



Antimicrobial storage and antibiotic knowledge in the community: a cross-sectional pilot study in north-western Angola



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SUMMARY

Background: Antimicrobials are drugs that were once lifesavers and mainly curative. Nowadays their value is increasingly under pressure because of the rapid and worldwide emergence of antimicrobial resistance, which, in low-resource settings, frequently occurs in microorganisms that are likely to be transmitted in the community.

Methods: This was a cross-sectional pilot study including 102 households within the 10th Health and Demographic Surveillance System round in Dande, Bengo Province, Angola.

Results: Of the total 102 households piloted, 79 (77.45%) were urban. Fifty-seven respondents were female (56.44%), and the mean age of the respondents was 39.70 ± 15.35 years. Overall, storage of antimicrobials was found in 55/102 households (53.92%). More than 66% of the antimicrobials stored were prescribed by a health professional and the majority of antimicrobials were bought at pharmacies or at a street market. Penicillin and its derivatives, antimalarial drugs, and metronidazole were the antimicrobials most frequently stored. Households with female respondents reported storing any drugs at home more frequently (82.50%; $p=0.002$) and also storing antimicrobials more frequently (64.91%; $p=0.016$) as compared to households with male respondents. Reported use of antimicrobials was significantly higher in urban households (60.76%, 48/79) as compared to rural households (30.43%, 7/23) ($p=0.010$). Overall, 74 of 101 respondents (73.26%) reported having already heard about antibiotics. The common reasons given for their use were cough and other respiratory symptoms, wounds, flu and body muscle pain, fever, bladder complaints, and diarrhoea and/or presumed typhoid fever. Nearly 40% (28/74) of the respondents thought that antibiotics should be stopped as soon as the person does not feel sick anymore.

Conclusions: Community interventions for appropriate use of antibiotics should be designed with a special focus on women. This should be done through public awareness campaigns and improving access to reliable medical services. Drug prescribers are key not only to appropriate antimicrobial prescription, but also to adequate dispensing, and are strong advocates for the possible misconceptions on antimicrobial usage by lay people.

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Introduction

Antimicrobials are drugs that were once lifesavers, mainly curative for meningitis, pneumonia, and other invasive infections, as well as enabling safer childbirth, surgical procedures, and, in

high-resource countries, organ transplantation and oncological treatment regimens (Marston et al., 2016). Nowadays their value is increasingly under pressure because of the rapid and worldwide emergence of antimicrobial resistance (AMR).

In low-income countries, AMR frequently occurs in microorganisms that are likely to be transmitted in the community, such as the pathogens causing pneumonia, diarrheal diseases, tuberculosis, sexually transmitted diseases, and malaria (World Health

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Organization, 2017a). This complex health problem is likely associated with various factors, in particular the excessive and inappropriate use of antimicrobials (Laxminarayan and Heymann, 2012). Any antimicrobial use, whether or not appropriate, will cause selective pressure, which may lead to the selection of more resistant pathogens.

A study based on sales data from retail and hospital pharmacies in national sample surveys estimated that the worldwide consumption of antibiotics in healthcare settings over the first decade of the new millennium increased by more than one third (Van Boeckel et al., 2014). In that study, the lack of data for Sub-Saharan Africa was particularly striking. Worldwide, the large majority of antimicrobial use occurs in the community, where such drugs can readily be obtained, even without a prescription (Nga do et al., 2014; Landers et al., 2010; Hoa et al., 2009). Unfortunately in-depth information on antibiotic consumption in the communities worldwide is very scarce, especially in low-resource settings.

It has been shown that storing antimicrobials at home is related to their inappropriate use (Yu et al., 2014; Togoobaatar et al., 2010). It is also known that resource-poor healthcare systems in the developing world tend to use antimicrobials inappropriately more often (Kardas et al., 2005). Angola does not have national antibiotic treatment guidelines and has a lax regulatory system, similar to other developing countries (Laxminarayan and Heymann, 2012; Morgan et al., 2011; Holloway et al., 2016).

The purpose of this pilot study was to describe the first prevalence estimates for antimicrobial storage in the community, explore factors associated with storage, and to assess basic knowledge on antimicrobials among the general public in Bengo Province in the north of Angola. Additionally, this study served as a field test for the adequacy of the data collection tool and planning of human resources and logistics in preparation for a larger study.

Methods

Study area and site

The study was conducted in Bengo Province, about 60 km northwest of Luanda, and covered a total area of approximately 4763.6 km² in an area where the Health Research Centre of Angola (CISA) has run the Dande Health and Demographic Surveillance System (HDSS) since 2009. The Dande HDSS initial census covered approximately 60 000 residents living in more than 15 600 households (Sousa-Figueiredo et al., 2012), spread over 70 hamlets, 60% of them located in rural areas. The HDSS aims to provide relevant health, demographic, and socioeconomic data to inform local policies and research on endemic diseases (Fançonny et al., 2012; Pires et al., 2013; Magalhães et al., 2012). Agriculture is the main economic activity, attracting some migrant workers from other parts of the country. Fishing in lakes and rivers and charcoal exploitation are also important economic activities. The existing industrial activity is linked to stone and sand extraction, which supplies the construction business. The area is holoendemic for *Plasmodium falciparum* malaria, and the prevalence of HIV among adults aged 15–49 years nationwide was about 2.2% in 2015 (UNAIDS, 2017), with higher prevalence rates in provinces with international borders.

Study design and population

Trained field workers visited a convenience sample of 102 households supervised by the principal investigator. Urban hamlets were classified according to the National Statistical Institute of Angola as agglomerations of 2000 or more inhabitants and a basic infrastructure (Ministério do Planeamento, 2011).

Study visits were performed after a 2-day training programme on the theoretical background of antimicrobials and concepts of resistance, including role-play exercises adapted to the field workers' knowledge about antimicrobials. The term 'antimicrobial' was used for any anti-infective drug (i.e., antibiotics, antivirals, antifungals, anthelmintics, and tuberculostatic drugs). 'Antibiotic' was the term used to test the participants' knowledge on this topic. A standardized questionnaire with questions on knowledge of antibiotics and resistance was filled out during the interview, and the respondents were requested to bring any medication stored at home with them. Verbal informed consent was obtained before the questionnaire was completed. The respondent was any person living in the household at that time, who was aged 16 years or above. The trained field worker collected the name of any medication (drugs themselves and/or prescriptions) and asked whether that drug had been prescribed, whether the posology had been explained, and where it had been bought. A magnifying lens was used to help field workers to retrieve the information from damaged blister strips or prescriptions.

These 102 households were used as a pilot study for an ongoing cross-sectional study through the 10th HDSS round, which started in July 2016 and which was completed at the end of January 2017.

Statistical analysis

Data were analyzed using Stata 14.0 software (StataCorp, College Station, TX, USA). Frequencies and proportions were used to describe the study population in relation to the relevant variables. Odds ratios, 95% confidence intervals, and *p*-values were computed to assess the presence and degree of association between antimicrobial storage and demographic characteristics.

The Chi-square test was used to compare proportions (sex, distance to nearest health facility, place of residence (rural/urban), and literacy) with the consumption of antimicrobials, and a *p*-value of <0.05 was considered statistically significant.

Denominators vary in the analysis because not all respondents answered every question in the survey.

Results

Socio-demographic characteristics

Of the total 102 households piloted, 79 (77.45%) were urban and 23 (22.55%) were rural. Fifty-seven respondents were female (56.44%). The mean age of the respondents was 39.70 ± 15.35 years; 72/99 (72.73%) were able to read. Among the respondents who could provide information on monthly household income, nearly 32% (61/102) declared having less than 10 000 AOA or no monthly household income (100 AOA = 0.55 EUR/0.60 USD).

Storage of antimicrobials

Seventy-two of the 102 households (70.59%) stored any medication at home, and 55 of the 102 households (53.92%) stored antimicrobials. More than 66% of the antimicrobials stored were prescribed by a health professional. More than 60% of the respondents (62/102) had bought the antimicrobials at a pharmacy and 15.68% (16/102) had bought them at a street market.

Penicillin and its derivatives, antimalarial drugs and metronidazole are the most frequently antimicrobials stored respectively, 29/102 (28.43%) and 24/102 (23.53%), for antimalarial and metronidazole. Quinolones were reportedly taken in 12.75% of the households (13/102), and chloramphenicol and trimethoprim-sulfamethoxazole in 10.78% (11/102) each.

Households with female respondents reported storing any drugs at home more frequently (82.50%) (*p* = 0.002) and also

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