ECUMENICAL PHARMACEUTICAL NETWORK

AN EXPLORATORY PILOT STUDY ON KNOWLEDGE, ATTITUDES, AND PERCEPTIONS CONCERNING ANTIMICROBIAL RESISTANCE AND ANTIBIOTIC USE PRACTICES AMONG HOSPITAL STAFF IN KENYA

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About EPN

Ecumenical Pharmaceutical Network (EPN) is a Christian, not for profit, independent organization committed to the provision of quality pharmaceutical services as a means to achieving global goals and targets on health and access to medicines.

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Objective To explore the knowledge and perceptions of hospital staff in Kenya on antimicrobial resistance and antibiotic use practices.

Methods A survey was conducted in 22 hospitals in Nairobi and Nyanza provinces in Kenya in April and May 2010. Six of the hospitals were Government, nine were private sector and seven were church owned hospitals. Data were collected through face to face interviews of 86 professionals working in the hospitals.

Findings 92.6% of those interviewed considered antimicrobial resistance a significant national problem but only 63.8% considered it a problem in their hospital**.** Clinical/medical professionals were consistently more likely to consider AMR a problem than the other professionals interviewed**.** 80% of the health professionals rated the knowledge and awareness of their professional colleagues in the hospital on AMR as average or lower. There were no differences in opinion based on region, on the presence of certain practices known to promote antimicrobial resistance, except for a higher ranking of shortages of required medicines in Nyanza compared to Nairobi. Infection control in the hospitals was, in general, perceived as satisfactory and this perception was consistent across professions, regions and facility types. At least 16 out of 22 hospitals reported having some form of infection control policies/guidelines and structures in place although the written guidelines were only seen in one hospital. While 80% of the hospitals reported doing culture and sensitivity testing, only one hospital appeared to have an AMR surveillance system in place. The most important driver of choice for an antibiotic for prescribers was the patient's clinical presentation, while profit for the hospital or clinician were reported as having little influence on choice. Controls on the use of antibiotics were not common and only 20% of the hospitals reported that the prescribing of selected antibiotics was limited to certain groups of prescribers.

Conclusion The knowledge, attitudes, and perceptions of the professionals interviewed in this study indicate an awareness of the seriousness of antimicrobial resistance as a national level problem but far less as a problem at the facility level. In addition, practices known to promote development of resistance are thought not to be common in these hospitals. Studies to determine the existence of practices in hospitals that either promote or support the containment of resistance may need to go beyond simple interviews with hospital staff to include observational studies on actual practices and resistance trends.

INTRODUCTION

Antimicrobial resistance is a global problem and drivers of resistance are well documented[1,2,3]. However, little is known about the real economic and health impact of antimicrobial resistance in least developed countries[2], let alone the perceptions of health professionals in these countries on the phenomenon and the extent to which it influences their clinical practice. In addition to the high burden of infectious disease, least developed countries are characterized by poverty and inequities, all of which are major drivers of resistance[1]. In 2001, WHO launched a global strategy for the containment of Antimicrobial resistance (AMR) to provide countries with a framework of interventions to curb the emergence and spread of resistance organisms[3]. However, there is not much information on the extent to which countries in Africa have adopted and implemented the recommendations made. Given this absence of data on, among others, the opinions and attitudes of health professionals on AMR, the presence/absence of practices that impact on the development of resistance at hospital level and on antibiotic use, this study set out to establish:

1) The perceptions and beliefs of hospital staff about antibiotic resistance as a local and/or national issue and the perceived drivers of antibiotic use within the facilities

2) The possible existence of facility-level practices which contribute to the development of antibiotic resistance and the presence or absence of incentives for such practices

3) The possible existence of facility-level interventions which contribute to the containment of antibiotic resistance and the presence or absence of incentives for such interventions

METHODOLOGY

Approval of the study was obtained from the Ministry of Medical Services, Kenya who also expressed interest in having their division of medicines information and appropriate medicines use, formally collaborate in the study. Letters to request support for the study were also sent to the church health umbrella bodies - Christian Health Association of Kenya and Kenya Episcopal Conference Health Department which are responsible for coordinating health care provision by church institutions.

Two provinces were targeted for the study, Nairobi and Nyanza. The two were chosen because of the need to have both an urban and a more rural perspective. In addition, the two provinces are geographically compact and would facilitate easy reach of selected hospitals within the limitation of the resources available. Finally, the two provinces had a sufficient number of hospitals to choose from given that consent was required from each of the facilities.

According to a list from the Ministry of Medical Services (August 2009), Nairobi province has 41 hospitals and Nyanza province has 84 hospitals. The study team agreed to include 10 hospitals from each of the provinces as a matter of convenience and it was determined to target roughly equal numbers of hospitals from each of the main health sectors required for sub-analysis, i.e. government, private and faith based. Given the need to compare data from the respondents across hospital ownership, size and geographical location, it was necessary to exclude certain hospitals. The following categories were excluded:

- National referral hospitals
- University and Teaching hospitals
- Specialist hospitals (Maternity, Child, Mental)
- Facilities that appeared to be more like nursing homes or health centers even when categorized by the Ministry as hospitals

From the remaining hospitals in the two provinces, just over 30 were identified purposively to be contacted to participate in the study. For Nyanza, government hospitals in the more easily accessible districts of Kisumu East, Kisumu West, Bondo, Migori, and Kisii Central were used as point hospitals and private and faith based ones within

close proximity were identified as target hospitals. In Nairobi the choice of target hospitals was based on the need to have all the different ownership categories represented, the perceived ease of obtaining permission and the geographical location of the hospital. At least two hospitals within easy reach of each other were chosen to facilitate movement between one and the other and minimize travel time since the study design required each team to visit two hospitals in one day. Where a hospital declined to participate, another of similar ownership was identified as a replacement. Eventually, the military and air force hospitals in Nairobi had to be excluded because the process of obtaining consent was found to be very lengthy and not feasible within the time frame of the study.

Face to face interviews were conducted using a form with 5 parts: background information on the facility and a set of questions for a medical/clinical professional (clinician), a pharmacy professional or senior staff in the pharmacy department, a laboratory professional and a representative of accounts/administration. As such at least four people were to be interviewed in each hospital: a medical professional and one person each from pharmacy, laboratory and administration. The people to be interviewed were nominated by the member of the hospital management who gave consent for the study to proceed at the time the interview team arrived in the hospital. This was commonly the chief executive officer or the hospital administrator. In some cases additional staff, usually from the records section, provided the background information on the hospital. Prior to use, the tools had been validated using a pre-test conducted in two hospitals in Nairobi, one church and one private hospital. After the pre-test a number of questions which were ambiguous or were not easily understood were excluded and adjustments made to the questions which required enhancement.

Limitations

- There was an assumption that the respondents who responded in affirmative to the question: *Are you aware about the resistance of organisms to antimicrobials?* had a good understanding of the concept. It may have been prudent after establishing that a respondent was aware of AMR to establish a common understanding of the concept.
- The respondents interviewed were nominated by a senior hospital manager either the Chief Executive or the hospital administrator. This could have introduced some bias in that the respondents presented what they thought might be the hospital position rather than their personal opinions as was required.
- Some of the areas investigated e.g. opinions on resistance and existence of policies and committees would have required deeper probing in order to have more conclusive findings.
- The study did not target nurses and yet they are, in most hospitals, the cadre responsible for issues to do with infection control. Therefore the opinions of the other professionals may not reflect the actual situation of infection control in the hospitals.
- Exclusion of the military and air force hospitals in Nairobi constrain the potential of the study to influence policy and decision makers at national level since these hospitals are considered a significant part of the government health sector.
- Due to resource constraints it was not possible to put in place any mechanisms to validate the responses.

RESULTS

Facilities and respondents

Facilities

In all, 22 hospitals were included in the survey, one of which was later found to be outside the official boundaries of Nairobi, in central province. For the purpose of reporting, this hospital was grouped with the Nairobi hospitals given that it was within a similar radius of the city centre as some of the other hospitals visited. Six of the hospitals were Government, nine were private and seven were faith based hospitals (Table 1). Together, these facilities have over 2,200 inpatient beds and had over 500,000 outpatient attendances in 2009 (Table 2).

Table 1. Ownership and location of hospitals included in the survey on health professionals' attitudes and perceptions about antimicrobial resistance and antibiotic use

District	Type			Total
	Government	*Faith Based*	*Private*	
Bondo	**1**	-	-	**1**
Gucha South	-	**1**	-	**1**
Kiambu West	-	**1**	-	**1**
Kisii	-	-	**1**	**1**
Kisumu	-	-	**1**	**1**
Kisumu East	**1**		**1**	**2**
Kisumu West		**1**	-	**1**
Migori	**1**	**1**	-	**2**
Siaya	**1**	-	**1**	**2**
Dagoretti	**1**	-	-	**1**
Embakasi	**1**	-	-	**1**
Langata	-	**1**	**4**	**5**
Nairobi East	-	**1**		**1**
Nairobi North	-	-	**1**	**1**
Westlands	-	**1**	-	**1**
Total	**6**	**7**	**9**	**22**

Table 2. Characteristics of hospitals included in the survey: bed capacity, staffing and OPD attendances

	0 - 49	50-99	100-149	150-199	200-249	> 250
No. of Facilities with:						
Average outpatient attendance / day	5	5	2	3	-	1
Bed capacity	7	5	2	3	3	1
Full time staff	3	3	1	5	4	3

Respondents

A large part of the survey was aimed at determining the opinions and perceptions of various cadres of professionals in the hospitals on AMR and antibiotic use. A brief profile of the respondents is given in Table 3. A total of 86 hospital staff were interviewed, the majority of whom (61.6%) were male. All the cadres of professionals interviewed had been in employment, on average, for at least three years. The majority of pharmacy and laboratory professionals were holders of a diploma in their field (76.2% and 59.1% respectively) while the medical/clinical professionals were largely (61.9%) degree holders.

Table 3. Bio-data of the respondents interviewed in the hospital AMR survey in Kenya

	Clinical/medical		Pharmacy		Laboratory		Administration		Total	
Gender of respondents	*No*	*percent*	*No*	*percent*	*No*	*percent*	*No*	*percent*	*No*	*percent*
Female	4	18.2%	12	54.5%	8	36.4%	9	45.0%	33	38.4%
Male	18	81.8%	10	45.5%	14	63.6%	11	55.0%	53	61.6%
Total	22	100.0%	22	100.0%	22	100.0%	20	100.0%	86	100.0%
Length of service (months)										
Average length of service in months	40.09		37.85		51.57		57.22		46.68	
Qualifications										
Diploma	8	38.10%	16	(76.2%)	13	(59.1%)	*Not determined*		37	(57.8%)
Higher Diploma/ Degree	13	61.9%	5	(23.8%)	9	(40.9%)	*Not determined*		27	(42.2%)

Perceptions on the problem of antimicrobial resistance

Of the hospital staff interviewed, only 5 out of 65 indicated that they were unaware of AMR. All five were non health professionals. However, over 80% of the respondents in each of the three cadres of health professions interviewed ranked the level of knowledge of health care providers in their hospital about AMR and related issues, average or lower (Figure 1). Furthermore, up to 60% of clinical and pharmacy staff indicated that they were not aware of any local or national AMR containment efforts and only 50% recalled training or an awareness campaign being undertaken in the hospital in the 24 months preceding the study. The most common AMR containment efforts that the respondents could report on were national efforts to control development of resistance in tuberculosis while the areas of training that these respondents most commonly cited were related to infection control or rational use of medicines.

The perceptions of the different cadres of staff on the extent to which they thought AMR is a problem are given in Table 4. The majority of those interviewed (over 80% across each of the professional categories) felt AMR was a significant problem at national level but far fewer felt it was a significant problem in their hospital. However, the clinicians were a lot more likely to consider it a problem than the other professionals and more of them felt cases of AMR were being missed. Overall, over 70% of the health professionals interviewed felt that their hospital could be missing cases of antimicrobial resistance here and there. The most common reason given by the clinical and pharmacy staff for possibly missing cases of resistance was the lack of systems for monitoring patients.

"There is no follow up if patients got better or went to a different hospital."
Pharmacist Nyanza

"Patients come to the hospital from neighboring health facilities. It is hard to tell what they have been treated with."
Medical Officer Nyanza

The most commonly reported causes for failure to carry out required tests were financial constraints on the part of the patient or oversight/error by the clinician. Two of the hospitals indicated that they have no facilities for carrying out cultures. One respondent indicated that cases were missed because broad spectrum antibiotics are always used.

> *"Patients are treated without referral to the lab and broad spectrum (antibiotics) are given."*
> ***Laboratory in charge Nairobi***

> *"Some patients are treated without doing culture and sensitivity tests, since the test is expensive."*
> ***Laboratory Technologist Nairobi***

While the majority of pharmacy and laboratory staff (88.3%) reported that they had specific reports or evidence of AMR in the hospital, only about half of the clinicians and administration staff could confirm that they had specific evidence or examples of cases of resistance. Even for those who said they had evidence, only a small minority could explain/describe concretely infections, organisms and antibiotics for which resistance had been suspected. Some of the examples given actually showed a poor understanding of the issues as evident from this example from a clinician in Nyanza:

> *"Mostly in paediatrics where most will be put on IV treatment since the oral medications of most antibiotics will not work."*
> ***Clinical Officer Nyanza***

Figure 1. Rating of the level of awareness and knowledge on AMR and related issues of the health care providers in the hospitals surveyed.

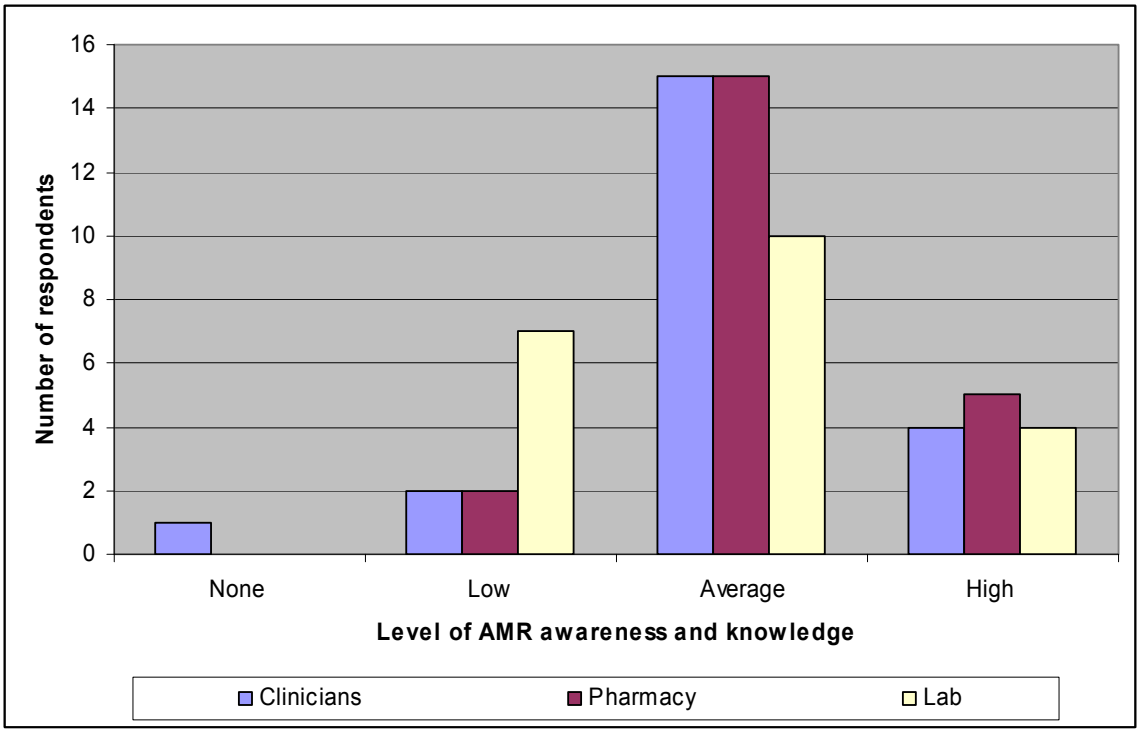


Table 4. Perceptions of respondents about AMR as a significant local and national concern: affirmative responses to the opinion/awareness question asked

	Clinical/medical staff [a]		Pharmacy Staff [b]		Laboratory Staff [c]		Administration staff [d]	
In your opinion, is antimicrobial resistance a significant problem nationally?	22	100.0%	19	90.5%	19	90.5%	15	88.2%
In your opinion, is antimicrobial resistance a big problem in your hospital?	19	86.3%	11	50.0%	11	55.0%	11	64.7%
Do you think the hospital might be missing cases of AMR here and there?	20	90.9%	15	71.4%	13	72.2%	*N/A*	*N/A*
Are you aware of any reports of antimicrobial resistance in this hospital over the past 12 months[e]?	11	55.0%	20	90.9%	18	85.7%	9	45.0%

[a] n=22, [b] n = 21 or 22, [c] n varies between 18-21, [d] n varies between 17-20

[e] For certain categories the question asked was 'have you encountered examples/evidence in this hospital in the last 12 months?'

The four most common concerns for the health professionals on AMR as a significant national problem could be grouped under the following categories:

- *Apparent widespread misuse of antibiotics by both health workers and patients*
- *Treatment failures were common with first line antibiotics*
- *The difficulties faced in managing patients because of resistance*
- *The higher cost of care resulting from resistance*

Similar concerns were expressed with regard to the problem of resistance at hospital level. A small number of respondents (4) raised concerns about the quality of available medicines and their impact on resistance.

For the respondents who indicated that AMR was not a problem in their specific hospital, only a limited number were able to elaborate on their position. The most common reason for this position was that stringent controls for the use of antibiotics were in place while one clinician indicated that they start treatment immediately with third and fourth line antibiotics and therefore resistance was not an issue.

These findings reflect a general trend in this study where perceptions on resistance are only weakly associated with detection of resistant pathogens in the laboratory.

Practices that influence the development of resistance

Prescribing and medicines management

In general, clinical professionals and pharmacy staff in both Nairobi and Nyanza did not think that a number of prescribing and medicine use practices known to contribute to the development of resistance were common in their hospitals (Table 5). However professionals in Nyanza ranked 3 out of 7 of the practices, as being almost twice as common in their hospitals than their counterparts in Nairobi. The most striking difference in perception in the different regions was on shortages of required medicines where respondents in Nyanza perceived it as a lot more common than those in Nairobi. The failure by patients to adhere to treatment was ranked as the most common practice in both provinces.

Table 5. Perceptions of clinical professionals and pharmacy staff on the presence of certain practices known to contribute to AMR in their hospitals in Nyanza and in Nairobi

	Nyanza *(n varies* 20-22)			Nairobi (n=21 or 22)		
Practice	**mean**	**freq**	**percent**	**mean**	**freq**	**percent**
Patients failing to adhere to treatment	3.55	10	50.0%	3.23	7	31.8%
Failure to properly diagnose patients condition	2.77	3	13.6%	2.23	1	4.5%
Lack of proper patient counseling on prescription medicines	2.64	4	18.2%	2.14	4	18.2%
Prescribing the wrong medicines	2.55	2	9.1%	2.32	4	18.2%
Shortages of required medicines	2.50	7	31.8%	1.82	3	13.6%
Limited use of laboratory services for diagnosis	2.09	2	9.1%	1.95	4	18.2%
Systems to check quality of medicines are not stringent	1.86	2	9.5%	2.00	2	9.5%

Freq= Frequency of those who reported a practice as being common (ranked as 4 or 5)
Mean = weighted average of all responses for a sale of 1-5 where 1 is never happens and 5 is very common.

Infection Control

With the exception of hand washing practices, there appeared to be no significant difference between clinical and pharmacy staff on how common selected practices related to infection control were in the hospitals. Notably all the different categories of respondents in this survey consistently indicated that infection control in the hospitals was satisfactory although government hospital staff appeared more inclined to acknowledge any problems in infection control than their counterparts in the private sector. This perception was the same across the different regions and facility types (Tables 6 -8).

Table 6. Clinicians and pharmacy staff views on infection control in the hospital

	Clinicians (n = 21 or 22)			Pharmacy staff (n = 21 or 22)		
	mean	frequency[a]	percent	mean	frequency[a]	percent
Poor infection control practices cause spread of antibiotic resistance	2.77	7	31.8%	2.91	9	42.9%
Poor hand washing practices are common among health workers	2.50	5	22.7%	1.68	2	9.1%

[a] Frequency refers to the number of professionals who report that a certain practice is common in the hospital i.e. give a score of 4 or 5 on a scale of 1-5. The mean is a weighted average of all responses for a particular practice.

Table 7. Opinions of laboratory staff (weighted mean) on the extent to which poor infection control is common in the hospital and impacts on service delivery

Practice	**Government** [a]	**Private** [b]	**Faith Based** [c]
Poor infection control is common in the hospital	3.00	1.78	2.00
Poor infection control is common in the lab	2.17	1.67	1.86
Poor infection control is a challenge in providing lab services	2.83	1.89	0.29

a n= 6, b n=9, c n=7

Table 8. An analysis by region on perceptions of clinicians and pharmacy staff on infection control practices within the hospital

	Nyanza *(n varies* 20-22)			Nairobi (n=21 or 22)		
Practice	**mean**	**freq**	**percent**	**mean**	**freq**	**percent**
Poor hand hygiene	1.77	2	9.1%	2.18	4	18.2%
Poor infection control	1.95	3	13.6%	2.00	1	4.5%

The majority of hospitals (63.6%) reported having infection control policies or guidelines in place but evidence of this was only seen in one hospital. Of the 17 clinicians who reported that the hospital had some kind of infection control structure in place, it was primarily a team or committee.

> *"An infection control committee is in place and has been very active for the last one year. There is also a dedicated trained nurse involved in infection control."*
> ***Consultant Pediatrician Nyanza***

Only two respondents reported having only an individual responsible for infection control in their hospital. There was no significant difference in the presence of the infection control measures investigated based on the type of hospital.

Table 9. Presence of measures to ensure good infection control by type of facility

	Government		FBO		Private	
Infection control person/team/committee in place	4	66.7%	5	71.4%	8	88.9%
Infection control policies/ guidelines in place	0	0.00%	0	0.00%	1	11.11%
Guidelines /Policies seen					*Guidelines on hand washing and poster on waste management*	
Systems for monitoring hand hygiene in place	2	33.3%	0	0.0%	2	25.0%

Only one hospital was able to elaborate fully on the system in place for monitoring hand hygiene as follows:

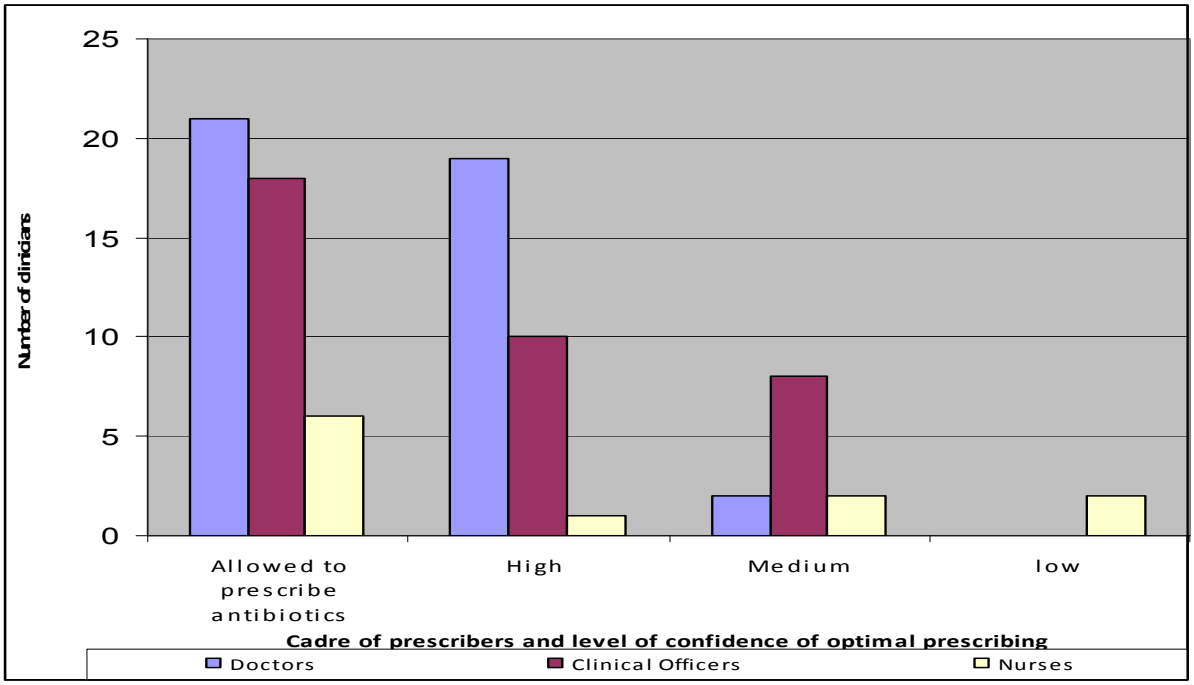
> *Randomly checking ward staff to determine cleaning effectiveness. Surgeons scrubbing in required to supply samples of under the nail deposits before and after scrubbing which is monitored.*

Antibiotic use

Prescribing of antibiotics

In the hospitals surveyed doctors, clinical officers and in a few cases nurses are allowed to prescribe antibiotics. The level of confidence of the clinicians interviewed in optimal prescribing by these cadres of staff is presented in figure 2.

Figure 2. Levels of confidence of clinicians on optimal prescribing by fellow prescribers in the hospitals.



Based on the aggregate responses of clinicians and pharmacy staff, antimicrobials are prescribed when they are needed and occasionally when they are not needed. The perceptions on this were the same across the two regions. (Table 10).

Table 10. Perceptions of clinicians and pharmacy staff on how common certain antibiotic use practices are in the hospital

	Nyanza *(n varies* 20-22)			Nairobi (n=21 or 22)		
Practice	mean	freq[a]	percent	mean	freq[a]	percent
Patients demanding for antibiotics	3.27	12	54.5%	3.32	10	45.5%
Prescribing antibiotics when they are not needed	2.82	7	31.8%	2.68	7	31.8%
Required antibiotic medicines are often not available	2.27	6	27.3%	2.32	5	22.7%
Not prescribing antimicrobials when they are needed	1.59	0	0.0%	1.77	0	0.0%

a = Number of respondents ranking a practice as common based on a score of 4 or 5 on a scale of 1-5 where 1 is never happens and 5 is very common

Table 11. Clinicians ranking of factors leading to prescribing of antibiotics when they are not needed

Factor	Frequency	Percent
Lack of confirmed laboratory results	15	68.2%
Demand from patients	10	45.5%
Lack of knowledge on correct use of antibiotics	8	36.4%
Preferred more appropriate options are not available	8	36.4%
Pressure from other clinicians	6	27.3%

On the other hand, patient demand for antimicrobials was perceived as common by slightly more of the respondents in Nyanza than those in Nairobi. When asked to rank the top three factors leading clinical staff to prescribe antibiotics when they are not needed, the highest ranked factor was lack of confirmed laboratory results

(Table 11). The ranking of patient demand as a common factor by 45.5% of the clinicians is consistent with the results presented in Table 10.

Drivers of choice of antibiotic

The clinical and pharmacy professionals' opinions on drivers of choice of antibiotic were investigated. Rankings of either 4 or 5 were aggregated and the percentage of those who considered a factor as having significant influence determined. To provide a comprehensive view based on all the respondents, the means of all the responses for a particular factor was calculated and the factors ranked in order of importance based on the mean (Table 12). For both cadres, the most important drivers of choice of antibiotic were the patient's clinical presentation and the prospect of treatment failure.

Profit for the hospital or prescribers, antibiotic audits and cost to the hospital were consistently reported as having little influence on choice. Overall the perceptions of these professionals on drivers of choice did not appear to differ considerably except that the clinical professionals appeared to consider results from cultures and interactions with colleagues as having a slightly greater influence on choice than their pharmacy counterparts did. On the other hand antibiotic audits, though considered of limited influence by both cadres, were considerably more likely to be ranked as having significant influence by pharmacy rather than clinical professionals. The importance given by the clinicians to results from cultures as a driver of choice stands in contrast to the results in table 11 where lack of laboratory results is given as the biggest driver for prescribing antibiotics when they are not needed.

Table 12. Drivers of choice of an antibiotic: opinions of clinical and pharmacy professionals in Nairobi and Nyanza

	Clinical staff *(n= 22)*			**Pharmacy staff** *(n = 18 or 21)*		
Factor	**Mean**	**Frequency**	**Percent**	**Mean**	**Frequency**	**Percent**
Patient is critically ill or immuno-compromised	4.91	22	100.0%	4.14	16	76.2%
Treatment Failures	4.50	19	86.4%	4.48	18	85.7%
Results from cultures	4.36	18	81.8%	3.71	14	66.7%
Interaction with colleagues and or consultants	4.23	19	86.4%	3.81	14	66.7%
Risk of missing an infection	3.95	15	68.2%	3.95	14	66.7%
Cost to the patient	3.77	12	54.5%	3.57	12	57.1%
Hospital or other guidelines	3.27	12	54.5%	3.35	12	57.1%
Patients' demands and expectations	3.00	8	36.4%	2.81	6	28.6%
Pharmaceutical Representatives	2.59	7	31.8%	3.24	10	47.6%
Cost to the hospital	2.00	3	13.7%	1.76	3	14.3%
Antibiotics Audits	1.93	1	4.5%	2.56	6	33.3%
Profit for hospital	1.91	3	13.7%	2.24	4	19.1%
Profit for the clinician	1.27	2	9.1%	1.57	2	9.5%

Interactions with pharmaceutical representatives were considered by both clinicians and pharmacy staff to have only moderate influence on prescribing in the hospital (weighted mean of responses of between 2.5 and 3.3 for both cadres were obtained consistently for two distinct questions) although the pharmacy professionals appeared to attach a slightly higher significance to their influence - Table 12. A striking difference was observed when the aggregate opinions of clinicians and pharmacy staff in Nyanza were compared with those in Nairobi (Table 13). More than half of the professionals in Nairobi felt that pharmaceutical representatives had significant influence on the choice of antibiotic prescribed whereas less than 1 in 3 of those in Nyanza felt the same way. Perhaps in contrast, professionals in Nyanza felt that hospital and other guidelines had a greater influence on choice of an

antibiotic than their counterparts in Nairobi. Results from cultures were also more likely to be considered as having a significant influence on choice in Nyanza than in Nairobi.

Over 75% (34 of 44) of the clinical and pharmacy professionals felt that a patient's ability to pay influences the type of medicines prescribed. However, on the question of whether the methods by which patients pay influenced the type of antibiotics prescribed, the respondents were more cautious. Of the clinical professionals 13 of 22 (59.1%) thought it did while only 40.9% (9 of 22) of the pharmacy staff were of this opinion. Nonetheless among those who felt that the method by which a patient pays does influence the choice of antibiotic there were some telling examples.

> *"When I was new (she had been in the hospital for 6 months) a few minutes after prescribing antibiotics for a patient I would get a call from revenue or pharmacy saying … 'this is a corporate client, why don't you prescribe according to their status?' "*
> ***Clinician, Nyanza***

> *"If the company is paying then the prescriber can give branded products or more expensive drugs because the patient feels no pinch."*
> ***Pharmaceutical Technologist Nairobi***

From the purchasing point of view, only 40% (8) of the Administration staff felt that there was any influence of the method by which most patients pay for their medication on the type of antibiotics purchased by the hospital.

Table 13. **Drivers of choice of an antibiotic: comparison of opinions of professionals in Nairobi and Nyanza**

	Nyanza			Nairobi		
Factor	**mean**	**frequency**	**percent**	**mean**	**frequency**	**percent**
Patient is critically ill or immuno-compromised	4.36	19	86.4%	4.71	19	90.5%
Results from cultures	4.36	18	81.8%	3.71	14	66.7%
Treatment failures	4.27	18	81.8%	4.71	19	90.5%
Risk of missing an infection	4.10	15	68.2%	4.00	14	66.7%
Interaction with colleagues and or consultants	4.09	18	81.8%	3.95	15	71.4%
Hospital or other guidelines	3.64	15	68.2%	2.80	9	42.9%
Cost to the patient	3.59	11	50.0%	3.76	13	61.9%
Patients demand and expectations	3.00	8	36.4%	2.81	6	28.6%
Pharmaceutical representatives	2.50	6	27.3%	3.33	11	52.3%
Antibiotics audits	2.18	6	27.3%	1.66	1	6.7%
Profit for hospital	1.95	3	13.7%	2.19	4	19.1%
Cost to the hospital	1.86	4	18.2%	1.90	2	9.5%
Profit for the clinician	1.68	3	13.6%	1.14	1	4.8%

Laboratory services

While 80% of the hospitals reported that they do culture and sensitivity testing, the frequency and scope of the tests done was not established and only one hospital appeared to have an AMR surveillance system in place. However, even for this hospital it was not possible to get comprehensive data on the resistance rates for common problematic organisms (*MRSA, C.difficile, and E. Coli*) for 2009. The laboratory staff interviewed indicated that for the most part whoever undertook the test wrote the findings on the laboratory request form of the individual patient and nowhere else. As such there was no common knowledge in the laboratories on which organisms were being cultured and what sensitivity patterns were being detected. Certainly there appeared to be no systems for aggregating and compiling the data. Nonetheless, the laboratory staff appeared satisfied that the bacteriology

services in general and results from culture and sensitivity were used (less than 25% felt that the use of these services were limited). Indeed overall less than 30% of those interviewed felt that the laboratory role was not appreciated. However it is possible that this overly positive outlook arose from the negative frame of the questions which made application of the scale challenging.

The laboratory staff were invited to report on the challenges they faced in providing a laboratory service. Government hospital staff ranked work overload and inconsistent supply of reagents as significant challenges contrary to their counterparts in both the private and faith based hospitals. In fact, the latter group did not consider any of the challenges significant. The Table below (14) shows the weighted mean of the ranking of the significance of selected challenges.

Table 14. **Challenges faced by laboratory staff in providing a comprehensive service**

Challenges for laboratory staff	**Government** (n=6)	**Private** (n=9)	**Faith Based** (n=7)
Work overload	5.00	2.89	2.86
Inconsistent supply of required reagents	4.17	1.33	2.14
Insufficient qualified human resources	3.83	1.89	1.67
Inadequate equipment	3.67	2.44	2.71
Limited appreciation of the lab role	3.17	2.11	2.50

Financing and performance incentives

The payment method most frequently used to obtain medicines in the hospitals surveyed is out of pocket as shown in Table 15 below. 80% of the hospitals reported it as most frequent and almost all (21) indicated that at least some payments for medicines were made out of pocket.

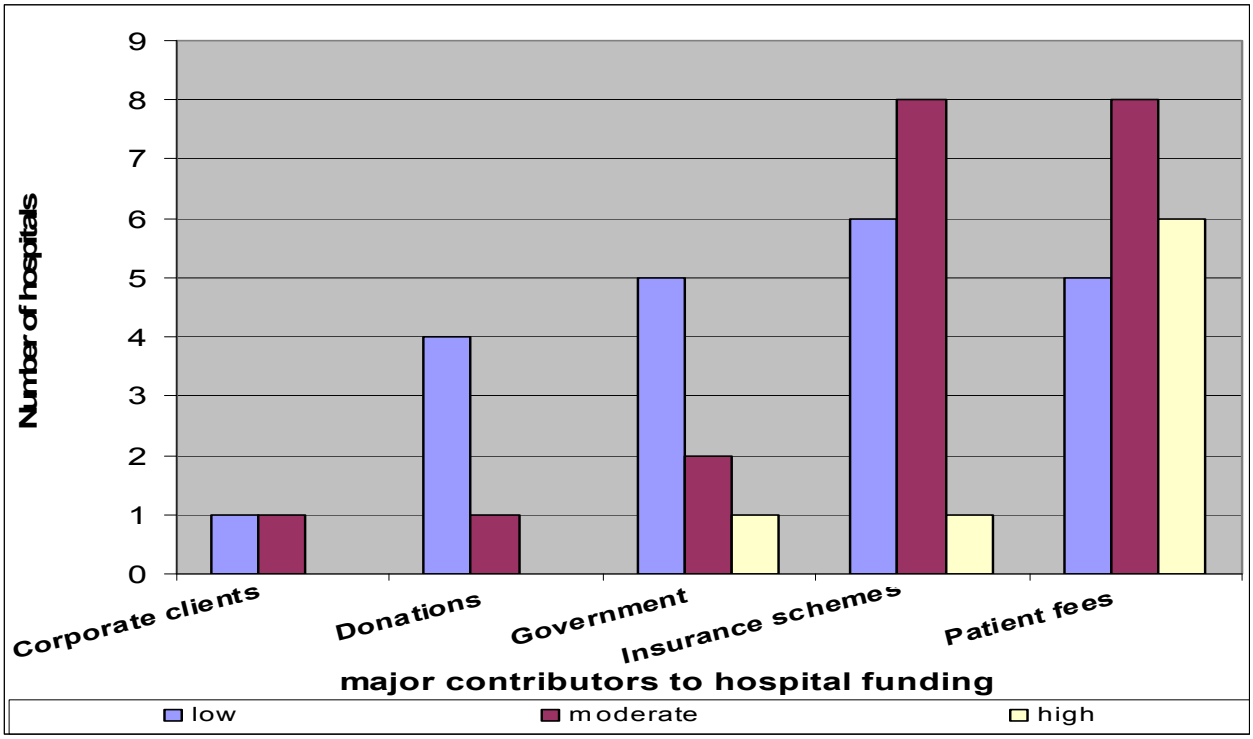
Table 15. **Ranking of the frequency of use of named payment methods by patients for the medication**

	1		***2***		***3***	
Payment Method	*Most frequent>>>>>>>>>……>>>>>> reducing frequency Number of hospitals in which method is used and percentage*					
Out of pocket [a]	17	81.0%	4	19.0%		
Insurance-public [b]	1	7.1%	11	78.6%	2	14.3%
Insurance-private [c]	2	14.3%	4	28.6%	5	35.7%
No payments are made for any medicines/ some medicines are free [d]			1	9.1%	5	45.5%

[a] n=21, b n=14, c n=14, d n=11

The sources of funding were further explored when administrative staff were asked to indicate the level of contribution of different sources to the funding required to run the hospital. Data were provided from 20 hospitals. From the estimates given on the level of contribution, they were categorized as low, moderate or high. Of the 20 hospitals 19 (95.0%) were able to provide an estimate of the contribution that patient fees made to their revenue indicating the level of importance of this contribution to service delivery. In contrast contributions from donors appeared to be far less important with only 5 hospitals reporting an estimate on the contributions from donations for the hospital. Although insurance schemes were a common source of revenue in the hospitals in the study, only one hospital rated the contribution from insurance as high. Figure 3 provides details on the relative importance of these revenue sources.

Figure 3. The top contributors and perceptions on level of contribution to hospital revenue



Performance evaluation

80% (53 of 66) of the respondents reported that the hospital had systems in place for individual or departmental performance evaluation. However only 40.4% (21 of 52) reported that incentives to encourage good performance were provided. The non monetary incentives such as formal recognition and award of certificates were slightly more common than the monetary such as promotions/demotions or increases or decreases in salary.

Table 16. Presence of systems for performance evaluation to encourage good performance

	Government		FBO		Private	
Performance evaluation Clinicians	5	83.33%	4	57.1%	8	88.9%
Performance evaluation Pharmacy	6	100.00%	4	57.1%	8	88.9%
Performance evaluation Laboratory	6	100.00%	3	50.0%	9	100.0%

Practices promoting the correct use of antibiotics

Policies, guidelines and controls

While there were reported to be a number of guidelines and policies in place in the hospitals, they were not readily accessible to the interview teams. Other apparent contradictions were evident in this regard for example, while over 50% of the pharmacy staff indicated that use of antibiotics was restricted in the hospital, less than 25% had the kind of controls that could be expected in place such as restrictions on the duration of treatment or restricting prescribing of selected antibiotics by defined cadres (Table 19). The hospitals in the private sector appeared, in general, to have more policies and control mechanisms in place than the other two categories. In addition, as might be expected, the administrative staff interviewed were more affirmative in their response on the presence of written policies around antibiotic use than the pharmacy staff. Details are in Tables 17-19.

Some examples of restrictions on usage of antibiotics reported by the hospitals were

a. *Meropenem* *used only when cultures are done, ICU use only, not used in casualty, reserved for resistant cases*
b. *Imipenem* *ICU use only*
c. *Teicoplanin* *culture is required*
d. *Ceftriaxone* *second line treatment, for inpatients only*
e. *Gentamycin* *not used in OPD*
f. *Ceftazidime* *ICU use only, not used in casualty*

A few examples of the restrictions in place on duration of treatment were:

a. *Amoxicillin/clavulanic acid is given for a maximum of ten days*
b. *Any IV antibiotic is stopped after every 5 days. IV treatment can only continue if the doctors justify why it should*
c. *All antibiotics are given for a maximum of 14 days*

Only 20% of the hospitals reported having antibiotics whose prescribing was limited to selected groups of prescribers. The medicines which were controlled in this way included Teicoplanin, Ceftazidime, Meropenem and Vancomycin.

Table 17. **Presence of written policies on antibiotic use in the hospital: responses from administration staff**

Parameter	**Frequency**	**Percentage**	***n***
General antibiotic use	9	53.0%	17
Infection control	16	88.9%	18
Policies restricting the use of antibiotics	5	31.3%	16
Surgical prophylaxis	4	25.0%	16

Table 18. **Policies and controls on antibiotic use in the hospitals: responses from pharmacy staff**

Parameter	**Frequency**	**Percentage**	***n***
Written policies on the use of antibiotics in place	6	27.3%	*22*
Monitor usage of antibiotics	13	59.1%	*22*
Restrict use of certain antibiotics	12	54.5%	*22*
Restrict duration of treatment for selected antibiotics	4	18.2%	*22*
Restrict prescribing of certain antibiotics to selected groups	5	22.7%	*22*

Table 19. **Existence of policies and controls on antibiotic use in the hospitals, breakdown by type of facility**

	Government		**FBO**		**Private**	
Written policies on the use of antibiotics in place	0	0.00%	2	28.6%	4	44.4%
Hospital monitors usage of antibiotics	5	83.3%	3	42.7%	5	55.6%
Hospital restricts use of certain antibiotics	5	83.3%	1	14.3%	6	66.7%
Hospital restricts duration of treatment for selected antibiotics	1	16.7%	1	14.3%	2	22.2%
Hospital restricts prescribing of certain antibiotics to selected groups	2	33.3%	0	0.0%	3	33.3%
Hospital has recently instituted measures to control use of Antibiotics - clinicians	4	66.7%	4	57.1%	4	44.4%
Hospital has recently instituted measures to control use of Antibiotics - pharmacy	2	33.3%	1	14.3%	3	33.3%

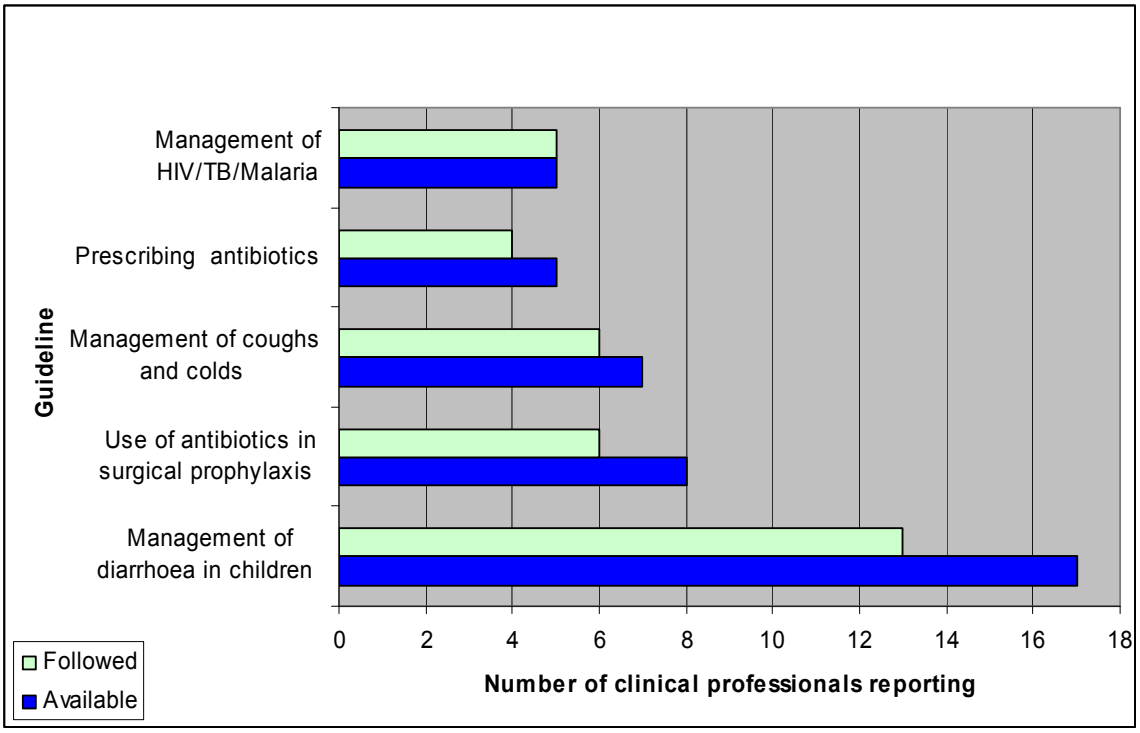
Tools and Education

The availability of general and specific guidelines was investigated as were opinions on whether locally developed treatment guidelines would be more useful than national guidelines. Notably less than half of the clinicians (42.9%) felt that locally developed treatment guidelines would be more useful than national guidelines. The clinicians also gave their opinion on the effectiveness of guidelines and other tools available within the hospital to improve compliance with optimal antibiotic prescribing. Results are given in the table below (20). The specific medicine use guidelines available to the clinicians are given in figure 4.

Table 20. Methods used by the hospitals to improve compliance with optimal antibiotic prescribing

Method	Number using method	Effectiveness of method				
		not effective<----------->highly effective				
		1	**2**	**3**	**4**	**5**
Clinician education	17	0	1	3	7	6
National or local treatment guidelines	13	0	1	1	6	5
Patient education	12	0	1	4	5	1
Antimicrobial or disease specific guidelines	11	0	1	0	6	4
Algorithms/ flowcharts	9	0	0	0	2	7

Figure 4. Medicine use guidelines available to clinicians



Medicines and Therapeutic Committees

Out of 22 hospitals, 14 (63.6%) reported having a functional medicines and therapeutics committee. Whereas almost all government hospitals (5 of 6) reported having a medicines and therapeutics committee, they were less common in the private and the faith based sector (Table 21). An attempt was made to verify the reported functionality by asking additional questions on the date of establishment, the frequency of meeting, the role of the pharmacy in the committee and the date of the last meeting. The verification questions showed that only slightly fewer committees might be functional than reported. Twelve (85%) had met at least once in the four months preceding the study and only in one case did a respondent indicate that the committee was currently not meeting.

The majority of the committees were reported to meet at least quarterly and the role the pharmacy played on the committee could be articulated by all 14 respondents. The most common role for the pharmacy was to act as secretary to the committee (50%).

Table 21. Existence of functional medicines and therapeutics committees in the hospitals

	Government		FBO		Private	
Functional medicines and therapeutics committee in place	5	83.3%	4	57.4%	5	55.6%

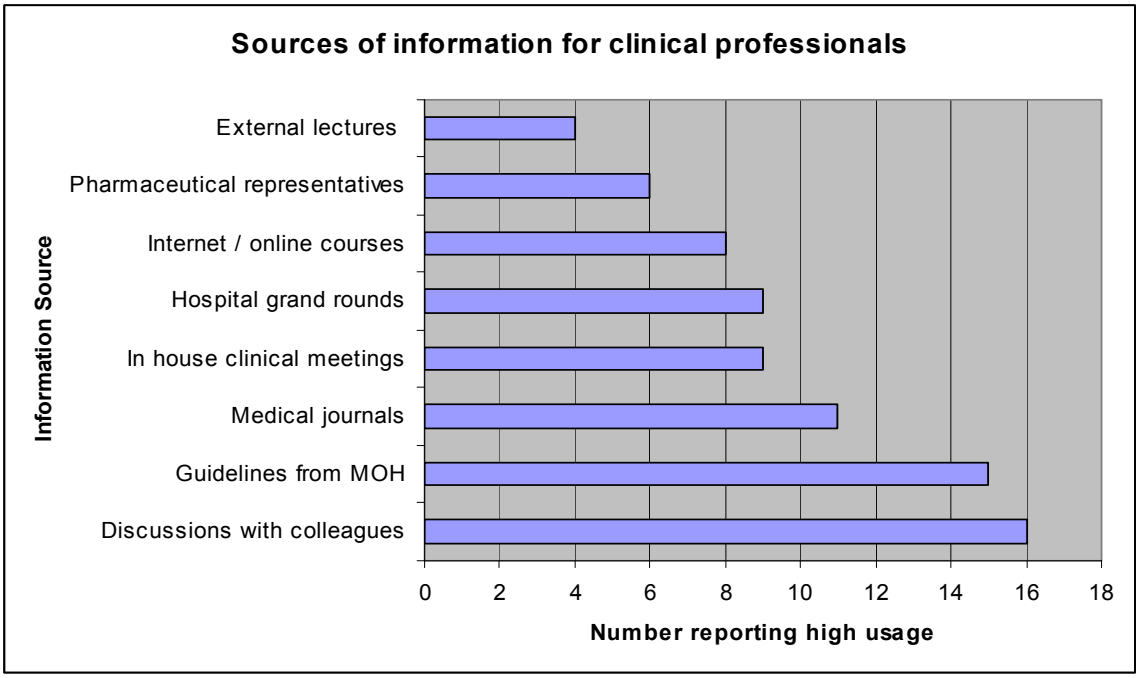
The recommendations made for establishing or strengthening MTCs in the hospitals surveyed could be grouped under the following broad areas

- *Creating awareness of the need for the MTC / Getting all relevant stakeholders to understand the importance of the committee* ***(6 mentions)***
- *Improving the multi-disciplinarity of the committee and having the committee roles clarified* ***(3 mentions)***
- *Getting the hospital management to provide financial and / or material support for the committee*
- *Ensuring that the decisions of the MTC are implemented* ***(2 mentions)***
- *Obtaining greater commitment from the members and / or the Chair as well as stabilizing the committee membership* ***(2 mentions)***

Information Sources

Figure 5 shows the level usage of various information sources by clinicians. The number of clinicians who reported that they use a certain information source *frequently (a scale of 1-5 where 1 is not used and 5 is used a lot was applied, scores of 4 and 5 were considered high/frequent use)* is plotted against each information source. The sources that were used a lot by the majority of clinicians were discussions with colleagues and guidelines from the Ministry of Health.

Figure 5: Information sources used frequently by clinicians for learning and continuing education about antibiotics



Practices promoting AMR containment

While the clinicians and pharmacy staff were confident that effective infection control measures were in place in their hospitals, they were less confident about prescribers concern for AMR as they prescribe antibiotics.

	Clinicians (n = 22)			Pharmacy (n=21 or 22)		
	Mean	Frequency	Percent	Mean	Frequency	Percent
Effective infection control measures are in place in the hospital	4.00	15	68.2%	3.95	13	61.9%
Prescribers are concerned about antibiotic resistance in the hospital when they prescribe antibiotics	3.23	10	45.5%	3.54	8	36.4%

DISCUSSION/RECOMMENDATIONS

1. The knowledge, attitudes, and perceptions of the professionals interviewed in this study indicate an **awareness** of the seriousness of AMR as a national level problem but far less as a problem at the facility level. The fact that, save for the clinicians, the other health professionals did not consider AMR a problem in their hospitals is rather worrying. This means that these professionals are unlikely to take initiative to curb the development of resistance. They may even fail to support interventions proposed by others to address the problem. As such, more effort needs to be put in including AMR in both pre- and in-service training and supporting sensitization efforts. It is also critical that microbiology services are strengthened and systems put in place to produce surveillance reports to provide information to the prescribers and hospital managers as proposed by WHO's global strategy[3]. Furthermore, information about cases of AMR in the hospital should be disseminated to all staff to ensure everybody is aware of the problem. The clinical professionals appear to be more aware of the need for action to address AMR and they could be targeted and used as change agents within their hospitals.
2. Training interventions and campaigns specifically on AMR containment and rational use of antibiotics both at hospital and national level appear to be very limited. This would probably reinforce the general perception of this study group that AMR is not such a major problem within their hospitals. Any **educational interventions** therefore must be designed in such a way that they reach individual prescribers and other professionals at hospital level. Awareness campaigns and education have proved effective in some parts of the world in improving antibiotic use[4,5]. All cadres of health professionals as well as administrative staff have a role to play in ensuring that antimicrobial resistance is contained and that useful medicines are preserved for as long as possible. As such, education programs should not exclude any cadre of health professionals and include relevant administrative staff. This is an area that could be highlighted for support from Government and development partners. The paucity of these kinds of interventions also provides a basis for organizations such as EPN to continue to mobilize resources to support education interventions on rational use of medicine and AMR containment campaigns. A related intervention for such organizations could be to use their work on pharmaceutical management support as an entry point to promote inter professional collaboration at hospital level aimed at promoting a common understanding on the extent to which resistance is a problem and how antibiotic use controls can help to address the problem and reduce costs to the patients and the hospital.
3. The findings of the survey on infection control practices possibly warrant **deeper investigation**. The perceptions of the staff interviewed would imply that adequate systems are in place however the absence of say mechanisms to monitor hand hygiene raise questions either about the general understanding of infection control or the reliability of the responses in this regard. Unfortunately the questions asked in the survey did not provide much opportunity for an in depth exploration of the issues. The fact that infection control in Kenya is largely the preserve of nurses who were not included in this study may also be a confounding factor. Infection Control is an important strategy for controlling resistance[3,6]. If the health professionals in a facility are under the impression that systems are working well, they will have no incentive to take action especially on recommendations made by parties external to the hospital. As such, it will be important to do some validation studies for the hospitals in this study to provide a better understanding of the responses that were obtained and to determine how the practices compare with the perceptions. This kind of information would be invaluable to inform any advocacy strategies that may be undertaken at facility and national level. In addition a more comprehensive picture on the infection control situation will need to include the opinions of infection control nurses or members of the infection control committees and seek to establish what practices are being implemented to control infections.
4. Among the key interventions recommended by the World Health Organization to improve use of medicines are the use of clinical guidelines and the establishment of hospital **medicines and therapeutic committees (MTCs)**[3]. Kenya national guidelines for appropriate medicine use[7] have adopted these recommendations and identify medicines and therapeutic committees as a mechanism to reduce misuse of antibiotics. In spite of this policy recommendation to have medicines and therapeutics committees in all hospitals the study points to the fact that private and faith based hospitals have not been as enthusiastic as Government hospitals in setting these up. There is an urgent need for concerted efforts to support the set-up and proper running of medicines and therapeutics committees in the hospitals because they are the most logical structure to push

for improvements in antibiotic use practices through prescribers' education, rational selection and enforcement of treatment guidelines. Some targeted initiatives to support the set-up of MTCs in private and faith based hospitals may be required. For hospitals where MTCs exist, further insights on functionality could be obtained by determining what issues the committees address and what kinds of decisions they make. Such information could be obtained relatively easily by reviewing minutes of meetings and other documents of the committees. More complex studies on the impact of MTCs on antibiotic use practices in Kenya could be undertaken through controlled studies comparing practices in hospitals where they are deemed to be functional with those where there are no committees.

5. Changing prescribing habits and reducing the use of antibiotics is not easy[2, 6]. Possibly for resource limited settings a combination of education and stringent regulation within care facilities is needed. A few hospitals have been able to put in place some **controls on the use of antibiotics**. While the study did not investigate the level of compliance with such controls, it is a significant first step that these controls are in place. There may be need for further investigation of the hospitals where such controls exist and lessons drawn which can be promoted to other hospitals. Simple measures like getting the hospitals to write up their experiences with antibiotic controls for publication in the journals of the umbrella health associations would be inexpensive and relatively easy to implement. The similarities in perceptions across these two diverse regions of the country suggest that interventions and approaches could be replicated in different areas.
6. The findings from the study suggest that if **guidelines** are available and accessible they are used and clinicians generally considered them effective in improving prescribing practices *(p 19)*. The launch of the revised treatment guidelines for all levels of care in Kenya in June 2010, presents an opportunity for the campaign to curb development of resistance. The dissemination strategy for the guidelines could include messages on their role as an intervention to contain the development of resistance. The economic and patient care benefits that could accrue to the country from preserving antibiotics could also be highlighted in support of the call for high levels of compliance.
7. The absence of striking differences across the perceptions and practices in Nairobi compared with Nyanza suggest that **national AMR containment strategies** can be adopted and rolled out to all hospitals in the same way and best practices can be promoted across the rural/urban divide. The small numbers of hospitals in each of the three ownership categories made it difficult to determine whether differences of ownership resulted in significantly different practices and perceptions. A larger study involving more hospitals would be required if information on practices based on hospital ownership is required.
8. Prescribers reported that results from cultures had an important influence on choice of antibiotic but at the same time it appears that the laboratories are not used as much as they could be. Strengthening of **laboratory services** and defining policies both at national and hospital level on how and when laboratories should be used could make a difference to clinical practice and as such to resistance containment efforts.

EPN Study Team

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