelope is a tool intended to aid caregivers in the correct administration of amoxicillin DT for treatment of childhood pneumonia. Two amoxicillin DT dispensing envelopes have been designed for the two age group recommendations for the use of amoxicillin DT for treatment of pneumonia in children aged 2 months to 12 months and 1-5 years (Annex 2) and were printed on envelopes.

In addition, plastic cups and spoons were provided to health care workers and CHWs to allow them to demonstrate how to prepare and administer amoxicillin DT to the caregivers. They took 1 or 2 tablets from the blister and administered them in front of the caregiver providing the necessary instructions at the same time. The caregivers took home the rest of the amoxicillin blister in the printed envelopes. The cup and spoon used for the demonstration were also given to the caregiver for continued use at home.

3.2 Data collection

Data was collected through interviews and focus group discussions (FDG) with key stakeholders in the Ministry of Health (MOH) (drug regulatory body (DPM), procurement agency (PNAM), national program for ARI and for diarrheal diseases) as well as, provincial and health zone health teams, facility health care providers, community health workers and caregivers of children over 2 months and under 5 years of age. Initial data collection focused on establishing a baseline understanding of the current health policies and practices, care-seeking behaviors, and use of antibiotics for treating childhood pneumonia prior to the introduction of the job aid and dispensing envelope. The job aid and dispensing envelope were introduced to a group of health care workers, CHWs and caregivers in two health zones. Following the collection of base line data, the job aids and envelopes were introduced to health workers and community health workers in a training session as part of their regular meetings. After the introduction, consultations were observed (annex3) to see how the job aids and envelopes were used in a consultation for childhood pneumonia. Data was collected from health providers, CHWs and caregivers of children on the feasibility, acceptability, and user friendliness of the job aid and product presentation, its influence on adherence behaviors, as well as any other recommendations.

3.3 Sample size

Purposive sampling was used to obtain heterogeneous study participants and settings. This will allow for credible comparisons of the perceptions of the amoxicillin DT job aid and dispensing envelopes by key stakeholders, providers and community health workers providing direct care to children, and caregivers of children less than 5 years of age with pneumonia. Table 1 shows the target number of study participants for each group. An additional 10% of study participants had been calculated into the sample size to take into consideration screening failures, participant attrition, and withdrawals.

Table 1. Study participant groups

Study Activity and Participant Group	Identification and Approach	Sample Size
Initial field pre-testing of amoxicillin DT job aids and dispensing envelopes among providers, community health workers and caregivers in a non study zone.	6 participants including 4 providers and 2 caregivers were asked to provide feedback on the ease of use and understandability of design prior to amoxicillin DT job aid and product presentation introduction.	6
Key stakeholders and decision-makers at the national level	4 key stakeholders (DPM, PNIRA, PNLM & PNAM) were interviewed	4
Key stakeholders and decision-makers in the provincial and health zone health administration	Two key stakeholders in both health zones and two in each province were expected to be interviewed prior to amoxicillin DT job aid and product presentation introduction. However only one province stakeholder was interviewed in Ndekesha.	7
Health care providers	21 providers and 21 CHWs from 19 community sites were selected after discussion with the Health zone management teams (HZMT) based on case load and geographic accessibility. They were interviewed before and after amoxicillin DT job aid and product presentation introduction. In Bibanga, in the 9 health areas there were 9 health centers and 2 health posts and so 9 nurse in charge, 2 nurses and 11 CHWs. In Ndekesha there were 10 nurse in charge and 10 CHWs.	42 providers
Baseline caregiver group	20 caregivers of children over 2 months and under 5 years of age prescribed any antibiotic within the last 4 weeks in each health zone participated in a FGD and interviews prior to amoxicillin DT job aid and product presentation introduction. There were 10 caregivers in Bibanga and 10 in Ndekesha	20 interviews and 2 FGD
User feedback caregiver group	40 caregivers of children over 2 months and under 5 years of age prescribed amoxicillin DT using the job aid and product presentation for treatment of pneumonia in each health zone participated interviews and 8 FDGs were organized post-introduction. The interviews were divided evenly between the 2 health zones.	40 interviews and 8 FGD

3.4 Data analysis

We used primarily qualitative methods for data analysis. The transcripts of interviews and FDG were coded line by line and analyzed for emerging themes being identified. These themes will include opportunities and barriers for introduction and aspects of feasibility, acceptability, and user friendliness of the amoxicillin DT job aid and dispensing envelope. Key phrases or statements have been quoted in

this report. We compared and contrasted data collected in the FDG, surveys and interviews for trends and differences between user groups. The software NVivo 11Plus was used for the qualitative analysis.

Quantitative analysis was used to assess self-reports of treatment adherence and to analyze the results of the observations of the consultation. Quantitative data was entered into EPI Info TM7. An excel sheet was generated from the data base and quality was assured by checking the data form the excel sheet with the observation check list. Then data was imported into stata 12 for analysis. Only descriptive statistics were used in the quantitative analysis.

4.0 Research participants

4.1 Study site selection

The province of Kasai Central where Prosani provides assistance to the MoH and Kasai Oriental province where HPP was implementing were selected because of the availability of amoxicillin DT. Within those provinces, health zones of Ndekesha from Kasai central and Bibanga from Kasai Oriental were selected for convenience due to the availability of amoxicillin DT as it was not available in all health zones. In both health zones the population is predominantly rural.

4.2 Characteristics of study population

The study population for this study includes:

1. Key stakeholders from central, provincial and health zone levels
2. Health Care Provider
3. Community health workers
4. Mothers/caregivers of children under five who received treatment services from health care providers in the study areas.

4.2.1 Key Stakeholders

The key stakeholders include health zone and provincial health officers from the health management teams, central level health officials of the MoH involved in procurement, regulation, storage and use of amoxicillin DT; DPM, PNAME, and the programs involved in IMCI and iCCM (program of ARI and diarrhea).

4.2.2 Health Care Providers

- **Health centers**

The dispensers of medicines were the target of the study at the health center. In Bibanga, dispensing is conducted by the nurse in charge or nurse auxiliary, whereas in Ndekesha a dispenser does the dispensing and the nurse in charge the consultation. In this case, both the dispenser and the nurse in charge were interviewed as a pair but only the dispenser was observed.

- **Community level**

The CHW provide curative treatment to children under 5. They are rural villagers who can read and write and who have been trained to treat certain conditions, including pneumonia.

4.2.3 Caregivers

Caregivers represent the target users the amoxicillin DT product presentation. As such, three groups of caregivers were enrolled in this study: the pre-testing group, the baseline caregiver group, and the user feedback group. The first group pre-tested the product presentation to verify that the translations of the amoxicillin DT job aids and dispensing envelopes were appropriate. They came from the health zone of Lemba, close to Kinshasa. The second group of caregivers, the baseline group- provided a baseline understanding of local knowledge of pneumonia and its treatment, appropriate antibiotics preparation and use, and adherence behaviors prior to the introduction of the job aid or product presentation from the two study health zones. The final group, the user feedback group, participated in FDG and interviews after introduction of the job aid and product presentation into their health zones and after using these tools. No caregivers under the age of 18 was enrolled in the study. The word “caregiver” was used to describe persons who brought a sick child to be treated. Usually they were mothers but any caregiver was included, including fathers.

4.3 Inclusion criteria

1. *Key stakeholders:*

- a. Oversee primary health care activities and supervise the health care providers, be involved with pediatric care, or be involved with drug procurement and dispensing as part of the public health system or private health system.
- b. Willing and able to provide informed consent to participate in an interview.

2. *Health care provider:*

- a. Work in one of the participating sub-counties selected for the study.
- b. Provide care for children over 2 months and under 5 years of age.
- c. Currently prescribe and dispense amoxicillin and willing to use amoxicillin DT for the treatment of childhood pneumonia.
- d. Willing and able to use job aid and give dispensing envelope to caregivers in the treatment of childhood pneumonia.
- e. Willing and able to provide informed consent to participate in an interview.

3. *Mothers/Caregivers:*

4.1 *Pre-testing group*

- a. Have been exposed to amoxicillin treatment for pneumonia in the recent past (less than month ago)
- b. Can read French
- c. Willing and able to provide informed consent to participate in an interview

4.2 *Baseline group*

- d. Mother/Caregiver of a child over 2 months and under 5 years of age prescribed some form of amoxicillin for pneumonia within the last 4 weeks in the health zones selected for study.
- e. Willing and able to provide informed consent to participate in an interview.

4.3 *User feedback group*

- a. Mother/Caregiver of a child over 2 months and under 5 years of age prescribed amoxicillin DT for treatment of pneumonia by a participating health care provider.
- b. Willing and able to have a researcher contact her within 5 days of receiving amoxicillin DT dispensing envelope.
- c. Willing and able to provide informed consent to participate in an interview.

4.4 Exclusion Criteria

1. Key stakeholders:

- a. Does not oversee nor supervise primary health care activities and HEALTH CARE PROVIDER directly or not involved with drug procurement and dispensing as part of the public health system or private health system.
- b. Unwilling or unable to provide consent for and participate in an interview.

2. Health care provider:

- a. Does not work in one of the participating health zones selected for the study.
- b. Does not provide care for children over 2 months and under 5 years of age.
- c. Does not prescribe and dispense amoxicillin or unwilling to prescribe and dispense amoxicillin DT for treatment of childhood pneumonia.
- d. Unwilling to use job aid or give dispensing envelope to caregivers.
- e. Unwilling or unable to provide consent for or participate in an interview.

3. Mothers/Caregivers:

4.1 Pre-testing group

- a. Are not familiar with amoxicillin for pneumonia
- b. Do not read French

4.2 Baseline group

- a. Not the mother/caregiver of a child who was prescribed a medicine for pneumonia within the last 4 weeks by a health care provider in the sub-counties selected for study.
- b. The child of the mother/caregiver is not within the recommended age band for treatment with amoxicillin DT treatment.
- c. The child of the mother/caregiver is deemed too high risk and cannot be treated at the community level with amoxicillin DT.
- d. Unwilling or unable to provide consent for or participate in an interview.

4.3 User feedback group

- a. Not the mother/caregiver of a child who was prescribed amoxicillin DT for treatment of pneumonia by a participating health care provider in the sub-counties.
- b. The child of the caregiver is not within the recommended for use of amoxicillin DT treatment.

- c. The child of the mother/caregiver is deemed too high risk and cannot be treated at the community level with amoxicillin DT.
- d. Unwilling to have a researcher contact him or her within 5 days of receiving amoxicillin DT with dispensing envelope.
- e. Unwilling or unable to provide consent for or participate in an interview.

4.5 Withdrawal Procedures

All participants had the choice to participate in the study and can quit the study at any time without reason. There was no consequence to participants or their children- in the case of caregivers- for withdrawing or not participating in the study.

5.0 Study procedures



5.1 Pre-testing job aid and product presentation

In order to ensure that the data collection tools and materials were appropriate for use in the study setting, we asked a small group of providers, community health workers and caregivers from a different health zone, Lemba in Kinshasa, not included in the study to participate in the initial field pre-testing of the amoxicillin DT job aids and dispensing envelopes. The pre-test was conducted on 10-11 November 2015. Providers, community health workers and caregivers were selected based on their availability and willingness to participate. The initial feedback gathered will be used to inform the improvement of the amoxicillin DT job aid and dispensing envelope for use in DRC. Input gathered here will include content accuracy, appropriateness of the images and colors as well as design preferences.

5.2 Generating support for the intervention through key stakeholder interviews

Prior to introducing the amoxicillin DT job aid and dispensing envelope, researchers contacted and informed key stakeholders at the national level, as well as provincial and health zone levels of the purpose of the study and conduct interviews. They used semi-structured interview guides to conduct the interviews and assess the perceived feasibility of introducing the job aid and dispensing envelope into the current practice of care of pneumonia in the health zones. These interviews were used to:

- obtain study approval
- understand the current policies for prescribing amoxicillin DT for the treatment of childhood pneumonia

- assess the organizational feasibility of introducing job aids and dispensing envelopes for amoxicillin DT
- identify potential barriers and facilitators for uptake of the amoxicillin DT job aids and dispensing envelopes
- assess the perceived importance of adding job aid and dispensing envelope to facilitate adherence to amoxicillin DT treatment.

5.3 Collecting baseline data

Semi-structured interview guides and FDG guides were used to conduct interviews with providers in facilities, and community health workers as well as caregivers of children recently sick with pneumonia and receiving amoxicillin to collect baseline data. This data was to:

- Understand the current policies, practices, and trainings for prescribing amoxicillin DT for the treatment of childhood pneumonia.
- Identify potential barriers and capability to incorporate amoxicillin DT job aids and dispensing envelopes into care.

And the data from the caregivers was to:

- Understand knowledge of pneumonia and related care-seeking behaviors.
- Understand knowledge of and experience with antibiotics.

5.4 Introducing and training users on the job aid and user friendly product presentation

The facility-based providers and the community health workers were trained to incorporate the amoxicillin DT job aid and dispensing envelope into their practice of prescribing and dispensing amoxicillin. The research team explained that the job aid and product presentation are for educational purposes only and do not change the diagnostic or treatment regimen in any way. This training took place in the health zones for the health center staff on 21 November 2015 and with the community health workers on 23 November 2015.

The training was to:

- Ensure that the providers and CHWs understand and can use job aid and product presentation.
- Help them integrate job aid and product presentation into their current work.
- Training study representatives to identify and recruit caregiver participants.

5.5 Monitoring and collecting data on the use of job aid and product presentation

Trained providers and community health workers diagnosed and prescribed treatment, using the amoxicillin DT job aid to instruct caregivers to administer amoxicillin DT and giving the blister(s) of amoxicillin in the printed envelope to caregivers.

Ten days after incorporating the amoxicillin DT job aid and dispensing envelope into their practices of prescribing and dispensing amoxicillin DT, the providers, CHWs and the caregivers participated in an interview or FDG to gather feedback.

The interviews and discussions with providers, CHWs and caregivers allowed us to:

- Evaluate the acceptability and user friendliness of the dispensing envelopes for amoxicillin DT treatment of childhood pneumonia by caregivers of children.
- Assess the influence of dispensing envelopes on adherence to amoxicillin DT treatment.
- Identify recommendations to amoxicillin DT dispensing envelope

5.6 Post-study follow-up

The data gathered from the study will be used to improve the job aid and product presentation. Once there is an improved version of the tools, they will be made available for use by the MOH, their implementing partners and other interested stakeholders. This report and the results of the study will be made available to participants and key stakeholders.

6.0 Recruitment

6.1 Key stakeholders

Local research staff used their professional networks to identify relevant key stakeholders, the appropriate administrators and decision-makers in the health zones to interview for the study.

6.2 Health Care Providers

Health care providers providing direct care for children over 2 months and under 5 years of age and involved in dispensing amoxicillin treatment were recruited purposively based on their availability and willingness to undergo training and provide consent to participate in interviews or FDG. To minimize bias, previous performance or reputation was not considered in sampling. This ensured that health care providers with varying levels of experiences and job performance were included in the sample.

6.3 Pre-testing caregiver group

Caregivers visiting a health facility in the pretest health zone were asked to participate in this pre-testing exercise.

6.4 Baseline caregiver group

Eligible caregivers were asked by providers whether they will agree to be contacted by a researcher. If the caregiver agreed, the researcher followed-up to schedule a convenient time to conduct the consent process and FGD.

6.5 User feedback caregiver group and direct observation

Eligible caregivers for the feedback group were asked by provider whether they will agree to be contacted by a researcher. If the caregiver agrees, the health care providers will collect the caregiver's contact information using an enrolment form and the researcher would follow-up to schedule a convenient time to conduct the consent process and FGD.

For the observations, the researcher was present all day in a health facility and only noted information about the consultations where amoxicillin was dispensed. The health care provider explained to the caregiver that the researcher was there to observe the consultation and that the researcher may take notes on the discussion but without using the name of the caregiver. The researcher only stayed if the caregiver consents that the encounter be observed.

7.0 Consent process

The legal age of consent is 18 years and no participants under the age of 18 were enrolled.

Consent from the key stakeholders was given prior to starting the interviews and the interview was conducted in a private setting such as an office. Consent from health care providers was also obtained before starting the interviews and they were provided with an information sheet. The research team conducted the consent process in a private setting in the health facility.

Written consent from caregivers was obtained by researchers prior to an interview or FDG at a convenient location within 5- 10 days of the caregivers' visit to the health facility. The research team contacted the caregivers using the information provided on the enrolment form. The FDG and interviews were arranged at a mutually convenient time and written consent was obtained prior to in a private setting.

8.0 RESULTS

In total, 156 interviews and 10 focus group discussions (FGD) were carried out in November and December 2015. There were 11 interviews with key stakeholders, 84 interviews with providers and 61 interviews with mothers/guardians. The 84 provider interviews were split, with 42 occurring before and 42 after the introduction of the tools. Of the 61 caregiver interviews, 20 occurred before and 41 after the introduction of the tools. Of the 10 FGD, 2 occurred before and 8 after the introduction of the tools. The average age of mothers/guardians was 29 years old, ranging from 18 to 62 years old, 65% (39/60) of mothers/guardians interviewed were farmers, and 53% (31/58) had a primary school education level. The number of interviews was more or less evenly distributed between Bibanga and Ndekesha. The pilot study was conducted in 10 health areas in Ndekesha and 9 health areas in Bibanga.

8.1 Health policy and common practice

8.1.1 Health policy

i) Data on pneumonia

Pneumonia is considered a serious illness in the DRC. With a prevalence of around 7%, it constitutes one of the leading causes of infant and newborn mortality, nationally as well as provincially.

“There is today 7% prevalence, serious yes because it is the 1st cause of mortality among children and newborns.” (Key stakeholder, PNIRA, Kinshasa)

“This illness is the 2nd leading cause for morbi-mortality in the province, it affects many children, especially those with problems of dysimmunity...” (Key stakeholder, DPS, Central Kasai)

Nationally, the fight against pneumonia and the reduction of morbi-mortality caused by childhood pneumonia can be summarized as follows: a large number of health facilities capable of offering treatment for pneumonia, unreliable availability of medicine in these health facilities and a community that is unaware of the dangers of pneumonia, leading to low demand for healthcare at the community level.

“The SARA study shows us that facilities providing treatment is around 75%, although the product may not be available everywhere.” (Key stakeholder, PNIRA, Kinshasa)

“After malaria, acute respiratory infections including pneumonia come in second place. Most children affected are in the community, few go to health centers. The community has not yet been educated about pneumonia. Most do not know that pneumonia is a great killer of children.” (Key stakeholder, HZMT, Bibanga)

“Pneumonia in health zones is ranked among the top five child-killing diseases. Characterized by coughing accompanied by fever and dyspnea. In the community, awareness-raising has led to the understanding that when a child coughs and has dyspnea, they must be taken to the hospital.” (Key stakeholder, HZMT, Bibanga)

ii) Management of pneumonia

Elements that are included in the operational definition of pneumonia in the DRC are coughing, rapid and difficulty breathing. With this definition, pneumonia diagnosis can even occur at the community level by counting respiratory movements with the use of a timer for a case of coughing. A diagnosis of pneumonia is made by a doctor at the hospital level, a nurse at the health center level, and a community health worker (CHW) at community health care sites. Community members, especially parents, are also increasingly involved in the diagnosis of pneumonia, but medical prescription is reserved for hospital doctors, nurses in health centers, and CHWs in health care sites and it can be dispensed by a dispenser in a pharmacy, a nurse at a health center or a CHW at a health care site.

“The operational definition of pneumonia is when a child coughs and we count rapid respiratory movements, with respiratory difficulties (they may or may not have mild chest indrawing). And diagnosis depends on the level: At the community level, we use our eyes and a timer; at the hospital there are complete kits, we use stethoscopes, visual observations, an oximeter in case of severe respiratory distress.” (Key stakeholder, PNIRA, Kinshasa)

“We are already teaching mothers to detect that a child has difficulty breathing at home. At the community level, the CHW [diagnoses pneumonia], at the health center it’s the nurse-in-charge, at the hospital it’s the doctor.” (Key stakeholder, PNIRA, Kinshasa)

“The nurse or doctor [prescribe medicine], but also the CHW. If it’s complicated, the CHW will give treatment before referring to the hospital.” (Key stakeholder, HZMT, Bibanga)

“Nurses dispense in health centers, and CHWs do so in the community after classifying the case.” (Key stakeholder, PNLMD, Kinshasa)

There are national guidelines to help providers with diagnosis and appropriate management of pneumonia. Relevant information is available in flowcharts. There are also technical datasheets for the management of ARIs and chart booklets for IMCI. For CHWs, there are data sheets for community management. This information is transmitted to providers during training courses. Among the trainings that include the management of pneumonia, there have been trainings on flowcharts and IMCI for nurses-in charge as well as training in cIMCI (community) for CHWs. But the greatest challenge encountered is the dissemination of these guidelines and the organization of regular trainings.

“In infant and mother survival, there is the IMCI (Integrated Management of Childhood Illness) that provides informational sheets that guide the diagnosis and management of pneumonia.” (Key stakeholder, DPS, Kasai Oriental)

“We have guidelines but, the problem that arises is the dissemination of these guidelines at the community level and the provision of technical sheets and different management tools and medicine (in short, supplies).” (Key stakeholder, PNIRA, Kinshasa)

“It depends on the partner, whenever there is money we give trainings but, to my knowledge, there is one training every year. Other than that, we, we conduct quarterly supervisory follow-up on the flowcharts.” (Key stakeholder, DPS, Kasai Central)

“The frequency, hmm, that’s hard to say. The occurrence of these trainings doesn’t depend on us but on funding. What often happens is that we plan but the training doesn’t happen due to a lack of funding.” (Key stakeholder, HZMT, Bibanga)

iii) Medicine for pneumonia

According to current national policy, the first-choice medicine for the treatment of pneumonia is amoxicillin. Regarding the form of amoxicillin, capsules are most popular for adults while syrups and oral suspensions are most popular for children. But the greatest challenge is that in health zones where there are no partner subsidies or supply, pediatric forms of amoxicillin are very expensive compared to population income. This means that cotrimoxazole continues to be the medicine of choice for pneumonia, except in health zones that benefit from partner support for training and provision of amoxicillin syrup. Besides cost, the other problem with amoxicillin syrups/suspensions is that they are much heavier and take up more space.

“For the first-choice treatment, we use amoxicillin, for the second choice, we use cotrimoxazole which is generally used as a prophylaxis for HIV-positive children. But we are currently trying to find a second-choice antibiotic.” (Key stakeholder, PNIRA, Kinshasa)

“We currently have syrups and suspensions for children and capsules for adults. But, there is a problem in that the syrups and suspensions weigh and cost more.” (Key stakeholder, PNIRA, Kinshasa)

“It’s a question of availability. If they have the 2 molecules, they’ll give the less expensive cotrimoxazole. If they don’t have it, they’ll give the amoxicillin. They base their decision on availability and cost.” (Key stakeholder, DPS, Kasai Oriental)

In the national policy on childhood pneumonia management, communication between providers and mothers/guardians is of utmost importance. Nevertheless, there are no written tools supporting this communication. Communication happens through word of mouth. The provider should orally communicate the instructions on administration of medicine to the caregiver. In order to ensure good understanding, after first demonstrating, the provider is instructed to ask the caregiver to repeat the instructions or to return for a later evaluation—this is part of the patients’ health education. When the mother can read, the health care provider can write the instructions on the packaging.

“In principle, when the mother arrives at the hospital, we examine the child, evaluate and classify the child with pneumonia. For the CHW, they present the medicine to the mother and explain how to administer it to the child and show her how it is different to other medicines, in shape and color. The first dose is administered to the child in front of the mother and the mother repeats what she has been told.” (Key stakeholder, PNLMD, Kinshasa)

“We often write on the packaging and we include signs to clearly show the mother how it is written, starting even with the shape of the medicine, and we explain it to her so that she will understand.”
(Key stakeholder, PNLMD, Kinshasa)

iv) Amoxicillin dispersible tablets (DT)

Amoxicillin DT has already been integrated into national policy for the management of childhood pneumonia in the DRC. But the mobilization of funds for its purchasing and supply to health zones has been delayed. In the meantime, partners such as UNICEF and MSH have supported certain health zones and the private sector is already requesting marketing authorization. Currently, amoxicillin DT is primarily available in health zones being supported by PROSANI, an MSH project funded by USAID, or from MSH’s Health for the Poorest Populations (HPP) project, funded by UNICEF. But, still certain providers who have received amoxicillin DT, do not know how to use it, despite the fact that a fact sheet produced by the Ministry and partners, was distributed along with the medicine and that meetings were held with providers.

“It’s UNICEF [that buys and supplies amoxicillin DT] because they are involved in the program. There is also MSH. There could also be several importers. Some have already applied for marketing authorization.” (Key stakeholder, DPM, Kinshasa)

“[Amoxicillin DT] is really rare. Only [in] health zones supported by USAID or PROSANI. At the regional stores, there is nothing. It’s a problem of availability.” (Key stakeholder, DPS, Kasai Central)

“So far, there is a big problem because amoxicillin DT isn’t available in all community health sites. If the medicine were available, we could use it.” (Key stakeholder, PNLMD, Kinshasa)

“The most common are the capsules. The dispersible tablets have only just arrived with HPP. But it depends on availability.” (Key stakeholder, HZMT, Ndeksha)

“We have developed documents but trainings have not yet begun. Except where they are trained in IMCI, they already use amoxicillin DT.” (Key stakeholder, PNIRA, Kinshasa)

“It’s a bit awkward. They are now prescribed but not in all facilities. There are even providers who ask how to use it.” (Key stakeholder, HZMT, Bibanga)

At the provider level, knowledge and prescription of amoxicillin DT in the management of childhood pneumonia were evaluated before the training on the use of job aids and envelopes. Results in the 2 health zones were very different. In Bibanga, the product had only just arrived in health centers but the community health sites had not yet been supplied. The nurses-in charge that had received amoxicillin DT had not yet been trained and each prescribed according to their previous knowledge of the prescription of other forms of amoxicillin.

"We are looking at this product with confidence and enthusiasm and we will start using it. I have used it only once, but it's a good product... I think that it all depends on the weight of the child. The 250mg blister, it's not yet clear... Yes, we have received the supplies less than two weeks ago." (BP03, Nurse-in-charge, HZ, Bibanga)

"They have been very efficient for the 2 or 3 children to whom I have prescribed them. It's easy to break open to access the dose for administration. Mothers say that it isn't bitter and therefore easier to give... But first, we are not trained. We compared it to the capsule form that is also 250mg." (BP02, Nurse-in-charge, HZ, Bibanga)

"It is still a new product, but it is good... It takes 5 tablets, 125mg in the morning and 125mg at night." (BP05, Nurse-in-charge, HZ, Bibanga)

"We have not yet noticed any side effects. Children tolerate it and take it like regular water... For a child, the dose is initially 25 to 50mg per Kg of weight taken 3 to 4 times per day. If for example 3 tablets per day, it would be 15 tablets over 5 days." (BP06, Nurse-in-charge, HZ, Bibanga)

"It's a good medicine, but it's just that the quantity is minimal... Based on the Kg of the child's weight. There are children who take 12 tablets, others 21 tablets and others still 14 tablets." (BP07, Nurse-in-charge, HZ, Bibanga)

In Ndekesha however, amoxicillin DT seemed to have been in the field for a bit longer and had already been used by several nurses-in charge and CHWs in community health sites. Nevertheless, some CHWs had already received training on prescribing the product and know how to prescribe it, while the nurses-in charge had not yet benefited from formal training, only informational meetings with the distribution of technical sheets, but it seems that they did not yet know how to prescribe it.

"Yes, I think it's effective... No, we haven't yet been trained... We often give around 15 tablets depending on the age of the child. For a 2-year-old child, take one 250mg tablet in the morning and one in the evening for 6 days. For 3-4-year-old children, we can go up to 20 250mg tablets, 2x 1 tablet." (NP05, Nurse-in-charge, HZ, Ndekesha)

"Yes, it's very effective... No, we have not been trained, only briefings from friends... It's in total 14 tablets, or 1 tablet twice per day for 7 days." (NP04, Nurse-in-charge, HZ, Ndekesha)

"Okay, we think that it's a good product since [it has] direct action and the child takes it easily like water but there is unfortunately too many stockout issues... No, it's only with the notices and since school... We can calculate to be sure, it's 15 tablets per treatment; no that's based on the child's age; if they are older, 15 tablets is too little... Yes, yes we have that because with HPP, when they left, they left us, maybe 14,000 tablets, currently there are 11,900 tablets." (NP08, Nurse-in-charge, HZ, Ndekesha)

"I agree, [I] am very happy... Yes, we received [training]... It was from August 1st to the 2nd, called Evaluation after training for health sites... For a 2 - 11-month-old child, it's 10 tablets, and 12 - 59 months it's 20 tablets for 5 days." (NP02, CHW, HZ, Ndekesha)

"I am going to accept because the medicine treats very well... The training was on how to treat children with pneumonia... The tablets are given differently depending on the age, less than 12 months 2 tablets per day, 1 in the morning and 1 in the evening, older than 12 months 4 tablets per day, 2 tablets in the morning and 2 tablets in the evening." (NR08, CHW, HZ, Ndeksha)

Before the training conducted within the context of this study, providers using amoxicillin DT have advice to the mothers/guardians. But each had their own message based on their own knowledge. Some mistrusted home administration of the product and preferred managing it at the health facility level. Sometimes mothers/guardians had to come in 3 times a day. There was no informational material for the mothers to take home.

"We begin with the illness itself to tell them that pneumonia is avoidable; firstly factors such as smoke, cold, and dust. It is important for example to cover the child when it is cold. Keep the child away from dust and smoke. There are general recommendations, like that the child must eat well. We never give the medicine to mothers to bring home, they must come to the center three times a day... Yes each mother brings her spoon to the center and we show her how to give it to the child. We do this because the mother might forget at home... No, we do not give the medicine to the mothers." (BP02, Nurse-in-charge, HZ, Bibanga)

"Since it's a new medicine we have always administered the product in the health center and we don't give it to the mother... Yes, we break the medicine and we add water and we have the child drink it... The only instruction that we give to the mothers, is to come back if there is a side effect but as of now we have not heard of anything." (BP05, Nurse-in-charge, HZ, Bibanga)

"We advise mothers to respect the prescribed doses so that there may be rapid improvement in the condition of the child and we explain the efficacy of the medicine... Yes, so that the mother rigorously respects the doses prescribed in the centers when she arrives home... No, there is no support... Some understand, others don't understand, this in view of their capacity, according to the intelligence of the mother." (NP05, Nurse-in-charge, HZ, Ndeksha)

"We tell them how to give, crush the tablet in the spoon and add a bit of water and give it to the child... I do it the first time and I give it[to the child] then, it's so that the mother will be able to also administer it... Most remember our instructions. Because often, the treatment is good and when they come back it's for a different complaint, not the same... Some mothers stop the treatment when symptoms disappear." (BP09, Nurse-in-charge, HZ, Bibanga)

"I show her how to administer the medicine at home. I give her advice and an appointment... Based on the training, we were told to demonstrate... They understand easily since all the children who come to the site are cured... Because based on the advice and follow-up, I can see that they understand." (NR01, CHW, HZ, Ndeksha)

During the collection of data following the introduction of the job aid and envelopes, it was noted that amoxicillin DT was very much appreciated in the field by nurses-in charge, CHWs and mothers/guardians. It has shown a high rate of recovery when administered at a frequency of twice a

day during 5 days and a dose of 1 tablet per administration for children aged 2 to 12 months and 2 tablets per administration for children aged 12 months to 5 years. Over the course of the interviews and FGDs that we conducted, we have identified only 3 mothers/guardians who reported a persistence in the symptoms of the children. The cause of this persistence was identified for 2 of the children, one had from the start a complaint of pus on urination in addition to pneumonia, so it is possible that he also had a urinary tract infection. The other was seen by a nurse's aid who had prescribed a dose of 1 tablet per administration even though the child was older than one year, so the dose was inadequate.

"All that we can ask, that the delivery schedules be respected and especially that the response be very good to the treatment especially since drugs on the market can be problematic with regards to quality." (BP03, Nurse-in-charge, HZ, Bibanga)

"For us, our problem is that during the study comes people adhere, but after if there are stockouts and women won't find the product, that will pose problems. They will say 'that product healed my son, why isn't there any?' It hurts us when there are prolonged stockouts." (BP07, Nurse-in-charge, HZ, Bibanga)

"That it be ongoing. Or else there will be disturbances. They will say 'where is our medicine?' They also know that it's free. That encourages the mother to return early. And also that helps raise our rates of recovery. We never reach 50%." (BP02, Nurse-in-charge, HZ, Bibanga)

"Our comment is to always bolster ourselves with a lot of medicine in order to have a lot of clients. Because mothers are complicated. They will say 'today you didn't give the tablet that you had given last time.'" (BR03, CHW, HZ, Bibanga)

"It's just the regular supply of amoxicillin and envelopes. The job aid, we can copy it over and over. If there is an intellectual mother we can photocopy it for her." (BP02, Nurse-in-charge, HZ, Bibanga)

8.1.2 Common practices

i) Knowledge of and attitudes towards childhood illnesses

According to the mothers/guardians interviewed, the majority of children under 5 years old are sick most of the time. Among the most commonly encountered pathologies, they cited coughing, malaria, diarrhea, fever, vomiting, worm infections. Among the medicines cited by the mothers, most were anti-infectives including artesunate/amodiaquine and antibiotics (Bactrim, amoxicillin, tetracycline, chloramphenicol, Flagyl). There were also medicines such as paracetamol or Novalgine and ORS. They could find these medicines either in health centers or in the private sector, particularly in pharmacies. Prices vary enormously from one medicine to another.

"Many of them are sick," "They are always ill," "They are regularly ill." (FGD Mothers/guardians, HA Cikuyi, HZ Bibanga)

“They are often sick with coughing and vomiting,” “Even malaria and also diarrhea,” “We see vomiting, fever and even respiratory infections and others.” (FGD Mothers/guardians, HA Cikuyi, HZ Bibanga)

“We give amoxi or ampicillin or Bactrim® for cough (Pneumonia). We give injections, Novalgine or Quinine for fever...” (Caregiver, HA Cikuyi, HZ Bibanga)

“We know that for the cough (pneumonia) we can give ampicillin, Novalgine for fever, ... When we have the means to go to the center, they give them to us there, when we don’t have money, we go buy them in a pharmacy in town... At the center we pay 1500CF for the whole treatment. They don’t sell the medicine separately. At the pharmacy, it depends on my means.” (Caregiver, HA Cikuyi, HZ Bibanga)

ii) Knowledge of pneumonia

Descriptions of pneumonia vary greatly between nurses-in charge, CHWs and mothers/guardians. The nurses-in charge talk about pneumonia when there is coughing, an elevated respiratory rate, fever, respiratory difficulties, dyspnea, chest indrawing, nasal flaring. For the CHWs, the key element for the diagnosis of pneumonia is respiratory rate, with some adding associated symptoms such as coughing, indrawing and wheezing. For the mothers/guardians, pneumonia is associated with a wide range of symptoms including coughing, cold, fever, swollen eyes, chest pain, respiratory problems, etc. The nurses-in charge and CHWs therefore have a good level of knowledge of the signs and symptoms leading to a diagnosis of pneumonia.

“We have a dry cough, dyspnea, rapid breathing (above 50 movements per minute for children under a year old, 40 movements a minute for children 12 to 49 months). Key signs are also coughing and rapid respiration. We can also have crackling when auscultating the lungs.” (BP02, Nurse-in-charge, HZ, Bibanga)

“Yes, first there is the cough, there is rapid breathing or either dyspnea, chest indrawing, there is crackling, there is fever.” (BP08, Nurse-in-charge, HZ, Bibanga)

“I am going to first count rapid breathing with wheezing, still based on age if the child is less than 1 year old and breathes more than 50 movements and over 1 year old breathes more than 40 movements or more.” (NR08, CHW, HZ, Ndekesha)

“Pneumonia in a child often begins with fever, the child coughs, the eyes get red. I give them a paracetamol tablet and when they don’t get better I bring them to the provider and if he indicates that it is pneumonia we follow the treatment until he gets better,” “I know that my child has pneumonia when he wakes up in the morning and his eyes are swollen and red, breathing becoming difficult, I bring him to the provider for appropriate treatment. “ (FGD Mothers/guardians, HA Cikuyi, HZ Bibanga)

For the management of pneumonia, medicines most often mentioned by nurses-in charge and CHWs were amoxicillin and Bactrim and more rarely ampicillin. Others added harmless remedies (honey, lemon juice). Where it is available, providers prefer prescribing amoxicillin syrup to children under 5 years old. Mothers accept this form although there are some who prefer the injectables. Providers follow the instructions in the flowcharts and technical sheets. If there is a change in national policy, the nurses receive information from the HZMT and relate it to the CHWs. In case of stockout, the health centers are provisioned by the HZ on a more or less quarterly schedule, while the CHWs are provisioned by the nurses-in charge on a more or less monthly schedule.

"I am supposed to prescribe them amoxicillin syrup 1 teaspoon 3 times during 7 days. Also, lemon juice and honey. If there is no amoxicillin, we can go with the co-trimoxazole. We can calm the cough with honey or lemon juice... The lemon juice or honey is to calm the cough. Pneumonia is a bacterial infection treated by an antibiotic and here amoxicillin is the antibiotic of choice... We especially prefer amoxicillin syrup. And now we have had dispersible tablets. These 2 forms are preferable." (BP02, Nurse-in-charge, HZ, Bibanga)

"Mothers prefer injections, but they are able to accept syrups after counseling. We encourage them." (NP01, Nurse-in-charge, HZ, Ndekesha)

"At the first training, we were told to give Bactrim, the 2nd training, we were told to give amoxicillin. For now, we give amoxicillin." (N01, CHW, HZ, Ndekesha)

"We are under direction of the Ministry. If there are changes, the hierarchy (central office) calls us to inform us, then train us." (BP02, Nurse-in-charge, HZ, Bibanga)

iii) Health care seeking behavior

In the search process for health care, parents first begin by trying to treat their child at home. If the child's condition does not improve, they then decide to bring them to the health center or community health site. Some parents bring their children to health care sites when the illness is less serious or in its early stages, to the health center when the illness becomes more serious and to the hospital when the child's illness persists. Among the factors that determine the choice of health facility there is habit, proximity, quality of care and low cost of service. Nevertheless, if they have to choose, some mothers prefer to bring their children to health centers and not to health sites, because they believe that nurses-in charge offer higher quality health services. Lack of money is the primary obstacle preventing mothers from bringing their sick children to a provider. Overall, parents are satisfied with the care offered by their usual providers. More than half of the mothers/guardians report having received counseling, primarily on how to administer the medicines at home and the importance of returning if the child's condition does not improve. The majority of mothers prefer returning to the provider if the condition of the child does not improve and leave the decision of a referral to a hospital up to them.

"[To a CHW] when the illness begins; [to a health center] if the treatment at home still doesn't work (no change); [to a hospital] if the condition of the child gets worse or there still is no change." (Caregiver, HA Ndekesha, HZ Ndekesha)

“When my child has fever at night then, I take advantage of the CHW closest to me, he gives me medicine and in the morning, we go to the Center.” (FGD Caregiver, HA Ndekesha, HZ Ndekesha)

“I first treat my child at home. Only after do I go to the center because I have to first gather the financial means... I bring him first to the health center by way of the servants of God. I go to the center like I learned from my parents who had taught us to trust Modern Medicine.” (Caregiver, HA Cikuyi, HZ Bibanga)

“The provider advises us not to keep the child at home too long when they are ill even if we don't have money and he often scolds us, “Have you ever brought a sick child that we didn't treat?”” (FGD Mothers/guardians, HA Cikuyi, HZ Bibanga)

8.2 Job aid and dispensing envelope

8.2.1 Comprehension of the job aid and dispensing envelope

The evaluation of the understanding of the job aid and envelopes was primarily conducted during the pre-test. Nevertheless, during the study itself we also considered other viewpoints.

The section on amoxicillin DT dosage for children aged 2 months to 12 months was very well understood by all pre-test participants. However, for the section on dosage for children 12 months to 5 years old, participants in the pre-test had difficulties understanding the image of the 1 - 5-year-old child taking the medicine. They understood that the child came to the health center alone and took the medicine alone without adult help. In the field, mothers/guardians had a better understanding of this section.

“Image of a mother administering the medicine to her child; then an image showing a mother happy to see her child healed; then an image illustrating dosage.” (P2, Nurse, HZ Lemba)

“I see a mother carrying a child (aged 2 months to 1 year) to whom she gives a medicine using a spoon 1 tablet in the morning and 1 tablet in the evening; and then I again see a child (aged 1 to 5 years) taking the medicine all alone with the help of a spoon 2 tablets in the morning and 2 tablets in the evening for 5 days. Afterwards these children are healed and happy.” (P3, Doctor, HZ Lemba)

“I think that on one hand there is the age range; taking 2 tablets for 2 months to 5 years; on the other, there is the mother and child; on the other, the child alone. “ (Pre-test Caregiver, HZ Lemba)

“Everything is important. Because I saw that when the child was sick, the arm was lowered and when the child took the medicine, he raised his arm up.” (Caregiver, HA Cikuyi, HZ Bibanga)

“After giving the tablets to the child they showed us the child standing up next to them. But when he hadn't yet taken the tablet, his arms were lowered. But if he already took the medicine, his arms are in the air. Which explains that the illness is completely over.” (FGD Caregiver, HA Katshiapanga, HZ Bibanga)

Concerning the development of the bacterial load and the reason for taking all the medicine without interruption. All participants in the pre-test displayed an excellent understanding of this section. But in the field, almost half were unable to interpret this section (see user-friendliness).

“There was pneumonia, when we administer the medicine the illness diminishes from the first day to the fifth day and little by little until recovery. Following the instructions, the guidelines; respecting the medicine dosage until the end of treatment so that there is recovery. You will see the illness improving until recovery.” (Pre-test Caregiver, HZ Lemba)

“When we administer the medicine every day, you have to go until the end of treatment despite improvement in the condition of the child. Do not stop treatment.” (P1, Nurse, HZ Lemba)

The section on treatment administration did not lead to many problems in comprehension. Participants in the pre-test and mothers/guardians in the field could describe it and remembered it well.

Regarding advice, follow-up and side effects, participants in the pre-test gave particular importance to the images accompanying the instructions and each participant gave their personal interpretation, no two were alike.

“The light that illuminates. These are the instructions that we give to the mother: Protect the medicine, follow the instructions, ...” (P1, Nurse, HZ Lemba)

“It’s the light; clear explanations. It’s the message that must be clearly given to mothers.” (P2, Nurse, HZ Lemba)

“It’s a light that illuminates. These are the prerequisites before using the product.” (P3, Doctor, HZ Lemba)

“Check the box if the answer is right, leave it empty if the assertion is wrong. Side effects on the child. The child cannot be weaned during treatment. The mother must ensure that the child is no longer sick at the end of the treatment.” (P4, Nurse, HZ Lemba)

“This image is incomprehensible.” (P1, Nurse, HZ Lemba)

8.2.2 Feasibility

Feasibility refers to the way in which it is possible, easy and practical to integrate these tools into the current care systems and norms, both at health system and provider levels.

According to key stakeholders, there is no job aid in the true sense of the word to help providers in case management. Rather, flowcharts and technical sheets are used. For certain illnesses, there are tools posted on walls that help providers diagnose and manage cases. The procedure for the

introduction of a new tool follows the same track as that of information and supply, going from validation at the central level to dissemination at the operational level. Nevertheless, before validation, involving the operational level in the conception of new tools, as well as in the pre-test, is very important.

“The job aids used up now are tools as mentioned such as flowcharts and technical sheets. For packaging, it’s in little plastic bags with writing on it.” (Key stakeholder, Kasai Central)

“I think that, before the introduction, an exchange of ideas about this tool with the HZMT is necessary so as not to forget certain important things and also include the experts.” (Key stakeholder, HZMT, Ndekesha)

“In theory, there is a meeting, people meet to discuss how to implement a tool, starting at the operational level to the central level. And we will show the importance of this tool and see how we can integrate them. Images are often better, using the image boxes.” (Key stakeholder, National Program to Combat Diarrheal Diseases (PNLMD), Kinshasa)

“It’s a whole process, the tool must first be developed and then we must determine for whom it is intended, pre-test it, if it’s okay, then disseminate so it is known and then provide it to facilities.” (Key stakeholder, National Program to Combat Acute Respiratory Infections (PNIRA), Kinshasa)

“Since we are at the operational level, it first has to go through the central level and the intermediary level relays to form a zone management team who will then disseminate to the health facilities.” (Key stakeholder, HZMT, Bibanga)

From the first contact with the job aid and the dispensing envelopes, all key stakeholders at the national or provincial levels or at health zones have stated that it is a useful tool, easy to understand and that it will help providers in the prescription of amoxicillin DT and mothers in understanding the instructions. Nevertheless, it should follow the procedures described above for its introduction into the health system.

“These tools will be welcome for a better use and understanding and also contribute to improving our health system.” (Key stakeholder, PNIRA, Kinshasa)

“Yes it will help because it is more appealing. Since it is the images that communicate it’ll be good when the mothers will have that at the health centers or sites... It will contribute to change, things will change.” (Key stakeholder, PNIRA, Kinshasa)

“Yes, it will help nurses follow the proper dosages. For the envelopes, it’s very helpful in keeping the products... If the product is dispensed well by the providers and kept well by the mothers at home to eventually administer to their children. In short, the administration and good packaging of the product.” (Key stakeholder, Provincial Health Division, DPS, Kasai Central)

“Yes, yes, we are willing to use them. As the pharmaceutical is already there, the tools will reinforce rational use... it will really help. There are additives in dispersible products that will add a certain taste

that will allow for an easier administration to children... These tools can improve management, versus co-trimoxazole for which these tools don't exist.” (Key stakeholder, DPS, Kasai Oriental)

“A technical committee would consider the question; other participants give their opinion. Then validation by the Technical Coordination Committee. Dissemination follows to the health zones, then to the health centers.” (Key stakeholder, PNAM, Kinshasa)

The majority of providers (nurses-in charge and CHWs) who have used the job aid and the envelopes during this pilot experience think that it will be possible for these tools to be integrated into other health centers and other health zones throughout the country for the management of childhood pneumonia. Most would also like to have other job aids for the prescription of other medicines used in primary health care. Medicines for which there was the most demand for a job aid are ACT (artesunate amodiaquine), zinc, paracetamol and cotrimoxazole.

“Yes it's possible. If it's everywhere then that's great... Because when we use it, we see an impact in the community. Mothers who use it will inform others also. If we integrate it everywhere then it's easy. Even for mothers who live far away.” (BP07, Nurse-in-charge, HZ, Bibanga)

“Bibanga is a public health center. Other areas don't have such centers. We can help by relaying to other regions so that they will also know that.” (BR04, CHW, HZ Bibanga)

“It's to help them adhere to the national protocol and to the guidelines because we have to standardize care in accordance with the protocol to reduce mortality associated with pneumonia.” (NP06, Nurse-in-charge, HZ Ndekesha)

“Because not all cases come to me; other centers also need to have the job aid and envelopes.” (BP04, Nurse-in-charge, HZ Bibanga)

“Yes it's very important. It's better if we do it for other products. Antibiotics like amoxicillin we gave it for 7 days. Now it's 5 days... Commonly used medicines; zinc that we use for diarrhea. Even antimalarials.” (BP04, Nurse-in-charge, HZ Bibanga)

8.2.3 Acceptability

Acceptability refers to the extent to which the tools are tolerated and/or appreciated by providers and mothers/guardians.

Upon first glance at the job aid and envelopes, key stakeholders thought that these tools would suit nurses-in charge, CHWs, and mothers and would therefore be appreciated in the field. For the mothers, they thought that the colors and images would aid their understanding regardless of their education level. As for the instructions on the job aid, they thought that they would be more useful for nurses-in charge. They expressed doubt on the comprehension of the French text by CHWs and wanted a translation in the local language.

“It’s quite clear. It helps the provider know how to manage a case of pneumonia depending on the age range. It also allows us to advise the mother in a practical way... It’s also much more useful for the mother of the child even if she has a low level of education. The sun shows that in the morning we give this much tablet according to age, and the moon shows that in the evening we give this much. And how to take it based on age and that it must be diluted in water.” (Key stakeholder, HZMT, Bibanga)

“It is complete in the sense that I can identify that for a child of 2 to 12 months of age they must take 1 tablet dissolved in water, morning and evening. For a child of 1 to 5 years, 2 tablets morning and evening. Side effects are also mentioned. I really appreciate that the dosage is indicated very clearly... Dosage is repeated and how to give it. The mother will refresh her memory when seeing the images on the envelope... Yes I really think that they will love them, because it will help even those who have not had been to school.” (Key stakeholder, DPS, Kasai oriental)

“It is much more adapted for care providers, and not for CHWs. For CHWs, it should be in the local language. Regarding color and image, it’s good. The instructions communicate the message to a caregiver at her level.” (Key stakeholder, HZMT, Ndekesha)

“Yes, they will use it, it helps explain to the mothers... Can the mothers/guardians refuse something? They will automatically accept. However, the colors will attract them and they will start spreading and communicating the medicine information to their neighbor.” (Key stakeholder, PNLMD, Kinshasa)

According to care providers who have used the job aid and envelopes, it was easy to use, no major challenges. It was also very easy to provide explanations and instructions to mothers/guardians by using these tools. The follow-up visits organized in the homes or demonstrations by mothers/guardians of the preparation of amoxicillin DT in front of providers proved that they understood perfectly well the explanations provided by the providers on the preparation and administration of the product to the child at home. Also, nearly all the care providers interviewed stated that they liked using the job aid and envelopes and that the mothers/guardians also really appreciated the envelopes.

“I think that there are no challenges in using the job aid, only add the treatment of other illnesses.” (NP08, Nurse-in-charge, HZ Ndekesha)

“The job aid afforded us the power to treat pneumonia at the community care site level because before, we were told that in case of rapid breathing the case must be referred.” (BR01, CHW, HZ Bibanga)

“Yes because the mothers said that they received ‘a weapon’ for treating their children. Even if there is no more medicine, the envelope continues to instruct them.” (BR07, CHW, HZ Bibanga)

“Yes, they accept because it allows them to keep the medicines well. At the same time it helps them like a reminder. They know how to give the medicine.” (BP03, Nurse-in-charge, HZ Bibanga)

“Because I asked them how I said it and they repeated what I taught them and after having given the medicine to their children I saw the change. Based on my visit, I saw children who breathed so poorly, now breathing was better.” (BR04, CHW, Bibanga)

Most of the mothers/guardians interviewed reported a good experience in using the envelopes. They stored it away and only took it out when administering the product to the child. It was useful in helping them administer the product to the child and they would like to keep using it.

“Doctor, I used this envelope, moreover, it’s what guided me all these five days when I gave it to my child.” (FGD Caregiver, HA Molola, HZ Bibanga)

“I was using it morning and evening when it was time to give the medicine and check the box... When I didn’t give the medicine, I didn’t use it... I feel comfortable, I think it’s well made.” (Caregiver, HA Lukangu, HZ Bibanga)

“Yes because the envelope helps me administer the medicine. Without the envelope, I would have a hard time giving the medicine to the child.” (Caregiver, HA Station, HZ Bibanga)

“Yes because this envelope gives us the necessary information for giving this medicine to our children. So I am satisfied.” BFGD2 (FGD Caregiver, HA Manja, HZ Bibanga)

“Yes, I will continue to use it since, with the envelope, I can see how to give the medicine and can show other mothers.” (Caregiver, HA Mombela, HZ Ndekesha)

8.2.4 User-friendliness

User-friendliness refers to the degree to which care providers and mothers/guardians understand and can remember the information in the job aid and flyer as well as how they use them.

Key stakeholders from different levels have decided that the job aid and envelopes could be particularly useful in situations where forgetting is likely either by mothers or by providers. They also stressed the fact that the information supplied is easily understandable by mothers regardless of their level of instruction and could help them administer the medicine themselves at home and easily remember the provider’s instructions.

“It is not difficult but, we just have to insist because they forget... it’s forgetfulness that makes it difficult.” (Key stakeholder, PNLMD, Kinshasa)

“Yes, especially the mothers/guardians. Even the providers can get confused by their activities, they could fall back on it.” (Key stakeholder, PNAM, Kinshasa)

“Yes it will help them, the job aid for the nurse to remember and some advice to give for the child, the envelope shows how the product is administered and how to store the medicine correctly.” (Key stakeholder, DPS, Kasai Central)

"I think that it will be very easy and the prescriber and the mothers have the same information... That will help the mother who needs to give the medicine without having to return to the nurse... The information is precise with clear word formulations that the mothers can use on their own." (Key stakeholder, DPS, Kasai Oriental)

"Yes of course, because the tool includes information that helps caregivers better administer the products and advice to mothers... Yes, it will help the providers to administer care well and the mothers will remember it easily." (Key stakeholder, DPS, Kasai Central)

The providers who participated in our pilot study all reported having regularly used the job aid. When not in use, they kept it either posted on the wall, on the consultation table, or in a closet or box. The job aid was easy to use and most of them had felt prepared to use it immediately after the training. Most could remember the dosage for amoxicillin for the 2 age ranges and even the color of the envelope associated with the age range. Many of them could, without difficulty, describe how to prepare amoxicillin DT and felt confident in their ability to prescribe accurately for the management of pneumonia with amoxicillin DT. They were also convinced that the mothers/guardians were able to remember these instructions.

"No, it's easy because we were even trained for that. And when we apply it with the mothers we see that they also use it easily. That's why we say that it's easy for us and easy for caregivers... Yes, it was right after the training that we started using these tools and it also helped us because it was new material. We need to work only with the guide." (BP07, nurse-in-charge, HZ, Bibanga)

"There is no unimportant section because in the first box, we were shown how to administer the product. In the second, there is the product itself. The third showed that the mothers cannot stop the product before completing the 5 days." (BR06, CHW, HZ, Bibanga)

"It's a dosage of 500mg, so 2 times 250mg per day is 500mg for 5 days. This means 10 tablets for this age range...less than 5 years old. Then there is 500mg morning, 500mg evening, meaning 2 times 500mg, meaning 1gr per day, 5 times a day, which makes 20 tablets for the full treatment." (BP09, Nurse-in-charge, Bibanga)

"I'll tell the mother, when you administer amoxicillin DT, you must first wash your hands, find a small clean cup, put water or your breast milk if you're breastfeeding. Then stir until the tablet dissolves. You'll give the full dose to the child and you'll see if the child took everything and not share it with other children." (BR03, CHW, HZ, Bibanga)

"...You find that a mother who has already received the explanation starts answering questions for new mothers, even without the envelopes." (BP04, Nurse-in-charge, Bibanga)

Regarding the mothers/guardians, most administered amoxicillin DT to their children between 6:00 and 8:00 in the morning and between 5:00 and 7:00 in the evening. Descriptions for the preparation of amoxicillin DT given by mothers/guardians complied with the description on the envelope. The

mothers could recall the provider's instructions, of which some appear in the job aid. Nevertheless, there were extra steps added by the mothers such as covering the cup for several minutes, while the medicine dissolves. This extra step was also found during observations when providers waited several seconds to show the mothers how the medicine 'swelled' in the water before stirring it with a spoon.

"4 tablets: 2 in the morning, 2 in the evening... Very early around 6:30 am before going to the field, and at 6:00 pm... I put 2 tablets in a cup, I pour water until the two tablets are just submerged, after complete dispersion, I mix it then give it to the child." (Caregiver, HA Manja, HZ Bibanga)

"Before preparing, I poured a bit of water in a cup. I added the 2 tablets which dispersed, I didn't need to crush the tablets with a spoon, I simply stirred." (Caregiver, HA Station, HZ Bibanga)

"The provider showed us that before giving the product to the child we should wash our hands with soap. Then we should take the medicine, put it in a glass with a bit of water, then we should put it in the spoon and give it to the child while paying attention that everything goes into the child's mouth or else the dose will not be sufficient. Must make sure it all goes into the child's mouth." (FGD, Mothers/guardians, HA Ndeksha, HZ Ndeksha)

"We were shown to give the child 2 tablets in the morning, 2 tablets in the evening; now we take that medicine, we put it in water, we stir until it is completely dissolved in the water with all its grains, we give it to the child, after when we go home, you don't leave it where children can see, you hide it where no one can come see it, and drink it." (FGD Mothers/guardians, HA Ndeksha, HZ Ndeksha)

"This preparation is easy. Because you take the cup, you put the medicine and the small amount of water and you combine them. You cover the cup for a few minutes and you smooth it out with a spoon before finally giving it to the child." (FGD Caregiver, HA Lukungu, HZ Bibanga)

Regarding the use of envelopes, some mothers/guardians used it during the medicine administration like a guide or job aid to remember the provider's instructions, others used it just like an envelope and simply recalled the provider's instructions themselves, others however also used it as a treatment follow-up tool.

"Yes I used it to not forget any steps... The envelope was like a provider in front of me explaining what and how to do... Yes it helped me because it was like an instructor next to me." (Caregiver, HA Katshampanga, HZ Bibanga)

"Yes to not disturb the order that the nurse had given me for the administration of the medicine at home... Before giving the medicine I looked at the section where there are blisters that show how to do to give the medicine... Yes, that helped me a lot since the number of tablets to give is shown and it allowed me to give the medicine well and without forgetting." (Caregiver, HA Kafuba, HZ Ndeksha)

"Yes, based on what the nurse had advised me to follow what he had said... I looked at how to give the medicine, the number of tablets... Yes, it was from there that I followed the advice from the nurse on how to give the medicine to the child." (Caregiver, HA Kaka, HZ Ndeksha)

“No, because the envelope keeps the medicine, that’s why I could not use it... It’s for keeping the medicine... It really helped me because if the envelope wasn’t there I would not have known where to keep the medicine.” (Caregiver, HA Ciyuki, HZ Bibanga)

“I didn’t use the envelope. I only used the instructions given to me by the CHWs on how to prepare the medicine at home. The CHW didn’t give me the envelope... I was instructed to do this, do that, I did it and it worked.” (Caregiver, HA Kalunda, HZ Bibanga)

“Yes to check the box each time I gave it morning and evening... I give 1 tablet and I check the box on the envelope morning and evening, then I remember that I did indeed give the medicine.” (Caregiver, HA Lukanga, HZ Bibanga)

All sections of the envelope were deemed important by most mothers/guardians. According to them, there were no sections of lesser importance. As for those who did not mention “all the sections”, each cited different sections. Nevertheless, the section on the tablet to be given to the child was mentioned more often. Regarding comprehension of the section on bacterial load, varying and different explanations were given. Nearly half of the mothers/guardians were unable to give a correct explanation. Others however were able to give coherent explanations for this section even though it was clear that they had not been given the necessary instructions by the provider. For mothers who gave the explanation, this section showed the efficacy of the medicine to heal the child over time or, simply put, how microbes diminish with treatment.

“I see under this envelope a square and I see dots in this square.” “I see that in this square there are dots, which means pneumonia microbes, meaning that the child takes the medicine, the saliva in the mouth stops.” “I think that this explains that when we give a child the medicine, change happens little by little, the second day a little change, the third day, the fourth and fifth all the microbes disappear.” (FGD Mothers/guardians, HA, Molola, HZ Bibanga)

“We are shown that when the child hasn’t taken the medicine, there is much filth in the body, but when he takes the medicine, this filth, the first day it is still there, the second day, the third day, the fourth day, it diminishes, the fifth day, this filth did what? It ends.” “We are shown the way in which the microbes, the first day, meaning many microbes and long worms, second day others are cut into pieces, third day, we end up with... (Insect?), aahhh! The microbes are diminished, fourth day, I count here, there are still eight. Fifth day there are still two. Meaning the body has stayed healthy, those two will all die by that medicine, that’s how I see it.” (FGD Mothers/guardians, HA Kazumba, HZ Ndekesha)

“I see blood but in different quantities, at first there is a lot, then there is little... I understand that the child has something like a wound in his ribs.” (Caregiver, HA Molola, HZ Bibanga)

“There are dots that slowly diminish, and in the end, there are no more. But I don’t know what these dots mean, that’s beyond me... I’m under the impression that it is a cough that is initially strong, and which diminishes progressively and in the end the child is no longer ill.” (Caregiver, HA Manja, HZ Bibanga)

“I think, you gave us 10 tablets to drink during 5 days but the recovery is in 6 days, why didn’t you give 12 tablets instead so that we give them to the children for 6 days? And on the envelope, I ask you to add OK in the part where there is the image of the image of the child being happy.” (FGD Mothers/guardians, HA Kashinde, HZ Ndekesha)

“No, the nurse hadn’t explained this part, at least you could explain it.” (Caregiver, HA Kalumue Kamue, HZ Ndekesha)

“The most important section [of the envelope], is when you see the microbes disappearing from my child’s body because I see how the tablets heal my child until the end of the illness.” (Caregiver, HA Kalumue Kamue, HZ Ndekesha)

8.2.5 Observation results

A total of 75 observations were conducted in 18 health facilities (17 HCs and 1 community care site), 9 of the facilities were in Bibanga and 9 in Ndekesha, with an average of 4 observations per HC. At Bibanga, consultations and dispensing by nurses-in charge were observed, at Ndekesha, dispensing by the dispensers was observed (table 2). In 71 observations out of 74 (95%), the job aid was visible at the time of the consultation/dispensation. For the 4 other observations conducted within the same health center, the job aid was posted on the wall of the dispensing room but the dispenser’s observation had been done in another room. In 31% (23/75) of cases, providers looked at the job aid during the consultation/dispensation. There was variation in the observation results between the health centers and between prescribers (Bibanga) and dispensers (Ndekesha) as shown in the 2 health zones (table 2); in the majority of cases, the prescribers applied the practices that were being studied, more than the dispensers. This difference has not been analyzed statistically they are shown for illustrative purposes. According to observers, the job aids posted on the walls were never used, however, those on a nurse-in-charge’s desk were sometimes used.

Table 2: Provider behavior during observation sessions

Provider behavior during observation sessions	Bibanga (Prescribers) % (n=33)	Ndekesha (Dispensers) % (n=42)	Total Percentage (n=75)
has a copy of the job aid	100	90	95
looked at the job aid during the consultation	41	24	31
Advice on treatment administration (from the job aid and envelopes)			
explained how many tablets to take at each dose	97	100	99
explained how many times the medicine must be given	100	100	100
explained the duration of the treatment in days	97	100	99
showed how to give the first dose	97	81	88
showed that the tablet must be completely mixed with water or milk	97	83	89
showed how to check that the child took all the medicine in the cup	81	62	70
gave the rest of the blister in the pre-printed envelope	94	78	85
explained to the mother the importance of continuing treatment for 5 days	91	95	93
explained the graphic of bacterial load to the mother	76	43	57
referred to the envelope	94	90	92
General advice (only in the job aid)			
explained that the dose must be given immediately and not kept for later	75	38	54
checked the blister's expiration date	0	2	1
explained that the blister should be kept out of reach of children	6	8	7
explained to the mother that she should not keep medicine to give to another ill person, even if the child has improved.	41	35	38
gave advice such as to continue breastfeeding and fluids	3	10	7
Advice related to follow-up (only on the job aid)			
explained that the child must be brought back immediately if they get worse	56	60	58
explained that the child must be brought back immediately if they are not drinking or breastfeeding	3	21	14
explained that the child must be brought back immediately if they vomit everything they swallow	13	26	20

Provider behavior during observation sessions	Bibanga (Prescribers) % (n=33)	Ndekesha (Dispensers) % (n=42)	Total Percentage (n=75)
explained that the child must be brought back if they have fever	28	36	32
explained that the child must be brought back if they still have rapid or difficult breathing	19	40	31
explained that amoxicillin can cause diarrhea, but that treatment should not be stopped	38	36	36

Advice for treatment administration

Overall, providers gave advice for the administration of the medicine to a degree which we could consider satisfactory. In all observations, there was always an explanation on the number of tablets (99%), the frequency (100%), the number of days (99%), and a reference to the envelope (92%). In 66 observations (88%), providers gave the first demonstration of administering the medicine and 89% told mothers/guardians that the tablet must be mixed in water or breast milk. In 7 cases, in two HCs, providers gave all instructions verbally but did not demonstrate. At Lukangu, the nurse-in-charge diagnosed a co-infection with malaria and only informed the mother of how many times she should return, with the goal of guaranteeing adherence to the antimalarial.

The used blisters were given to the mothers/guardians in the envelopes in 62 observations out of 73 (85%). For the remaining 11, in 5 observations from the same HC the provider gave empty envelopes; at the end of the observation he was asked why and he responded that it was an oversight caused by stress due to the presence of observers. In 5 other cases, in 2 different HCs, providers asked the mothers/guardians to return; in 4 cases they only gave the 2 evening tablets and mothers had to return the next morning; 1 case was the case of co-infection with malaria already mentioned above. For the last observation, there was an amoxicillin DT stockout.

Finally, for the counseling on administration, providers almost always recommended that mothers/guardians finish the whole treatment (93%) but did not always use the image of the evolution of bacterial load (57%). There was significant variation between health centers. In 9 HCs, the image was almost always used whereas 6 health centers almost never used it.

General and follow-up advice

The proportion of providers who gave advice of a general nature and specific to follow-up was in general very low. A comparison between the proportion of those who had given such advice and those who had looked at the job aid showed that, overall, the proportion of providers who gave advice was almost always greater in the group that had looked at the job aid than in the group that had not, except with regards to the advice to keep medicine out of reach of children, which was only reported in 5 observations where the job aid was not used.

Dispensing of amoxicillin DT

The number of packs dispensed was correct for 66 cases out of 67, or 99% with one exception where only one blister pack was given to a 32-month-old child as shown in table 3.

For 6 observations, the provider or dispenser did not give a pack for the following reasons:

- In 4 observations, the provider only gave 2 evening tablets and mothers had to return the next morning.
- In 1 observation, in Lukangu, where there was a co-infection with malaria, the nurse-in-charge decided to keep the medicines and asked the mother to return regularly so that adherence to the antimalarial could be guaranteed.
- For the last observation, there was an amoxicillin DT stockout.

Table 3: Number of blisters given to the mothers/guardians based on the child's age

Age group	Number of blisters given			
	0 blister	1 blister	2 blisters	Total
2 months to 11	2	25	0	27
12 months to 5	4	1	41	46
Total	6	26	41	73

8.2.6 Adherence and adherence behavior

Before the introduction of the job aid and envelopes

All key stakeholders unanimously agreed in that mothers/guardians do not finish treatment at home. The reasons given for this were, firstly, that mothers are too busy since they are responsible for feeding the family, they must then take care of children and work in the field at the same time and therefore forget easily; the fact that the condition of the child improves or declines is sufficient pretext for abandoning treatment. They nevertheless believe that the envelopes could contribute to better adherence to the treatment since they contain simple explanations and images to aid comprehension, which could allow mothers to entrust care to a third person even in their absence. However, for some key stakeholders, it is not tools alone that will change adherence but communication and awareness raising.

"A mother when she has understood well, what we clearly tell her, what she must do, she respects it... It's negligence, incorrect instruction and generally if dispensation is incorrect, that is to be expected." (Key stakeholder, DPM, Kinshasa)

"Yes, she finishes if she has received advice and is worried about her child but there are times when mothers don't give it to the end if there is no change. Generally women prefer injections... If the symptoms don't improve or worsen, some women who prefer injections refuse the tablets." (Key stakeholder, DPS, Kasai Central)

"No, it is not difficult because we see women that, when their child no longer coughs, and there is no more fever, the mother stops. She takes care of the child, and she also always has to go work in the field... Like I said, the mother is very busy. She supports the children and she is in the field. When she forgets, that's it." (Key stakeholder, HZMT, Bibanga)

"It can help change adherence to treatment if forgetting and work were one of the reasons. At home she can explain to others in the household and so the child can be treated even in her absence." (Key stakeholder, HZMT, Bibanga)

"Yes it's the pictures that can facilitate explanation to any member of the family who could replace the mother if it is explained to them easily." (Key stakeholder, HZMT, Bibanga)

“The tools alone will not be able to if we are unable to raise awareness, for example, like we do for TB medicines: people come regularly to the center to receive tablets.” (Key stakeholder, DPS, Kasai Oriental)

The providers’ view is that there are women who indeed finish the treatment while others do not. Other than the factors mentioned by the key stakeholders, providers identified other reasons to explain mothers’ non-adherence to treatment or to the follow-up system established to promote adherence to treatment such as lack of interest from fathers, financial problems, reliance on traditional medicine, water that must be pumped, funerals, distance, etc.

“I would say yes and no. For some mothers we even follow up with the CHW. There are other mothers who return with relapses, when we dig deeper, they reveal that some other medicine was left over... Negligence on the part of the mothers and disinterest from the fathers. The mothers are too busy and are late in administering the medicine.” (BP03, Nurse-in-charge, HZ Bibanga)

“Yes, I am sure that they finish the treatment especially those with no debt. Those with debt are more likely to avoid... The reason being the claiming of overdue money and you won’t see them again.” (BP04, Nurse-in-charge, HZ Bibanga)

“Lack of money, reliance on traditional medicine; others because of work in the field, market. Still others abandon treatment because there is improvement.” (BR03, CHW, Bibanga)

“If they think the child is recovered, they stop giving and they keep the medicine for next time or give it to a brother or sister.” (NP06, Provider, Ndekesha)

“For mothers living far away, only 2 out of 5 return. Distance is the reason.” (BP01, Nurse-in-charge, Bibanga)

Mothers/guardians interviewed also gave other reasons for non-adherence based on their personal experiences.

“Most do not follow the recommendations... They are the bad ones. Some have other sources of information that contradict what the provider told us...” (Caregiver, HA Cikuyi, HZ Bibanga)

“It depends. If there is money to pay everything, I continue the treatment. If I don’t have the money, I stop the treatment... I keep the rest of the medicine to give to other children if they become ill.” (Caregiver, HA Cikuyi, HZ Bibanga)

“The medicine that stays at the center, they don’t give them to me. But if I buy it in a pharmacy, I keep the rest to use later.” (Caregiver, HA Cikuyi, HZ Bibanga)

“For some mothers, they think that [if they buy] tablets and syrups, we are taking their money for no reason. They prefer injections.” (Caregiver, HA Ndekesha, HZ Ndekesha)

To explore the reasons behind intentional non-adherence, 20 mothers/guardians in two health areas

were asked about the importance of the antibiotics and 13 of them (65%) said they were to make the children feel better while 6 (30%) said they were to cure the infection. In addition, parents shared their experiences of administering the medicine to children.

"It's easy because there is nothing that is worth more than the child, I take the medicine and I give it so that the child will feel better." (FGD Caregiver, HA Cikuyi, HZ Bibanga)

"It's easy because the doctor shows me how to give it to him, I hold here, his mother holds there, we open his mouth, we put it down his throat." (FGD Caregiver, HA Ndekesha, HZ Ndekesha)

"No, I don't have difficulties because my husband and I see together how to give the medicine. I have the support of my husband." (Caregiver, HA Ndekesha, HZ Ndekesha)

"It's easy for a baby, and much harder for bigger children because children don't want medicine." (Caregiver, HA Cikuyi, HZ Bibanga)

"Often I don't know," "Because all the medicine prescribed to him, he is treated on site at the center here which is why I never know the administration method when I am alone at home," "Me, if I am given the medicine to give the child at home, I ask advice from the provider, I only do what he tells me." (FGD Caregiver, HA Cikuyi, HZ Bibanga)

"Me I want to know everything the provider recommends to me because if I give a low dose, the child will not recover and if I give a high dose, the illness gets worse," "Me I give the child the medicine in front of the nurse, I don't bring it home." (FGD Caregiver, HA Cikuyi, HZ Bibanga)

After introducing the job aid and envelopes

Providers generally suggested that caregivers return for follow-up the third day or at the end of treatment or if there was a decline or other additional symptoms. Reasons given to explain the necessity of a follow-up were to evaluate whether the child's illness improved or declined, if the mother correctly administered the medicine, if there are undesirable side effects or if there are new additional symptoms.

"Mothers came back every day so that I can check the box on the envelope... It was very useful because I had to check the box on the envelope and ensure that they really gave the medicine." (BR09, CHW, HZ Bibanga)

"Managing the illness now happens at home, mothers don't return often to the center like before, during treatment." (NP09, Nurse-in-charge, HZ Ndekesha)

"I do the follow-up in order to go down to the house and see the child's condition, the mother does not come to the site. I make an appointment for her to return to the site after 2 days. Beyond that, I do home visits." (BR01, CHW, HZ Bibanga)

“For us it's after 3 days, yet we can still follow up every day... It's important just to know the condition of the sick child. Is the child experiencing side effects or not. Except that no woman has complained of side effects.” (BP07, Nurse-in-charge, HZ Bibanga)

“The first time I tell her when you see the seriousness of the illness you will come back, when you have difficulties in taking the medicine you come back, if there is nothing you come back at the end of medicine, after 5 days... It's important for me to check the condition of the child; that the pneumonia, the illness is poorly or correctly treated.” (BR03, CHW, HZ Bibanga)

“Twice, after 2 days and at the end of treatment... To evaluate the child's condition, if he is cured or if there are other symptoms.” (NP09, Nurse-in-charge, HZ Ndekesha)

According to providers, the job aid and envelopes have contributed to an increase in mothers/guardians' adherence to the treatment of childhood pneumonia.

“Yes, since with advice with job aids and envelopes the mother continues until the end of the days written on the envelope.” (BR03, CHW, HZ Bibanga)

“Yes, because the job aid, has everything already written there to show the mother how to use amoxicillin at home. After 5 days I go down there to confirm.” (BR05, CHW, HZ Bibanga)

“Yes, they give the medicine correctly because there are no more limits, they give it at home instead of coming back each time to the health center.” (NP04, Nurse-in-charge, HZ Ndekesha)

“Yes, because especially when we explain how the bacterial load diminishes, they adhere to treatment, they understand.” (NP06, Nurse-in-charge, HZ Ndekesha)

“Yes, because the children treated get better, and I heard a mother explain to her husband how to give the medicine.” (NR03, CHW, HZ Ndekesha)

“Yes, since, before, when we gave the medicine in pieces of paper, mothers didn't know when to give the treatment but with the envelopes they see how to give it morning and evening.” (NR06, CHW, HZ Ndekesha)

Table 4 shows the quantitative analysis on use of envelope by mothers at home.

Table 4: Use of envelopes to prepare and administer amoxicillin DT

	Percentage (n=41)
Reported having used the envelope during amoxicillin DT administration	83
Reported that the envelope helped them correctly administer amoxicillin DT	95
Used water to prepare the amoxicillin DT tablets	92
Used breast milk to prepare the amoxicillin DT tablets	8
Gave a correct number of tablets at the time of verification	76
Were confident in having correctly prepared the amoxicillin DT	100
Would like to continue using the envelope	100

During interviews with mothers/guardians, 34 (83%) out of 41 reported having used the envelope during administration of amoxicillin DT and 37 (95%) out of 39 reported that the envelopes had helped them correctly administer amoxicillin DT. As highlighted in the section on user-friendliness, mothers/guardians generally use the envelopes as a guide or job aid for the preparation of amoxicillin DT. Very rarely, some used them strictly as an envelope and simply recalled the provider's instructions. Descriptions for the preparation of amoxicillin DT given by mothers/guardians complied with the description on the envelope. Of the 39 women interviewed, 36 (92%) used clean water while 3 (8%) used breast milk to prepare the amoxicillin DT tablets. All mothers/guardians administered the amoxicillin DT to their children twice a day, generally between 6:00 and 8:00 in the morning and between 5:00 and 7:00 in the evening, as reported in the section on user-friendliness.

During the interviews, mothers/guardians were asked about the child's age, the date of the beginning of treatment, the number of tablets already administered, and the number of tablets remaining. A comparison was done between the number of tablets reportedly consumed and the number of tablets that should have been consumed based on age and date of start of treatment. Based on their personal reports, we note that 28 mothers/guardians out of 37 (76%) had administered the correct number of tablets at the time of the check and 6 (16%) had forgotten to give at least one dose of medicine. Five of the six mothers/guardians recognized their mistake. The main reason for forgetting was an unexpected activity outside of the home.

"Yes, last night I didn't give it because I had traveled until late and I spent the night where I was, the medicine stayed at home." (Caregiver, HA Molola, HZ Bibanga)

"Yes, I was unable to correctly give the medicine because of the funeral." (Caregiver, HA Kafuba, HZ Ndeksha)

“There was one day when I gave it in the morning but in the evening I didn't give the medicine. By the time we left the center it was already late.” (Caregiver, HA Cikuyi, HZ Bibanga)

“Yes there were some, because Sunday night I went to my sister's whose child was sick and I spent the night there.” (Caregiver, HA Kaponji, HZ Bibanga)

“Yes, since several children were sick, my wife gave another child a tablet.” (Caregiver, HA Manja, HZ Bibanga)

When asked if they were confident of having correctly prepared and administered the amoxicillin DT, all the mothers/guardians (100%) responded yes, either because they had followed the provider's instructions, because they had followed the envelope instructions, because their child had recovered, etc.

“We followed all the directions prescribed on this envelope and especially with what the provider had told us at the center. That is why we are confident we prepared the medicine well.” (FGD Caregiver, Manja, HZ Bibanga)

“I am also confident because I gave the child 2 tablets in the morning, 2 in the evening for 5 days for a total of 20 tablets and there is change.” (FGD Caregiver, Katshiapanga, HZ Bibanga)

“Very confident because the tablet that was given to me, I didn't skip any days in giving it to the child.” (FGD Caregiver, Molola, HZ Bibanga)

“Yes, because since I began the treatment, there has been much change, there is no more coughing.” (Caregiver, HA Mwanza Mbala, HZ Ndekesha)

“Yes, because I correctly remembered the amount of water to add and I saw how the tablets dissolved.” (Caregiver, HA Kalumue Kamue, HZ Ndekesha)

“Yes, I was confident because I had seen that the child drank easily.” (Caregiver, HA Kalumue Kamue, HZ Ndekesha)

When asked if they would stop giving the medicine if the child's condition began to improve, nearly all responded no, with two exceptions. When asked if they would stop giving the medicine if the child's condition began to decline, some responded that they would return to see their providers, others (about 5 mothers/guardians out of 40) added that they would continue in the meantime without revisiting the provider.

“I give it to him until it's finished, when the prescribed dose is reached; we can't leave any leftover medicine, I give it to him until the end so that the illness can spare him forever.” (FGD Caregiver, HA Mwanza Mbala, HZ Ndekesha)

“When it doesn’t treat, I go to the nurse where my son is being treated there, to give arguments, to give grievances, how have you treated my son, up to now it hasn’t stuck, they will do what they have to do to cure my son.” (FGD Caregiver, HA Kazumba, HZ Ndekesha)

“I continue giving but I go back to the provider because he knows the solution to the problem.” (Caregiver, HA Station, HZ Bibanga)

“I will give the tablets, if I find it to be serious, I will bring the child and the tablet to the center.” (Caregiver, HA Kashinde, HZ Ndekesha)

8.2.7 Suggestions for the improvement of the job aid and dispensing envelope

In this section, we will relate relevant suggestions and recommendations made by the participants in the pilot study, from the pre-test to post-introduction activities, without commentary.

General suggestions

“The recommendations that I can make, it’s first that the envelopes need to be protected because paper can get wet and damaged. The half-moon can lead to confusion.” (Key stakeholder, DPS, Kasai Oriental)

“Paper flyers will be easily and quickly destroyed. I think that plastic envelopes would be better. Conservation will be difficult.” (Key stakeholder, HZMT, Kasai Oriental)

“No, we have nothing to add but only that the cups should be durable and the envelopes made out of plastic with visible notes.” (NP05, Nurse-in-charge, HZ Ndekesha)

“Only, if the house leaks, I’m worried that the job aid and envelopes may be destroyed by rain water.” (NP10, Nurse-in-charge, HZ Ndekesha)

“I could offer only one recommendation: The job aid and envelopes in local languages. This would allow for further reinforcement of the information. If the drawing isn’t understood, the person will understand if we read it to them in a local language during the health education by the CHW.” (Key stakeholder, DPS, Kasai Oriental)

“It is much more adapted for care providers, and not for CHWs. For the site relays, it should be in the local language.” (Key stakeholder, HZMT, Kasai central)

“Yes, there are enough points there. Nevertheless, if we can add others there like in Tshiluba to remind other people who could forget. They could read. The notes are in French. If we changed it to our language it would be better.” (BP07, Nurse-in-charge, HZ Bibanga)

“It should also be translated into Tshiluba or even Lingala. Because the mothers read in Tshiluba. It could help mothers read it better.” (Caregiver, HA Kalunda, HZ Bibanga)

“The comment, is that there needs to be serious dissemination, of what to say to the mother. These tools themselves are important. We must insist on the norms and that providers be well trained so that the mothers understand.” (Key stakeholder, DPM, Kinshasa)

Dosage suggestions

“The overall dosage must be well understood. My wish is that we keep the 250mg dose and abandon the 500mg doses, a pretext for older children. This can lead to oversights or confusion.” (Key stakeholder, DPM, Kinshasa)

“Add an image of a child on all fours. Age range: 2 months to < 12 months or 1 year.” (P1, Nurse, HZ Lemba)

“An image of a nurse giving the first dose should be added.” (P2, Nurse, HZ Lemba)

“Change this image because it looks like the child is taking the medicine on their own.” (P3, Doctor, HZ Lemba)

“...and on the envelope, I ask you to add OK in the part where there is the image of the child being happy.” (FGD Caregiver, HA Kashinde, HZ Ndekesha)

Suggestions on the bacterial load

“Amount of bacteria instead of bacterial load.” (P1, Nurse, HZ Lemba)

“Saying that the bacterial load ends, instead of saying that the bacterial load diminishes.” (P4, Nurse, HZ Lemba)

“I think that it’s better to show the sick child and how they get better.” (FGD Caregiver, HZ Lemba)

Suggestions for treatment administration

“The image of the mother and child after treatment is not very expressive. The second image of the cup makes me think of fire instead of water. I don’t understand this image where there’s the cup, the spoon and a face. But otherwise it’s clear.” (Key stakeholder, HZMT, Bibanga)

“The image about adding water, I prefer a hand holding a goblet or bottle and pouring the water. Otherwise, the rest is clear. They are operational verbs, action verbs.” (Key stakeholder, HZMT, Bibanga)

“I suggest that we also put an image where we put the spoon and the dispersible tablet then we add the water, instead of putting it in the cup.” (NS1, Key stakeholder, HZMT, Ndekesha)

“We recommend that the amount of water be only in the spoon and not in the glass.” (Key stakeholder, DPM, Kinshasa)

“In my opinion, in what we have designed we put the tablet directly into a cup containing water but you put the tablet first into a cup and then add the water or breast milk. We need to standardize our tools, so that the message can be well understood by mothers/guardians, because it’s two different messages.” (Key stakeholder, PNIRA, Kinshasa)

“Yes, but I insist that there needs to be a small amount of water since a large amount can lead to a child refusing to take everything.” (Key stakeholder, DPM, Kinshasa)

“Add an image that shows that we add a bit of water after having administered the medicine, to rinse the medicine debris left in the glass. That way we are sure that the child has taken all the medicine.” (P4, Nurse, HZ Lemba)

“Put an image of the child and the mother giving the medicine; image of hand washing.” (P1, Nurse, HZ Lemba)

“Add at point 3.4, swirling the glass rather than mixing with a spoon, it's too many things (glass, spoon...).” (P3, Doctor, HZ Lemba)

Suggestions on advice, follow-up and side effects

“Maybe regarding side effects, the mother should maybe be alerted to them. If you see this don't stop giving the medicine, even just in one line on the envelope. That’s important to consider.” (BP03, Nurse-in-charge, HZ Bibanga)

“Show for example the child vomiting for the side effects. The image should speak even without text.” (P1, Nurse, HZ Lemba)

“Change the image to better illustrate digestive issues.” (P1, Nurse, HZ Lemba)

9.0 DISCUSSION

Our pilot study had as a goal to evaluate and determine the user-friendliness, feasibility and acceptability of the job aid and dispensing envelope in order to facilitate an increase in adherence to amoxicillin dispersible tablets (DT) for the treatment of childhood pneumonia by care providers, CHWs and mothers/guardians. It was conducted between November and December 2015. It involved all key stakeholders involved in the decision-making process for the introduction of new medicines (the DPM, which is the national authority for pharmaceutical regulation), in supplying the entire country with medicine (PNAM), and in the design and outreach of national policy on the management of acute respiratory infections, including pneumonia, by care providers (PNIRA) and CHWs (PNLMD). It also included as interviewees key stakeholders at the provincial level (DPS) and operational level (HZMT). It was also interested in amoxicillin DT prescribers (nurses-in charge and CHWs), dispensers and users (mothers/guardians). By stratifying the levels of information collection, the study could claim to capture a maximum amount of information on the feasibility, acceptability, user-friendliness, and influence of these tools on adherence to amoxicillin DT in the management of childhood pneumonia.

Nevertheless, the choice of health zones that could be integrated in the study was limited. Indeed, although recently introduced through national policy for the management of childhood pneumonia, amoxicillin DT is not yet available in all health zones. Health zones supported by MSH, through projects like PROSANI or HPP, generally already have the medicine, hence our choice of HZ Bibanga, supported by PROSANI, and Ndekesha which has benefited from HPP support.

We encountered two practical situations in the field. In the first case, amoxicillin DT was already available at the health zone level but not yet distributed at the health facility level. In the second case, it had recently been distributed to health facilities, but some had simply stored it away because they did not know how to use it. The study was thus conducted concurrently with the provisioning of amoxicillin DT and could then go beyond its objectives by also studying amoxicillin DT use.

Feasibility of the job aid and dispensing envelope

Interviews with key stakeholders show that the job aid and envelopes were greatly appreciated by key actors at the national, intermediary and operational levels of the health care system. They reported that these tools would contribute to the improvement of the management of childhood pneumonia and the rational use of the medicine by both prescribers and dispensers, as well as users of the new product.

Nevertheless, the dosage for amoxicillin DT differs from that of the syrup form, in that it is administered twice a day instead of 3 times and during 5 days instead of the 7 currently reported for amoxicillin syrup by providers. Additionally, amoxicillin DT does not need to be crushed in a spoon like other tablets currently used by mothers. Everything is therefore in place for irrational use of amoxicillin DT by

prescribers and users if the medicine is not accompanied by a tool to aid in prescription and dispensation.

The job aid is not a medicine nor is the envelope and would not need to pass security inspections normally required for the introduction of new medicines. They do not need to be registered as is the case for medicines. Key stakeholders have demonstrated the necessary procedure for ensuring the feasibility of its integration into the Congolese health system. Key elements in this procedure are validation from different key actors, operational level involvement, and a pre-test. This pilot study was carried out in health centers, community care sites and the community and could be used as a pre-test. The study also includes assessments by stakeholders from different levels as well as recommendations formulated from all levels to further its improvement, to be easier to use and more adapted by recipients. The optimism displayed by key players in decision-making for new medicines and management policy for childhood pneumonia, is a very positive element that offers a certain guarantee as to the feasibility of the job aid and dispensing envelope's introduction into the health system.

Acceptability of the job aid and dispensing envelope

From first contact, key stakeholders have predicted that the job aid and envelopes would be useful tools for prescribers, dispensers, and mothers/guardians. That the design and key messages were simple to grasp, due to images facilitating comprehension even by uneducated mothers/guardians. But they have expressed doubt with regards to the capacity of CHWs to use tools written in French. In the field however, all providers, including CHWs, felt that the tools were easy to use, without major challenges, and that they facilitated the communication of explanations and instructions to mothers/guardians.

The job aid and dispensing envelope make it very easy to manage childhood pneumonia with amoxicillin DT and, consequently, offer a great opportunity for a more effective integration of CHWs in the management of pneumonia, therefore contributing to the fight against this illness said to be the second leading cause of mortality in the country. Indeed, community health care sites have been introduced into areas where distance and natural barriers make it difficult to access care for early and efficient management of the sick child. A greater involvement of CHWs in the management of childhood pneumonia could contribute to a reduction of child mortality through early diagnosis and management of childhood pneumonia.

Furthermore, the opportunity for easier communication offered by the envelopes and job aid could be used to relay key messages for a change in behavior with regards to pneumonia. Indeed, communities are not able to distinguish between a cough and pneumonia. The same word in local jargon, "Lukosu", is used for a cough and for pneumonia, which could explain why some mothers/guardians describe Bactrim (cotrimoxazole) as a medicine for the symptomatic treatment of a cough, which helps the child

feel better and which can be stopped as soon as the cough ends. Images showing the evolution of bacterial load should be used to a greater degree in communication for behavior modification to help mothers/guardians stop prematurely interrupting treatment because the child feels better. At the same time, it would be imperative to help the community distinguish between pneumonia and a cough in order to improve care-seeking behaviors and avoid irrational consumption of amoxicillin DT in the treatment of coughs, as was the case with cotrimoxazole. CHWs close to the community could be efficiently utilized for this purpose.

User-friendliness of the job aid and dispensing envelope

During base data collection, it was observed that many providers, especially nurses-in charge, already had amoxicillin DT and had already begun administering it to children. There was significant difficulty, however, since due to a lack of training each had their own dosage, which for the most part did not comply with standards. The introduction of the job aid was an important step in promoting standardization in dosage and communication with mothers/guardians. There is concern that when amoxicillin DT will be more widely distributed around the country, such irrational prescription patterns may be repeated if the medicine is supplied to health facilities without being accompanied by a tool such as this job aid to help providers with prescribing and dispensing.

The envelopes have also helped mothers/guardians better understand key messages for the preparation of adequate doses of amoxicillin DT for children. Nevertheless, it was observed that in the absence of specific explanations, the envelopes were perceived by mothers/guardians as simple packaging for storing the products. In this context, where not all mothers/guardians have a significant level of education, it would be important to instruct providers to accompany the distribution of envelopes with adequate explanations, which the caregiver will be able to remember when they are administering amoxicillin DT.

The section of the envelope on the evolution of bacterial load and the recommendation to continue treatment without interruption is the most important information on this envelope. A paradox, however, emerged when it was observed that mothers had understood the fact that treatment had to be continued without interruption, without having necessarily understood the image on the evolution of bacterial load. This difficulty in comprehension is deemed a challenge for the eventual scaling up of this tool, and particular attention should be given to this image during subsequent provider trainings.

Observation results

The results of the observations have shown that providers have referred to the envelope in 92% of cases and relayed instructions related to the images in over 90% of cases, while they only looked at the job aid in 31% of cases and relayed written instructions only found in the job aid in less than 40%. We find ourselves in the same situation as in the pre-test, where participants, regardless of education level, were more concerned with and discussed the significance of the images rather than the message content. It is possible that we are facing very busy providers who do not have time to read and who limit themselves to the more easily perceived images.

These providers seemed to focus more on the envelopes than on the job aids. A solution for conveying key messages could be to write the most important information on the other side of the envelope, which would increase its chances of being disseminated.

These results should not be interpreted as saying that the job aids are useless in comparison to the envelopes. One should bear in mind that the envelopes are given to mothers and could always go out of stock, while the job aid is a tool for providers and can be used even in the absence of envelopes. It would always be important to give both tools to health facilities and to insist on the importance of provider communication with mothers/guardians.

Adherence and adherence behavior

In our study, we have identified several reasons for non-adherence to treatment: forgetfulness due to the multiple responsibilities of mothers/guardians (housework, fieldwork, market, mourning, pumping water), financial problems, distance, disinterest from fathers, etc. Another explanation could be that mothers administer antibiotics so that their child feels better and not to cure the infection.

The job aid contains enough information to help providers instruct mothers/guardians so that adherence may be improved. Providers have reported observing an increase in adherence and mothers/guardians have shown adherent behavior after receiving instructions from providers. Verification of the mothers interviewed showed that 76% of them had adhered to treatment and those who had forgotten to give the treatment had done so because of an unexpected situation outside of the home.

It would be interesting to conduct a quantitative analytic study to better evaluate patients' adherence to treatment. This study has nevertheless allowed for the analysis of adherence behavior by mothers/guardians and identified the primary causes of non-adherence.

Amoxicillin DT circumvents one of these causes due to the fact that it is given twice a day, mothers/guardians can administer the product in the morning before going to the fields and in the evening after returning. The envelopes allow for greater ease in administering the medicine at home, which allows mothers to share information with other adults, especially fathers, on how to administer the medicine. The instructions found in the 2 tools offer enough information to encourage parents to finish the treatment at home. For example, the section on bacterial load provides an important argument to mothers/guardians for not interrupting treatment. Good provider training, improved by the integration of lessons learned from this pilot study, could contribute even more to improved patient adherence.

Suggestions

Based on results obtained and, more specifically, suggestions for the improvement of the job aid and dispensing envelope, we can thus summarize the suggestions that we found most relevant.

For preparation:

- For children 12 months to 5 years of age, add an image that shows that an adult administers to the child rather than the child alone.
- Add OK to the 3 images that come after day 5 to reinforce the idea that it is very good for the child if the medicine is given correctly through the 5th day.

For bacterial load:

- Put amount of bacteria instead of bacterial load.
- Insist even more in further trainings on the importance of always showing and explaining this section of the envelope to the mother in order to highlight the importance of not stopping treatment, and that the child must be given all the tablets until the last day.

For tablet administration:

- Find consensus with the PNIRA on the preparation of amoxicillin DT - should the tablet be put in the cup and then water poured over it, or pour the water and then put the tablet in the cup? Otherwise, comply with existing texts and begin by pouring the water.
- Add an image that serves as a reminder that hands must first be washed.
- To avoid that parents add too much water when preparing amoxicillin DT, put the phrase “add water... to cover tablet(s) completely” in red and reduce the amount of water in the corresponding image. If we opt for first pouring water then adding the tablet, then we suggest a description of the amount of water in terms of number of spoonfuls.
- Also put the phrase “ensure that the child has drunk the entire medicine” in red.

For side effects and follow-up:

- Insist on the importance of monitoring and evaluation in provider trainings.
- Allow for an additional printing on the other side of the envelope to include key messages for mothers/guardians, such as: It is important to give your child the medicine as recommended by the health care provider and not keep it for future use or share it. If your child is sick, you should continue to breastfeed and/or give them more fluids. You should return to your health care provider immediately if your child: becomes sicker, is not able to drink or breastfeed, vomits everything, develops a fever, continues breathing rapidly or with difficulty or noisily; do not stop administering medicine in case of diarrhea.
- In the side-effects section of the envelopes, allow for an image suggesting digestive issues (diarrhea), as they can be common.

General suggestions:

- Translate the final version of the protocol into the 4 national languages (Lingala, Kikongo, Swahili, Tshiluba).
- See if it is possible to find a paper or other material more resistant to rain and humidity, and which can at the same time allow for color printing.

- During trainings, recommend that providers not post the job aid on the wall, but rather put them on the examination table.

10.0 CONCLUSIONS AND RECOMMENDATIONS

This study has been conducted with the objective of evaluating the feasibility, acceptability and user-friendliness of the job aid and dispensing envelope in order to facilitate increased adherence to amoxicillin dispersible tablets (DT) for the treatment of childhood pneumonia. It was carried out concurrently with the introduction of amoxicillin DT in certain health areas. Data on the pre-test have shown that providers and mothers/guardians are able to understand the tools even without prior training. The base data obtained show that providers have a good operational definition of pneumonia but, due to lack of training, do not know how to correctly administer amoxicillin DT. The job aid has been a great contribution in helping providers correctly administer amoxicillin DT. It has also helped providers communicate with patients and give them key information to help them improve adherence behavior. The envelopes have allowed mothers to bring home a document that can help them administer the medicine at home. Account taken of all of the above, we are able to conclude that the job aid and dispensing envelope are easy-to-use tools that have been accepted by amoxicillin DT users and are enthusiastically recommended for a potential introduction into the Congolese health system, to accompany the introduction of the use of amoxicillin DT in the management of childhood pneumonia.

Based on the results obtained in this study, we can offer the following recommendations:

To the Ministry of Health

- Accelerate the supplying of amoxicillin DT to health zones for the management of childhood pneumonia as it is an easy product to administer, with an excellent recovery rate.
- Include the job aid and dispensing envelope among the tools accompanying prescriber and dispenser trainings on the use of amoxicillin DT as well as the administration of this product at home.

To MSH and/or other partners

- Reinforce the guidance of providers in health zones that have already benefited from amoxicillin DT in order to avoid irrational prescription of this product.
- Organize a meeting to present the results of this study that could help advocate for the accelerated integration of this tool into the Congolese health system.
- Organize a workshop to update the job aid and dispensing envelope, taking into account observations of study participants as well as difficulties of comprehension.
- Produce updated tools in the DRC's four national languages.
- Develop an integration plan for the tool in the health system, which should include advocacy for validation, reproduction and dissemination.

Annexes

Annex 1: Job aid for providers

Amoxicilline 250mg comprimé dispersible

Traitement de pneumonie des enfants de 2 mois à 5 ans

POSOLOGIE

- Démontrer en donnant la première dose. La mère ou l'accompagnant de l'enfant regardera et apprendra.
- Donner ce qui reste de traitement à mère /l'accompagnant pour administrer à la maison.
- Informer la mère / l'accompagnant qu'il faut donner le médicament 2 fois par jour pendant 5 jours, même si l'enfant se sent mieux.

		Jour1	Jour2	Jour3	Jour4	Jour5	
2 mois à 12 mois							
12 mois à 5 ans							
Compléter tous les jours du traitement	La charge bactérienne diminue						

Expliquez à la mère /l'accompagnant que même si l'enfant s'est amélioré, l'infection peut être encore présente dans son corps. TOUS les comprimés devraient être donnés pour éliminer la bactérie /l'infection.

1 Laver les mains, et prendre: 1 comprimé pour l'enfant de 2 mois à 12 mois. 2 comprimés pour l'enfant de 12 mois à 5 ans.

2 Mettre dans une petite tasse propre.

3 Ajouter de l'eau à boire ou le lait maternel jusqu'à couvrir le(s) comprimé(s) complètement.

4 Mélanger bien le(s) comprimé(s) dans l'eau ou le maternel.

5 S'assurer que l'enfant a bu tout le médicament.



IMPORTANT

- Informer la mère /l'accompagnant qu'il faut donner immédiatement le mélange à l'enfant. Ne pas le garder pour le donner plus tard.
- Donner à l'enfant ce qui reste de médicament dans la tasse.
- Vérifier la date de péremption avant de donner le médicament à la mère /l'accompagnant.
- Informer la mère /l'accompagnant de garder l'amoxicilline hors de la portée des enfants et dans un endroit propre et sec.
- Dire à la mère /l'accompagnant de ne pas partager les médicaments.
- Dire à la mère /l'accompagnant que Amoxicilline ne peut pas traiter une infection virale comme la grippe ou rhume.



SUIVI

Instruire à la mère /l'accompagnant

- A continuer l'allaitement et à donner plus des liquides à l'enfant.
- A revenir immédiatement si l'enfant:
 - Devient plus malade
 - Est incapable de boire ou téter
 - Vomit tout ce qu'il consomme
 - Développe la fièvre
 - Continue à avoir une respiration rapide ou difficile ou sifflante

LORS DES VISITES DE SUIVI

- Vérifier la présence des signes de danger
- Evaluer si l'enfant a la toux ou difficulté respiratoire
- Demander à la mère /l'accompagnant
 - Est-ce que l'enfant respire moins vite?
 - Est-ce que l'enfant a moins de fièvre?
 - Est-ce que l'enfant mange mieux?
- Considérez la référence si l'enfant ne s'est pas amélioré

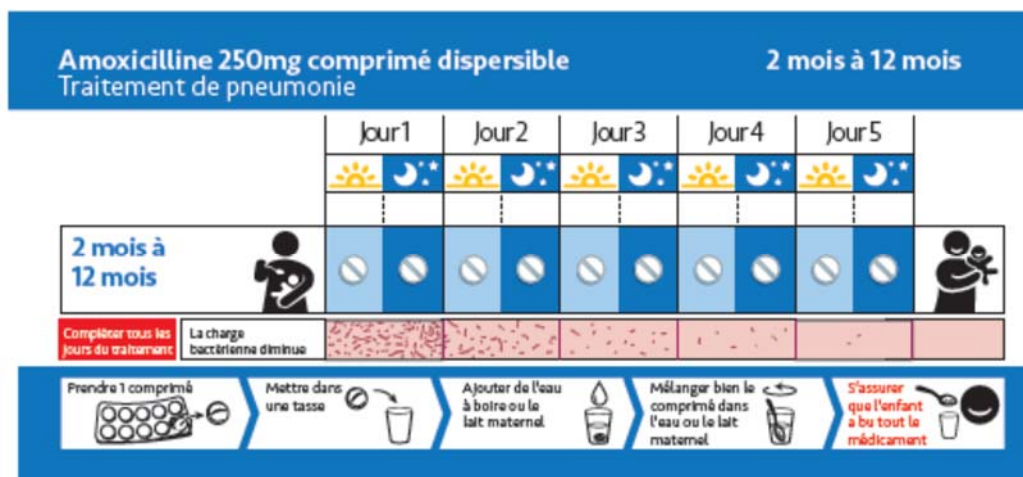


EFFETS SECONDAIRES

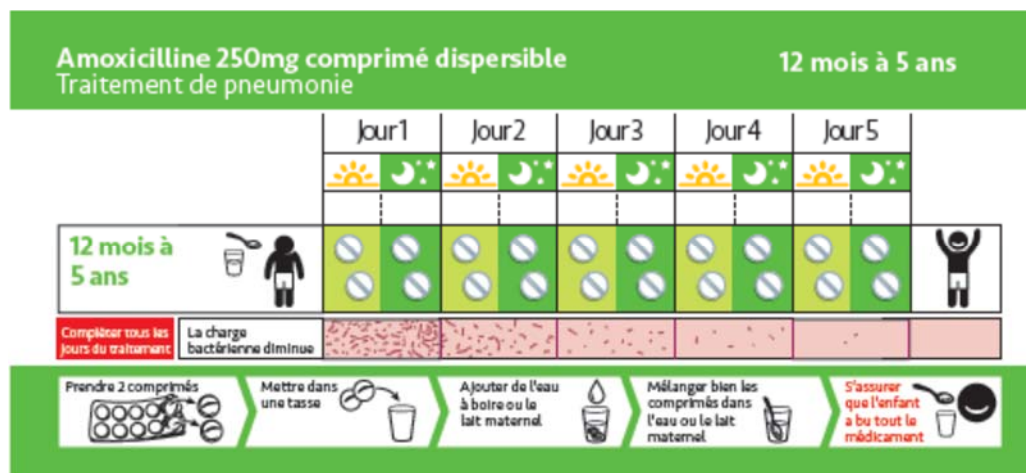
- L'amoxicilline peut provoquer des troubles digestifs, surtout la diarrhée ou les réactions allergiques.
- S'il y a d'autres symptômes, ramenez l'enfant au centre de santé.

Annex 2: Dispensing envelopes

2-12 months



1-5 years



Appendix 3: Observation check list

Health Center _____					Date: _____							
Health Zone : _____					Observer: _____							
No.	QUESTION	Child #1		Child #2		Child #3		Child #4		Child #5		
		age										
		ID										
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	
1	Specify whether the provider:											
a	has a copy of the job aid											
b	looked at the job aid during the consultation											
c	explained how many tablets to take at each administration											
d	explained how many times the medicine must be given											
e	explained the duration of the treatment in days											
f	showed how to give the first dose											
g	showed that the tablet must be completely mixed with water or milk											
h	showed how to check that the child took all the medicine in the cup											
i	gave the rest of the blister in the pre-printed envelope											
j	explained the importance of continuing treatment for 5 days to the mother											
k	explained the graphic of bacterial load to the mother											
l	referred to the envelope											
m	explained that the dose must be given immediately and not kept for later.											
n	checked the blister's expiration date											
o	explained that the blister should be kept out of reach of children											

No.	QUESTION	ENFANT #1		ENFANT #2		ENFANT #3		ENFANT #4		ENFANT #5	
		age									
		ID									
		OUI	NON	OUI	NON	OUI	NON	OUI	NON	OUI	NON
p	explained to the mother that she should not keep medicine to give to another sick person, even if the child has improved										
q	gave advice such as how to continue breastfeeding and fluids										
r	explained that the child must be brought back immediately if they get worse										
s	explained that the child must be brought back immediately if they are not drinking or breastfeeding										
t	explained that the child must be brought back immediately if they vomit everything they swallow										
u	explained that the child must be brought back immediately if they have a fever										
v	explained that the child must be brought back immediately with difficult or rapid breathing										
w	explained that amoxicillin can cause diarrhea, but that treatment should not be stopped										
2	Fill in with the number of amoxicillin blisters given (fill in 1 or 2 for each child seen)										