Knowledge, attitudes, and practice survey about antimicrobial resistance and prescribing among physicians in a hospital setting in Nairobi, Kenya

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Abstract

Antimicrobial resistance (AMR) is an increasing threat to global health security, potentially compromising gains made in public health worldwide. Resistance has been reported for entire classes of antibiotics, and untreatable multi-drug resistant bacteria are increasingly documented. This study, using a Knowledge, Attitude and Practice (KAP) survey, aimed to describe AMR and antimicrobial prescribing among medical doctors from the Kenyatta National Teaching and Referral Hospital in Nairobi, Kenya. A total of 160 questionnaires were distributed to the four departments of Internal Medicine, Paediatrics, Obstetrics, and Surgery. A total of 107 of the 160 questionnaires were completed (response rate, 66.88%). All the participants agreed that knowledge about antibiotics and their appropriate use is important in their daily work and 64.5% declared that they prescribed antibiotics more than once a day. Participants strongly agreed that AMR is a problem worldwide (97.2%), locally (93.4%), and in daily practice (75.9%). About one third of the participants (33.6%) agreed that they had difficulties choosing an antibiotic. Overall, 85.9 % of the study participants had had fewer than four lectures on antibiotic use as part of academic activities within their departments during the previous year. The majority of the participants also identified that antibiotics are being overused in hospitals across Kenya (91.5%) and in local communities (93.4%) as a whole. Patient demand for antibiotics in outpatient practice was perceived by 88.8% of the participants to contribute to their overuse. Half of the participants (52.4%) suspected that some antibiotics available in their hospital are of poor quality and for that reason do not work. The awareness of AMR as a worldwide and national problem was very high among the participants. The present KAP survey has shown that there is a clear need to carry out research on local AMR rates, to promote confidence in the quality of locally available AMs, and to expand the current residency curriculum to include AM use in greater detail. The lack of standard implementation of local AM guidelines is another issue that should be addressed.

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Introduction

Antibiotics are the most important tool we have to control many life-threatening bacterial diseases once infection has occurred, yet increasing levels of resistance are compromising the effectiveness of these antibiotics. Antimicrobial resistance (AMR) is an increasing threat to global health security, potentially compromising gains made in public health worldwide.[1] AM-resistant bacterial infections now account for much of the problem of emerging infectious disease worldwide.[2–6] AMR is a complex problem driven by many interconnected factors, therefore single, isolated interventions have little impact and coordinated action is required. Underlying factors that have accelerated the emergence and spread of AMR in middle- and low-income countries include: lack of a comprehensive and coordinated response; weak or absent AMR surveillance and monitoring systems; inadequate systems to ensure quality and uninterrupted supply of medicines; inappropriate use of AM medicines, including in animal husbandry; poor infection prevention and control practices; insufficient diagnostic, prevention and therapeutic tools.[7]

AMR can lead to many infectious diseases becoming untreatable and uncontrollable, which could derail the progress made towards reaching the health-related United Nations Millennium Development Goals for 2015. Therefore, knowledge about the driving forces behind AM prescription is needed, and such information can be obtained by means of Knowledge, Attitudes and Practice (KAP) surveys. KAP surveys on AMR have been conducted among medical doctors in the community setting. This study used a KAP survey about AMR and antibiotic prescribing among medical doctors from the Kenyatta National Teaching and Referral Hospital in Nairobi, Kenya.

Original Article

Methods

This was a cross-sectional survey of residents and specialist doctors from the Kenyatta National Hospital (the largest public teaching and referral hospital in Nairobi, Kenya) carried out between September and November 2015. A self-administered questionnaire was distributed among residents (i.e. physicians in training) and attending physicians (i.e. staff physicians after completion of training and specialisation). Medical doctors from psychiatry, radiology, ophthalmology and anaesthesiology were not included as they do not routinely prescribe AMs. Questionnaires were distributed on-site during working hours and participants were asked to respond immediately. There was no incentive for subjects to participate and no reminders were given. The questionnaire was based on previous surveys carried out in the United States and in Peru.[8] This tool was modified to suit the Kenyatta National Hospital setting by a team of infectious disease experts from the University of Nairobi. The 35-item questionnaire addressed the professional profile of the participants and frequency of antimicrobial prescription, their awareness about the current scope of AMR, sources of information and continuing education about antimicrobials, confidence and factors influencing decisions around AM prescription. Questions used a 4- or 5-point Likert scale (which included answers ranging from 'strongly agree' to 'strongly disagree', from 'very useful' to 'not useful at all' and from 'always' to 'never'). The study tool had seven questions that assessed basic knowledge about the clinical indications, spectrum, administration and pharmacology of AMs.

The survey had three case-based questions that looked into the choice of AMs for treating an upper respiratory tract infection, acute diarrhea, and sepsis in a patient with impaired renal function, three questions looked into the spectrum of AMs and their ability to cross the blood–brain barrier and a question on safety of AMs during pregnancy.

The study was approved by the Department of Medicine, University of Nairobi and Kenyatta National Hospital Ethical Committee. As the nature of the study was anonymous, informed consent was not sought.

Data analysis. The survey targeted residents and specialists in Internal Medicine, Paediatrics, Obstetrics, and Surgery. In each department, 40 doctors were targetted, giving a total of 160. Proportions were calculated for categorical variables and their significance assessed by the Chi-square method. Means and standard deviations were calculated as continuous variables. Unless otherwise stated, Likert items were used by combining the data into two categories, 'strongly agree/agree', 'very useful/useful' and 'very confident/confident' versus the remaining options of the scale. The data were verified, cleaned, and entered into a Microsoft database access and analysed using SPSS version 21.0.

Results

Demographics and professional profiles. A total of 107 of the 160 questionnaires were completed and returned successfully by the study participants (response rate, 66.88%). The majority of the doctors (59.9%) had worked for more than five years.

The participants were mainly residents (91.6%) with Internal Medicine and Surgery predominating at 35.5% and 32.7%, respectively. All the participants agreed that knowledge about AMs and their adequate use are important in their daily work and 64.5% declared that they prescribe AMs more than once a day.

Knowledge on AM use. The majority of the participants agreed that there was no need to start AM for the two case-based questions on acute diarrhoea (81%) and upper respiratory tract infection (54.2%). However, 36.4% of the participants would start amoxicillin for the upper respiratory tract infection. The last case-based question assessed knowledge of when to adjust the dose of AM in a patient with severe renal failure due to sepsis. The patient was prescribed ceftriaxone and gentamicin. About half (n=51.0, 47.7%) correctly identified that the dose of these two AMs would have to be adjusted in the setting of renal failure. There were two questions on choice of antibiotics with regard to anaerobes and methicillin-resistant Staphylococcus aureus (MRSA). The majority correctly identified metronidazole (94.4%) as a target for anaerobes and that MRSA is not susceptible to cephalosporins (81%). Amoxicillin was the preferred drug of choice in pregnancy (n=101, 94.4%). A total of 79 (73.8%) participants correctly identified ceftriaxone as the drug with the best blood–brain barrier penetration.

Medical rank		n	%
Consultant physician		8	7.5
Internal medicine Resident		38	35.5
Obsgyn consultant		1	9
Obsgyn resident		7	6.5
Paediatric Resident		18	16.8
Surgery Resident		35	32.7
Since leaving medical school, how many years have you worked in a hospital?	≤1 year or less	3	2.8
	2 years	5	4.7
	3 years	19	17.8
	4 years	16	15.0
	5 years	19	17.8
	6 years	11	10.3
	≥7 years	34	31.8

Table 1: Medical rank of study participants and years worked

Awareness about the current scope of AMR. A total of 104 participants (97.2%) agreed that AMR is a worldwide problem. The majority agreed that AMR is a problem both locally and in daily practice (93.4% and 75.9% combined agreed and strongly agreed, respectively, for both settings). Most of the study participants disagreed (77.2%, disagree and strongly disagree combined) that AMR is not a significant problem in their local hospital.

Confidence and seeking of inputs. Nearly all the residents (81.3%) were confident about the optimal use of antibiotics. About one third of the participants (33.6%) agreed they had difficulties choosing an antibiotic. With regard to seeking reviews with a senior colleague, 3.7% replied 'never', 82.2% 'sometimes', 1.9% 'most', and 7.5% 'half the time'.

Sources of information and continuing education about AMs. Overall, 85.9% of the resident doctors in the study had received fewer than four lectures about AM use as part of academic activities within their departments during the previous year. The majority (95.6%) attended less than four training courses on AM over the past year yet, surprisingly, most (95.5%) would have wanted to attend these courses. Regarding sources of information, the majority found senior colleagues, same-rank colleagues, and the internet to be the most useful sources (82.3%, 86% and 85.9% respectively, 'very useful' and 'useful' combined). Most of the residents (72%) disagreed that antibiotic guidelines and antibiotic committees are an obstacle rather than a help to clinical care. The majority of the participants (96.2%) agreed that the development of local guidelines would be more useful than international guidelines. About four in 10 were not familiar with the Kenyatta National Hospital guidelines. Of those who were familiar, 39.8% found them useful. The Sanford Guidelines were not familiar to 59.8% of the residents.

Factors influencing decisions around AM prescription. Over half of the residents (53.2%) reported that they 'never knew the antibiotics available at Kenyatta National Hospital because of the frequent formulary changes'. The majority of the participants identified that antibiotics were being overused in hospitals across Kenya and in the local community as a whole (91.5% and 93.4% respectively, 'agree' and 'strongly agree' combined). Patients' demands for antibiotics in outpatient practice was perceived by 88.8% of the participants to contribute to their overuse. This contrasted with inpatient care where half of the participants (51.4%) disagreed that patient demands for antibiotics contributed to their overuse. Half of the participants (52.4%) suspected that some of the antibiotics available in their hospital are of poor quality and for that reason do not work.

Discussion

The present study describes the results of a KAP survey among 107 medical doctors (both residents in training and attending physicians) practicing in the Kenyatta National Teaching hospital in Nairobi, Kenya. The departments included were Internal Medicine, Paediatrics, Surgery, and Obstetrics and Gynecology. Overall, the participants scored well on theoretical knowledge about AMs, including indications, administration, and side effects. However, it is important to note that about one third of the participants would have treated the upper respiratory tract infection with an antibiotic and that just under half the participants were able to identify the need to adjust the dose of antibiotics in the sepsis patient. This suggests that knowledge of AMs – including indications, administration, and side effects – is a potential target for intervention. The awareness of AMR as a global and national problem was very high among the participants. This contrasts with a study from Peru where doctors were aware of the problem worldwide but failed to identify it in the local setting.[8] Research from the United States among general

		n	%
When you are in the emergency room, outpatient clinic or in the wards, how frequently do you review your decision to prescribe antibiotics with a senior colleague?	About half the time	7	6.5
	Always	1	9
	Most of the time	16	15.0
	Never	14	13.1
	Sometimes	68	63.6
If you ask a senior colleague, how frequently does he/she recommend a different antibiotic to you?	About half the time	8	7.5
	Most of the time	2	1.9
	Never	4	3.7
	Sometimes	88	82.2
How confident do you feel about the optimal use of antibiotics?	Somewhat confident	80	74.8
	Somewhat unconfident	7	6.5
	Unconfident	2	1.9
	Very confident	18	16.8

Table 2: Choice of antibiotics

practitioners showed that most of the physicians interviewed were aware that inappropriate use of AMs in their own practice contributes to increasing AMR.[9] Approximately nine in ten of the participants identified that patient demand for AMs plays a major role in their overuse in the local community and hospital. The pressure from patients has been found to influence prescription patterns in middle- and low-income settings. This is despite the fact that the majority of participants identified that prescribing AMs can cause some harm to patients who do not need them. A study among parents and paediatricians in Venezuela revealed that the majority (87%) of doctors felt pressured by parents into prescribing AMs; 48% of parents said that they had requested AMs and 33% revealed that they had obtained a prescription.[10] The high expectation about AM use from patients is probably due to their minimal understanding of AMR and AM side effects. This can be addressed by educational forums targeting the community setting. The participants identified guidelines and education as key areas to help tackle AMR. About four in 10 were not familiar with the Kenyatta National Hospital guidelines. Of these, an equally low number (39.8%) found them useful. The Sanford Guidelines were not familiar to 59.8% of the residents. In addition to this, half of the residents (53.2%) reported that they never knew which antibiotics were available at Kenyatta National Hospital because the formulary always changes. The need for local guidelines is paramount in the fight against AMR. The residents should be encouraged to consult their colleagues (senior and same rank) as this was found to be beneficial in passing on information about AM use and AMR. An increase in the number of classroom lectures about AMR and AM prescribing was welcomed by the vast majority of participants, suggesting a gap in knowledge about infectious diseases, microbiology, and AM prescribing in university teaching curriculums. Other influences on AMR included poor quality of the AM. This is similar to other studies in low- and middle-income countries like Peru and Columbia.[11,12] Studies need to be done to potentiate the efficacy of these AM drugs. There should be strict policies on

vetting and testing of these drugs before and after they enter the local market. Efforts should be made by the Kenya Ministry of Health to instill confidence in AMs. In conclusion, this survey has presented some vital information on the prescribing attitudes and practices of medical doctors from a major public hospital of a middle-income country. The key message is that AMR is an emerging problem in healthcare in Kenya and steps should be put in place to tackle it. Simple steps would include increasing AMR educational fora, dissemination of information about local AMR rates, and the importance of renewing public confidence in the quality of locally available AMs. Furthermore, the study highlights that local guidelines should be revised to suit a Kenyan setting. Local infectious diseases services and AM stewardship programmes should take these data into account when planning and executing their activities. A key step to minimise AMR in Kenya would be the development of a healthcare policy on infection prevention and control.

Study limitations
1. KAP surveys are limited by the fact that participants may tend to give socially desirable answers rather than expressing their true opinions.
2. The present setting was a teaching hospital, and this may not reflect the knowledge and attitudes towards community infections of clinicians in the general community.

The following recommendations can be made from the results of the survey:
1. Inclusion of more formal lectures in the teaching curriculum in the various residential programmes with emphasis on AM use, AMR, and side effects.
2. Local guidelines on AM use should be produced.
3. More local studies on patterns of AMR are needed.
4. There should be strict policies on the vetting and testing of these drugs before and after they enter the local market.

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Author declaration

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		n	%
1. A 40-year-old woman went to the Emergency room complaining of four days of diarrhoea (three unformed stools per day). No history of fever. What treatment would you recommend?	Ceftriaxone	1	9
	Ciprofloxacin	7	6.5
	Metronidazole	9	8.4
	No need of antibiotic use. Oral rehydration	87	81.3
2. A 32-year-old male went to the clinic complaining of fever (37.6°C), nasal discharge and throat pain for three days. Which antibiotic will you recommend?	Amoxicillin	39	36.4
	Cefuroxime	4	3.7
	Clarithromycin	5	4.7
	No need of antibiotic use	58	54.2
3. During your stay in the ward, you have seen two patients with impaired kidney function. Patient A is a 68 year-old male with cellulitis in the lower limb. He received clindamycin. Patient B is a 64 year-old woman with diabetes who received empirically treatment. Which treatment should be adjusted?	Neither patient A nor patient B	3	2.8
	Patient A	18	16.8
	Patient A and B	28	26.2
	Patient B	51	47.7
4. Which one of the following antibiotics may be safe during pregnancy?	Amoxicillin	101	94.4
	Ciprofloxacin	1	9
	Doxycycline	1	9
	Gentamicin	1	9
5. Which one of the following antibiotics has the best activity against anaerobes?	Ceftriaxone	1	9
	Ciprofloxacin	2	1.9
	Metronidazole	101	94.4
	Trimethoprim-sulfamethoxazole	1	9
6. Methicillin resistant-*Staphylococcus aureus* is susceptible to:	Cefalotin	6	5.6
	Ceftriaxone	11	10.3
	Cefuroxime	5	4.7
	None of these antibiotics	81	75.7
7. Which one of the following antibiotic is more effective to cross the blood–brain barrier?	Ceftriaxone	79	73.8
	Clindamycin	2	1.9
	Vancomycin	22	20.6

Table 3: Case based questions and responses

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