Home management of acute respiratory infections in a Nigerian district

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Abstract

Globally, over 2 million children die annually from acute respiratory infections (ARIs) especially pneumonia. ARI symptoms (cough and difficult/fast breathing) frequently overlap with those of malaria. In Nigeria, children with these pneumonia symptoms are frequently overlooked by the home management strategy that seeks to treat all childhood fevers as malaria.

The aim of the study was to determine the prevalence of overlap of fever and ARI symptoms, the timeliness of care-seeking and the type of care sought for ARI with or without fever at community level.

From a district, 420 households with 420 children aged over 5 years who had been sick with cough within 2 weeks of the survey were selected through systematic random sampling and their carer interviewed about the child's illness. Of the 413 children who had been sick with cough, 21% reported overlapping symptoms of fever, cough and difficult/fast breathing (DFB). Of these, 27% received antimalarials alone. Sixty percent of children with ARI received antibiotics and 59% received care within 24 hours of symptom recognition. Carers of infants and children with DFB were more likely to seek care within 24 hours of symptom recognition (both $p < 0.001$). Most (45%) of the antibiotics used were obtained from patent medicine dealers.

It was concluded that a large percentage of children have malaria and pneumonia symptom overlap; and a significant proportion of these cases are mismanaged as malaria in the community. The role of patent medicine dealers in recognising and appropriately treating ARI should be explored.

Introduction

Acute respiratory infections (ARIs), especially pneumonia, accounts for nearly one-fifth of childhood deaths worldwide, with approximately 2 million children under five dying each year. The majority of deaths occur in Africa and South-East Asia.[1] In Nigeria, the incidence of clinical pneumonia among children ranges from 0.34 to 1.3 episodes per child-year.[1,2] Over 6 million new cases are estimated annually with expected mortality of 204 000 children.[1] Recent aetiology studies show that bacterial causes account for up to 70% of childhood pneumonia; mainly, *Streptococcus pneumoniae* followed by *Haemophilus influenzae type b (Hib), Staphylococcus aureus* and *Klebsiella pneumoniae,* respectively.[1,3,4] Also, viral aetiology studies show that respiratory syncytial virus is the leading viral cause, followed by influenza A and B, parainfluenza, human metapneumovirus, and adenovirus, respectively.[1,5]

Thus, most children with signs of pneumonia in developing countries need antibiotics, as they are more likely to have a bacterial etiology.[6] Ensuring antibiotic treatment for pneumonia is vital to meet the Millennium Development Goal 4 (MDG 4) of reducing under-5 mortality by two-thirds by 2015, compared with 1990 levels.[7] However, many children with pneumonia do not receive timely, appropriate treatment at health facilities,[8] especially children from poorer families – for economic and social reasons.[9] Hence, many pneumonia cases are treated at home or seek care too late.[10] In Uganda, pneumonia probably contributes to the death of one-third of children with ARI, who die at home without prior contact with the formal health sector.[10]

In response, the WHO/United Nations Children's Fund (UNICEF) recommended that countries can reduce pneumonia mortality in community settings by 'integrating community pneumonia treatment activities with other efforts and initiatives that promote child health, especially malaria (…) at the household and community level.'[11] The clinical features of malaria and pneumonia overlap in Africa.[12,13] Usually, there is fever which may be associated with cough and rapid breathing. Under the Integrated Management of Childhood Illness (IMCI) strategy, malaria is defined as fever while pneumonia is considered as cough with difficult and rapid breathing. In primary health centres, children with overlapping symptoms are classified as both and treated with antimalarials and antibiotics.[13] The prevalence of this overlap has not been documented among children with ARI in the community setting in Nigeria.

Currently, Nigeria practises home-based management of malaria in various forms (using community

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health workers, patent medicine dealers, role-model mothers etc.).[14,15] However, despite its huge burden of pneumonia, there is no explicit policy supporting home/community-based management of the illness,[16] although recent evidence suggests that there are plans for its implementation.[16] Thus, as in much of Africa, care-seeking behaviour for malaria is well explored in Nigeria[14] but few have examined treatment-seeking behaviour for childhood ARIs.[12,13] Our objectives were to evaluate ARI symptoms, alone and in combination with those of malaria at the community level, the timeliness of care-seeking, the relative frequency of different treatments, and the source of care sought for ARI and malaria symptoms before ARI is integrated in the home/community management strategy in Nigeria.

Subjects and methods

Study area

A cross-sectional survey was carried out during August and September 2009 in Abeokuta (south local government area), Ogun State, south-western Nigeria. This period corresponds to the peak of ARI in the region.[17] The local government forms part of Abeokuta, the state capital and has 15 health districts. Eight of 16 neighbourhoods were purposely selected from Erunbe health district because they were peri-urban areas of high-density population characterised by poorly constituted and haphazardly located houses numbering 900 to 1200 (project census). Also, they were inhabited mainly by artisans, traders, teachers, junior civil servants, or the unemployed and they each had a distance of at least 2.5 km to the nearest public health facility. There is one government health post in Erunbe. This is complemented with many private clinics, patent medicine dealers (an individual without formal pharmacy training who sells orthodox pharmaceutical products on retail basis for profit),[18] and traditional healers.

Sampling procedure

Assuming 86% of children with cough receive treatment at home,[12] with a 3.5% and 95% confidence interval, a minimum of 378 children with cough will be required for the study. (sample size calculated using Win Episcope 2.0). Systematic random sampling was used to select households with eligible children from a sampling frame of 500–700 households in each neighbourhood with children under 5 years (and assuming 20–30% of these had been sick with cough in the preceding 2 weeks). Four hundred and twenty (420) households were selected, starting with the most central home closest to the main neighbourhoods' public water supply. If the household did not have a child under 5 years of age with cough within 2 weeks preceding the survey, refused to be interviewed, or had no carer available, replacement sampling was done by continuing to the next household. Clustering of ARI in children at mother's level was avoided by collecting the data only on the youngest eligible child with ARI per mother.

Data collection and analysis

The district had one study supervisor and two study monitors. Eight interviewers (all students of community health and extension works) were selected for the study. Their selection was based on reading and writing skills, ability to communicate in both English and the local language, previous experience in community-based surveys, and availability during the study period. The interviewers were trained for 5 days using general instructions and practical exercises. Each of the questions was discussed and translated into the local (Yoruba) language and wherever confusion existed consensus terms were agreed upon. The questionnaire used (available on request) is a modified UNICEF/WHO MICS-3 questionnaire with closed and open-ended questions on different modules such as malaria, HIV/AIDS, immunisation, vitamin A supplementation, care of the sick child, etc. For the purpose of this study, only questions concerning 'care of the sick child with cough' were adapted (some questions on the child with fever module were also included). The entry question to this module was whether any of the children under 5 had an illness with cough during the preceding 2 weeks.

Illness symptoms were further probed for by the interviewers. The local terms for cough 'owu co', and fever 'ogbono', were used during the interview. Although difficult and rapid breathing have an almost exact equivalent in the local Yoruba language 'omi gule gule' meaning fast and 'bad' breathing. In this paper, we grouped difficult and fast breathing (DFB) in carers' reports of ARI symptom since difficult breathing may be interpreted by carers to include an increase in respiratory rate and caretakers may not be sure of the exact respiratory frequency. During analysis, ARI was defined as reported symptoms of cough with DFB. Regarding drug use, interviewers asked for the names of drugs administered, requested to see the drug or its packaging (categories were developed based on locally used antimalarials and antibiotics), and if none were available, interviewers showed the respondents packages of locally available antimalarials and antibiotics. The questionnaire was in English and the interviewers translated the questions during the interview using local terminologies agreed upon during the training session. Information collected was about the carers stated practice concerning the most recent illness with cough.

The data were double-entered in Epi Info 3.4.1 by two trained operators then cleaned for inconsistencies and errors. Continuous variables were summarised using median and standard deviation while categorical variables were summarised using percentiles. Group comparisons were made using Chi-square and a p value of 0.05 was considered as the criteria for significance. Age (1 year vs ≥1 year), gender and carers' educational status were used as primary stratifying variables.

Approval for this study was given by the Department of Primary Health Care and Disease Control, Abeokuta-south local government area, Ogun State, Nigeria and

all participants gave voluntary informed consent for inclusion in the study.

Results

Four hundred and twenty (420) households with children under 5 who were sick with cough were surveyed. The questionnaire from seven children had missing variables, and so the data we present are based on 413 children. Fifty-two percent (217) of the children were females and 28% infants (≤1 year). The median (SD) age was 2 (1.3) years. Most carers (93%) were females with at least primary education (93%) and their median (SD) age was 29 (6.4) years.

Figure 1 shows the proportions of children with various ARI symptom combinations. Twenty-one percent (86/413) were reported to have had overlap in symptoms of malaria and ARI. Of all the 407 children who were sick with cough, almost 52% (210) also had fever. In children for whom cough was the only stated symptom, 26% were said to have received treatment within 24 hours of symptom recognition. This proportion was significantly different when DFB was also present (59%, p<0.001). However, there was no statistically significant difference in the proportion of children who received care within 24 hours if a child with ARI also had fever (59% vs 50%, p=0.12). Also, there was no difference in timing of action if a child with cough alone also had fever (26% vs 23%, p=0.6). Carers of infants (≤1 year) were more likely to take action within 24 hour of recognition of symptom onset (51% vs 33%, p<0.001). There was no significant difference in timing of action in terms of gender of the child and carers educational status.

Eighty-three percent (345) of the children with ARI symptom combinations received treatment at home; 95% allopathic and 5% herbal. Most frequently reported sources of treatment were patent medicine dealers (PMDs)/ drug shops (45%), and government health centres (33%), but private clinics (13%) and herbal practitioners (5%) were also common. Overall, almost 55% of caretakers sought care from the informal health services sector . There were no significant differences between ARI symptom combinations, age and gender of the child, carers educational status, and the source of care.

Of the children with cough alone, 53% received antibiotics, as did 60% of children with cough and DFB (p=0.59). However, once fever occurred in children with cough and DFB, antibiotics use dropped to 53% (p=0.6), and antimalarial use increased from 11% to 69% (p<0.001) (see Figure 2). Although treatment with both antibiotics and antimalarial also increased (7% vs 42%) when fever presented, 27% of children with overlapping symptoms of cough, DFB and fever received antimalarial alone. There was no significant difference between proportions of children who received antibiotics and their gender, age or carers educational status.

The most commonly reported antibiotic used was cotrimoxazole (trimethoprim–sulfamethoxazole) (68%) and ampicillin-cloxacillin (17%). A small proportion reported using amoxicillin (7%) and chloramphenicol (4%). The antimalarials reported to have been administered were chloroquine (54%), followed by artemisinin-based combination therapy (33%), sulfadoxine-pyrimethamine (10%), and quinine (3%). The recommended first-line treatment for malaria by the Federal Ministry of Health at the time of the survey was artemisinin-based combinations therapy.

Discussion

This study demonstrates that:

1. every fifth child with ARI in the community has malaria–pneumonia symptom overlap;
2. home management of ARI with antibiotics occur in Nigeria;
3. the majority of caretakers seek care from the non-formal sector for ARI symptoms.

Studies undertaken in East Africa show that sick children had malaria-pneumonia symptom overlap of between 19% in the community and 50% in the hospital.[12,19] The prevalence of 21% observed in this study appears to be consistent with reports from Uganda.[12] However, the prevalence in Nigeria will certainly be lower if taken as a proportion of sick children in the community. The higher prevalence rates reported in the primary health centres and district hospitals may be due to higher proportions of carers taking the child with worsening pneumonia to the health centre or after the failure of home management.[12,13]

The use of antibiotics for cough is widespread in south-western Nigeria. Although this study reported higher proportions, it is in accordance with a previous report in Uganda.[12] Antibiotic use was not significantly affected by the presence of DFB in children with cough. However, care seeking behaviour seemed to be affected by the presence of DFB in children with cough. This prompt response to DFB illustrates carers fair awareness of

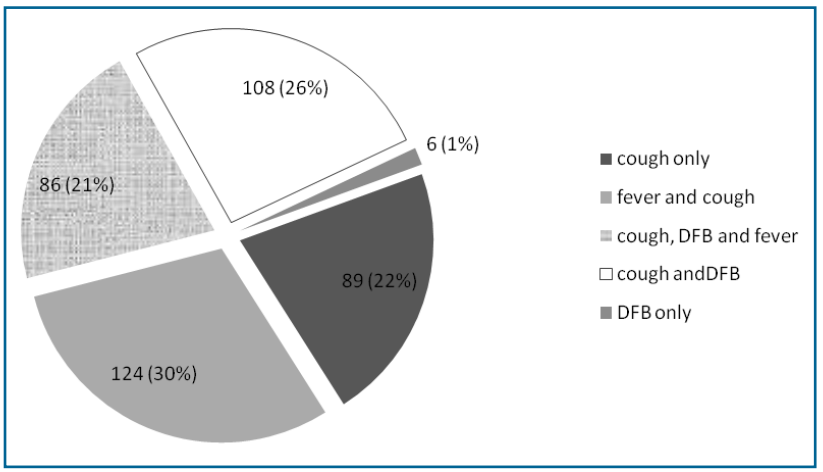

Figure1 ARI symptom combinations and overlap in 413 children aged 5 years or over at community level

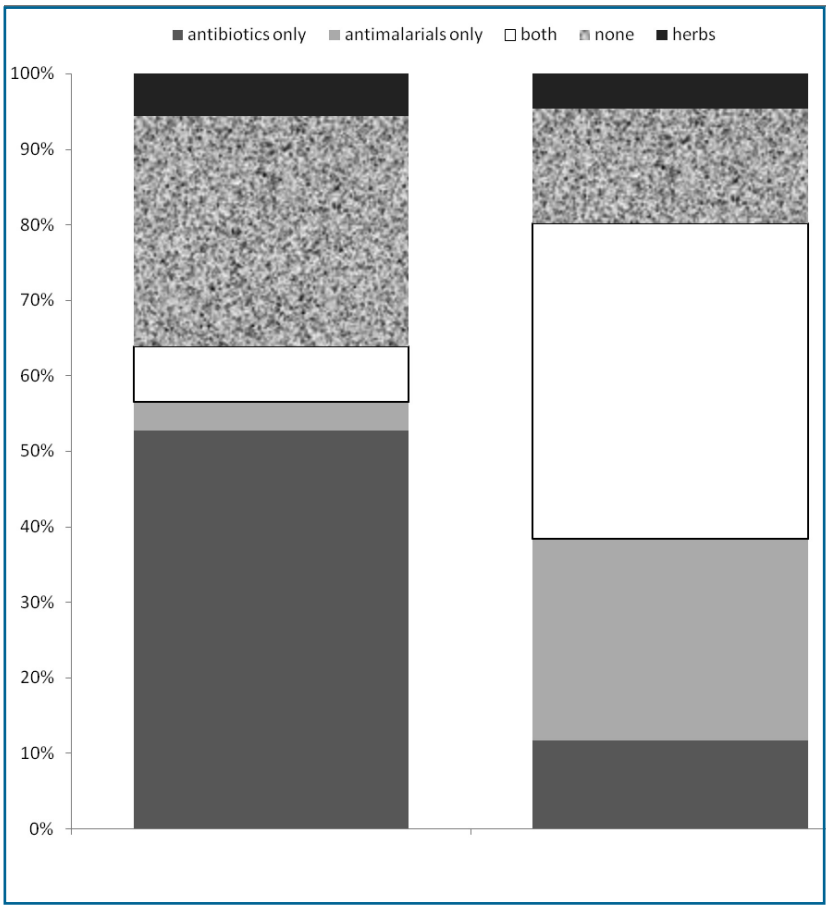

Figure 2 Antibiotic and antimalarial use for different symptom combinations for 413 children aged 5 years and over who had been sick with cough in the previous 2 weeks

this key pneumonia symptom. This is unlike previous reports and the reasons why this has occurred is not clear since carers educational status neither affected antibiotic use nor their care-seeking behaviour.[12,20] However, this provides a background on which further information, education and communications (IEC) messages on early and appropriate care for ARI can be built.

More than four-fifths of children with cough received care at home and the majority of these received allopathic medication from non-formal health providers. Consistent with a study in Uganda,[12] this demonstrates that home management of ARI is widespread in Nigeria and in line with studies in Asia; private retailers were the major source of medication.[21] This has serious implications for ARI control because a large percentage of drugs provided or dosages given – or both – by these health care providers (PMDs) are inappropriate, indicating a need for innovative and effective approaches to achieve rational prescribing practices.[22]

In spite of policy recommendations prohibiting the dispensing of antimicrobials without a prescription from a qualified healthcare professional,[23] and problems of low quality of drugs and service, carers go to drug shops/PMDs rather than formal sector alternatives because they are more accessible and available, and are more responsive to client needs.[22] Thus, PMDs and drug shops represent a resource that could make a significant contribution in many sub-Saharan African countries to achieving the child millennium development goal (MDG-4).

WHO/UNICEF currently recommend that malaria and pneumonia treatment initiatives be integrated and managed together in the community.[11] A Nigerian study educating PMDs to recognise and appropriately treat malaria, ARI, and diarrhoea showed that trained PMDs scored significantly higher in post- versus pre-intervention tests for knowledge and appropriate practices.[24] Also, compared with health workers and the mass media, PMDs remain a major source of information for childhood illnesses.[22] This indicates that PMDs represent a largely untapped resource for diffusion of health messages, particularly those that deal with treatment of childhood illnesses and should be adopted for ARI/malaria home management strategies.[22] The Integrated Managementn of Childhood Illnesses (IMCI) initiative has not yet addressed PMDs as an important source of treatment of child illness, especially ARI and this should be explored in Africa.

The following are some limitations of this study. This study may be representing the peri-urban population but may not necessarily represent the population in a more rural area or more affluent section of the population of south-west Nigeria. As with studies of this nature, this study relied on self-reported practices. It is not known how accurately carers recall actual experience with ARI and antibiotics, and parental reports of their behaviour may not always correspond to their actual behaviour. Besides this, invalid answers may be due to other factors such as interviewer bias.

Overlap of fever and ARI symptoms occurs at the community level in Nigeria and a significant proportion of affected children receive antimalarials alone – thus a potential fallout of the home management of malaria strategy may be inappropriate management of pneumonia in the community.[12] There is a need to further define and clarify the overlap between pneumonia and malaria at the community level and training of registered PMDs to recognise, appropriately manage, and educate carers on ARI should be conducted before pneumonia is integrated in to the home-management strategies in Nigeria.

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References

1. Rudan I, Boschi-pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemilogy and etiology of childhood pneumonia. *Bull WHO* 2008; 86: 408–16.
2. Akanbi MO, Ukoli CO, Erhabor GE, Akanbi FO, Gordon SB. The burden of respiratory disease in Nigeria. *Afric J Resp Med* 2009; 4: 10–17.
3. Falade AG, Mulholland EK, Adegbola RA, Greenwood BM. Bacterial isolates from blood and lung aspirate cultures in Gambian children with lobar pneumonia. *Ann Trop Paediatr* 1997; 17: 315-9.
4. Johnson AW, Osinusi K, Aderele WI, et al, Etiologic agents and outcome determinants of community acquired pneumonia in urban children: a hospital-based study. *J Natl Med Assoc* 2008; 100: 370–85.
5. Stensballe LG, Devasundaram JK, Simoes EA. Respiratory syncytial virus epidemics: the ups and downs of a seasonal virus. *Pediatr Infect Dis J* 2003; 22: S21–32.
6. *Technical basis for the WHO recommendations on the management of pneumonia in children at first-level facilities*. Geneva: WHO, 1991. WHO/ARI/91.2.
7. Wardlaw T, Salama P, Johansson EW, Mason E. Pneumonia: the leading killer of children. *Lancet* 2006; 368: 1048–50.
8. *Progress for children: a world fit for children* [Statistical Review. Number 6]. New York: UNICEF, 2007.
9. Schellenberg JA, Victora CG, Mushi A, et al. Inequities among the very poor: health care for children in rural southern Tanzania. *Lancet* 2003; 361: 561–6.
10. Källander K, Hildenwall H, Waiswa P, et al. Delayed care seeking for fatal pneumonia in children aged under five years in Uganda: a case-series study. *Bull WHO* 2008; 86: 332–8.
11. World Health Organization/UNICEF. *Joint Statement: Management of Pneumonia in Community Settings*. Geneva/New York: WHO/UNICEF, 2004. WHO/FCH/CAH/04.06.
12. Kallander K, Nsungwa-Sabiti J, Balyeku A, et al. Home and community management of acute respiratory infections in children in eight Ugandan districts. *Ann Trop Paediatr* 2005; 25: 283–91
13. Kallander K, Nsungwa-Sabiti J, Peterson S. Symptom overlap of malaria and pneumonia – policy implications for home management strategies. *Acta Trop* 2004; 90: 211–14.
14. Salako LA, Brieger WR, Afolabi BM, et al. Treatment of childhood fevers and other illnesses in three rural Nigerian communities. *J Trop Pediatr* 2001; 47: 230–8.
15. The national Strategies and Guidelines for Home and Community Management of Malaria. Federal Ministry of Health, Nigeria 2005. http://nmcpnigeria.org/f/case-management/hmm/National%20Guidelines%2026%20%Strategy%For%20HMM%20Dec%2005.pdf.
16. Marsh DR, Gilroy KE, Van de Weerdt R, Wansi E, Qazi S. Community case management of pneumonia: at a tipping point? *Bull WHO* 2008; 86: 381–9.
17. Fagbule D, Parakoyi DB, Spiegel R. Acute Respiratory Infections in Nigerian children: prospective cohort study of incidence and case management. *J Trop Pediatr* 1994; 40: 279–84.
18. Brieger WR, Osamor PE, Salami KK, Oladepo O, Otusanya SA. *Interactions between patent medicine vendors and customers in urban and rural Nigeria*. Health Policy Plan. 2004; 19: 177–82.
19. Perkins BA, Zucker JR, Otieno J, et al. Evaluation of an algorithm for integrated management of childhood illness in an area of Kenya with high malaria transmission. *Bull WHO* 1997; 75 (Suppl 1): 33–42.
20. Tupasi TE, Miguel CA, Tallo VL, et al. Child care practices of mothers: implications for intervention in acute respiratory infections. *Ann Trop Paediatr* 1989; 9: 82–8.
21. Chuc NT, Larsson M, Falkenberg T, Do NT, Binh NT, Tomson GB. Management of childhood acute respiratory infections at private pharmacies in Vietnam. *Ann Pharmacother* 2001; 35: 1283–8.
22. Greer G, Akinpelumi A, Madueke L, et al. *Improving Management of Childhood Malaria in Nigeria and Uganda by Improving Practices of Patent Medicine Vendors*. Arlington, VA: BASICS II for the United States Agency for International Development,2004.
23. WHO global strategy for containment of antimicrobial resistance. Geneva: WHO, 2001 (WHO/CDS/CSR/DRS/2001.2a). http://apps.who.int/medicinedocs/documents/s16344e/s16344e.pdf.
24. Oshiname FO, Brieger WR. Primary care training for patent medicine vendors in rural Nigeria. *Soc Sci Med* 1992; 35: 1477–84.