

Knowledge, Attitude and Practice of Health Care Professionals towards Antimicrobial Resistance and its Stewardship at Tertiary Care Teaching Hospital

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ABSTRACT



Background: Irrational antibiotic use leads to resistance, a serious problem which is increasing tremendously and requires urgent response. The goal of this study is to evaluate knowledge, attitude, and practice of health care professionals (HCPs) regarding antimicrobial resistance (AMR) and its stewardship.

Methods: This questionnaire based prospective cross-sectional study was conducted in 216 HCPs of Universal College of Medical Sciences (UCMS). Chi-square analysis was used to see the association of knowledge, attitude, and practice (KAP) with other demographic variables. Pearson correlation was done to analyze the correlation between knowledge and attitude, knowledge and practice, and attitude and practice.

Results: Among all participants, 33% had good knowledge, majority of them (78.2%) had positive attitude and 43.5% had good practice related to antimicrobial resistance and its stewardship. There was no significant correlation between knowledge and practice, as well as between practice and attitude. However, a weak positive correlation was found between knowledge and attitude ($r=0.186$; $p=0.006$).

Conclusion: The majority of health care professionals showed a positive attitude towards antibiotic resistance and its stewardship. However, in spite of positive attitude of HCPs, the level of knowledge and practice were found to be poor.

Keywords: Antimicrobial agents, Antimicrobial resistance, Health Care Professionals, Stewardship.

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INTRODUCTION

Antimicrobial agents are among the most commonly used medications as well as misused ones.¹ Their indiscriminate and irrational use has resulted in bacterial resistance, treatment failure, and higher cost.² The leading causes of AMR are over-prescription, unnecessary prescription, incomplete treatment, and inappropriate self-medication.³ About one in six deaths are due to infectious diseases worldwide, with only a handful of new antimicrobials in the developmental pipeline.^{4,5}

Awareness, attitude, and experience of HCPs are important and have a major effect on potential issues related to antibiotics.² Antimicrobial stewardship is optimal selection of dosage and duration of antimicrobial treatment resulting in best clinical outcomes and preventing microbial infection with minimal toxicity and minimal impact on resistance in a cost effective manner.^{6,7} Still there is no established national infection control and antibiotic stewardship guidelines in Nepal. Many hospitals have formed a manual committee to monitor infections to reduce hospital-acquired antimicrobial resistance.⁸

The aim of this study is to evaluate KAP of healthcare professionals towards antimicrobial resistance and its stewardship. This may help to formulate antibiotic policy at health care center and reduce the cost without reducing the quality of health service.

MATERIALS AND METHODS

A questionnaire-based prospective cross-sectional study was conducted among 216 health care professionals (HCPs) of Universal College of Medical Sciences and Teaching

Hospital (UCMS-TH). This study was conducted from September 2017 to February 2018 after the approval of Institutional Review Committee (Regd. No UCMS/IRC/087/17). The study participants included consultant doctors across various disciplines, postgraduates, medical officers, nurses, interns, pharmacists, and microbiologists. A printed consent form was distributed along with the questionnaire.

A self-assessed questionnaire was developed to evaluate the Knowledge, Attitude, and Practice of AMR among HCPs based on previously published studies.^{2,6,8-12} The questionnaires were then extensively reviewed, revised, modified, and customized to our setting, maintaining their simplicity and relevance. Subject experts were then consulted for the validity of the questions, and necessary modifications were made accordingly.

The questionnaires were categorized into four major sections. The first category included the participants' demographic details. The second part of the questionnaire dealt with the evaluation of knowledge regarding AMR and comprised of ten important questions, with sub-categories when necessary. The majority of the questions had binary responses possible (Yes/No and True/False). Some of them had multiple responses allowed and were indicated as such. The third category assessed the attitude of HCPs with ten questionnaires. A 3 point Likert scale was used, with responses ranging from 'agree,' 'disagree,' and 'no opinion,' along with few multiple response questions. The fourth category of questionnaire dealt with the evaluation of the practice of antibiotic prescriptions by the HCPs

and comprised ten questions. The response was answered 'yes' or 'no.'

Completed responses were collected and entered on Microsoft Excel and analyzed using the statistical package for social sciences (SPSS vs. 20). Descriptive data were expressed and tabulated as frequency and percentages. Chi-square analysis was used to see the association of knowledge, attitude, and practice with other demographic variables. Pearson correlation was done to analyze the correlation between knowledge and attitude, knowledge and practice, and attitude and practice.

RESULTS

Out of total 216 study participants, 109 (50.5%) were male and 107 (49.5%) were female. The majority of the participants, 162 (75%) belonged to the age group 20-30 years, and more than half 118 (54.6%) participants were doctors by profession (Table 1). The majority of HCPs (92.1%) agreed that

inappropriate use of antibiotics, can lead to resistance. Most HCPs (92.6%) were well acquainted with the fact that incorrect use of antibiotics can lead to ineffective treatment. They also agreed that injudicious use of antibiotics could lead to prolongation of illness (79.6%), an increase in adverse effects (81.5%), and additional burden to medical cost to the patients (90.7%) (Figure 1)

Table 1: Socio-demographic characteristics of study participants

Characteristics	Category	Frequency (%)
Gender	Male	109 (50.5%)
	Female	107 (49.5%)
Age	20-30	162 (75%)
	31-40	51 (23.6%)
	>40	3 (1.4%)
Profession	Doctors	118 (54.6%)
	Pharmacist	11 (5.1%)
	Intern	30 (13.9%)
	M.Sc	3 (1.4%)
Experience (yrs)	Nursing	54 (25%)
	1-10	208 (96.3%)
	11-20	6 (2.8%)
	21-30	2 (0.9%)

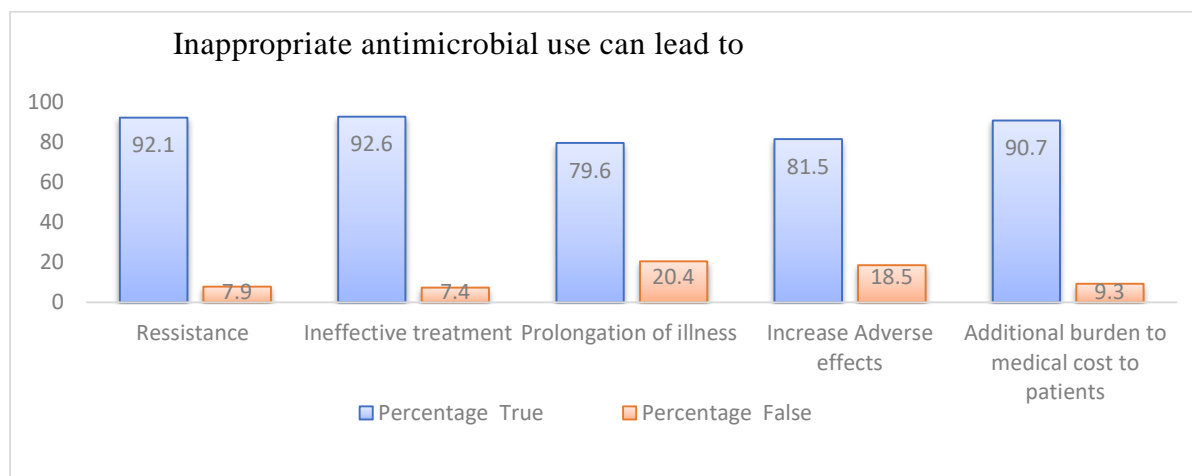


Figure 1: Knowledge of health care professionals about antibiotic resistance

When asked for their sources of information about antimicrobials, we found that 25% followed their university course, 17% followed WHO guidelines while 83% of the participants

followed the source like internet, pharmaceutical company, national antibiotic guideline. In next question we found that, 47.1% were familiar, 3.2% were not familiar at

all, and 19.4% were very familiar with the terms like antimicrobial resistance, antimicrobial stewardship, and antibiogram.

Most of the participants (89.8%) agreed that AMR was an important and serious health issue across the World. Only 38.7% of HCPs mentioned that overuse of antibiotics was the primary factor for antimicrobial resistance. Majority of HCPs (71.8%) agreed that antimicrobial stewardship was effective for improving patient outcomes, reducing resistance, and healthcare cost. More than half of HCPs were aware of the advantage of having an antibiotic policy in the hospital, and 69.9% were confident in prescribing antibiotics to the patients. Most of the HCPs (92.6%) thought that higher antibiotics should be reserved and used only after authorization from consultant.

Most HCPs agreed that antimicrobials were overused in hospitals, and 70% of the participants thought that proper use of antimicrobials could prevent resistance, and 65.3% agreed that frequent use of broad-spectrum antibiotics promotes resistance. More than half (59.3%) of HCPs believed that continued development of new antimicrobials can compensate current antibiotic resistance. More than half (52.8%) agreed that there should be a restriction of antibiotics for controlled use. The majority of HCPs (86.6%) agreed that patients should be advised about the complying with the antibiotic treatment. The majority of (95.8%) HCPs thought that strong knowledge of antibiotics in health career was necessary. Among the HCP, 71.8% agreed that the antimicrobial stewardship education had a significant role for HCPs, and 84.3% agreed that education of nurse and

pharmacist had important role in antimicrobial stewardship. They also believed that the management of antimicrobial resistance at the hospital was everyone's responsibility (78.2%).

For the selection of antibiotics, 38% of HCPs had a practice of selecting antimicrobials based on microbiology lab reports and only 18.5% selected based on the patient's condition. Only 4.6% of HCPs were used to prescribe broad-spectrum antimicrobials and 28.2% follow the guideline for selection of antimicrobials. The majority of HCPs (77.3%) used to consult a senior physician before prescribing higher antibiotics, and 39.4% had the practice of sending the sample for culture and sensitivity test before starting antibiotics. Approximately 86.6% of HCPs were confident, and 13.4% were not confident about choosing the appropriate dose of antibiotics. 79.2% of HCPs gave emphasis on patient education on the proper use of antibiotics. The majority of HCPs (88%) were unaware of the antimicrobial stewardship program in the hospital.

The HCPs thought that the barrier to implement the stewardship program in the hospital was due to lack of information (39.8%), opposition from prescriber (3.7%), administration not aware of the AMS program (33.3%) and lack of personal funding and others (14.4%). Around 68.5% of HCP had not been to any training or awareness program related to antimicrobial use and its management. The majority of (94.4%) of HCPs thought the AMS program should be conducted in hospitals, and 96.8% thought that there was need of further training regarding antimicrobial use. In total 33.3% of the participants had good knowledge on antimicrobial resistance and its stewardship.

Good practice was observed in 43.5% and a positive attitude was observed in 78.2% of the participants. (Table 2). No significant association of knowledge and practice towards other variables (gender, age, profession, year of experience) was observed (Table 3 and 5). However, a significant relation ($p=0.002$) was seen with the attitude and profession of HCPs (Table 4)

Table 2: KAP of healthcare professionals towards antimicrobial resistance and its stewardship

Variables	Category	Frequency (%)
Knowledge	Good	72 (33.3 %)
	Poor	144 (66.7%)
Attitude	Positive	169 (78.2%)
	Negative	47 (21.8%)
Practice	Good	94 (43.5%)
	Poor	122 (56.5%)

Table 3: Comparison of knowledge with age, gender, profession and year of experience

Characteristics	Category	Knowledge		Chi-square value	P. value
		Poor	Good		
Gender	Male	69 (64.5%)	38 (35.5%)	0.454	0.501
	Female	75 (68.8%)	34 (31.2%)		
Age	20-30	113 (69.8%)	49 (30.2%)	2.900	0.235
	31-40	29 (56.9%)	22 (43.1%)		
	>40	2 (66.7%)	1 (33.3%)		
Profession	Doctors	82 (69.5%)	36 (30.5%)	3.334	0.504
	Pharmacist	6 (54.5%)	5 (45.5%)		
	Intern	18 (60%)	12 (40%)		
	M.Sc	1 (33.3%)	2 (66.7%)		
	Nursing	37 (68.5%)	17 (31.5%)		
Year of experience	1-10	138 (66.3%)	70 (33.7%)	1.01	0.604
	11-20	4 (66.7%)	2 (33.3%)		
	21-30	2 (100%)	0		

Table 4: Comparison of attitude with age, gender, profession and year of experience

Characteristics	Category	Attitude		Chi-square value	P. value
		Poor	Good		
Gender	Male	19 (17.8%)	88 (82.2%)	1.995	0.158
	Female	28 (25.7%)	81 (74.3%)		
Age	20-30	41 (25.3%)	121 (74.7%)	5.026	0.081
	31-40	6 (11.8%)	45 (88.2%)		
	>40	0	3 (100%)		
Profession	Doctors	20 (16.9%)	98 (83.1%)	17.382	0.002
	Pharmacist	0	11 (100%)		
	Intern	5 (16.7%)	25 (83.3%)		
	M.Sc	0	3 (100%)		
	Nursing	22 (40.7%)	32 (59.3%)		
Year of experience	1-10	47 (22.6%)	161 (77.4%)	1.01	0.604
	11-20	0	6 (100%)		
	21-30	0	2 (100%)		

Table 5: Comparison of practice with age, gender, profession and year of experience

Category	Practice	Practice		Chi-square value	P. value
		Poor	Good		
Gender	Male	62 (57.9%)	45 (42.1%)	0.184	0.668
	Female	60 (55%)	49 (45%)		
Age	20-30	89 (54.9%)	73 (45.1%)	0.668	0.716
	31-40	31 (60.8%)	20 (39.2%)		
	>40	2 (66.7%)	1 (33.3%)		
Profession	Doctors	64 (54.2%)	54 (45.8%)	4.986	0.289
	Pharmacist	7 (63.6%)	4 (36.4%)		
	Intern	22 (73.3%)	8 (26.7%)		
	M.Sc	2 (66.7%)	1 (33.3%)		
	Nursing	27 (50%)	27 (50%)		
Year of experience	1-10	117 (56.2%)	91 (43.8%)	1.648	0.439
	11-20	3 (50%)	3 (50%)		
	21-30	2 (100%)	0		

Table 6: Correlation between knowledge, attitude, and practice

Characteristics		Knowledge	Attitude	Practice
Knowledge	r	1	0.186	0.058
	p-value	-	0.006	0.397
Attitude	r	0.186	1	0.067
	p-value	0.006	-	0.330
Practice	r	0.058	0.067	1
	p-value	0.397	0.330	-

No significant correlation between knowledge and practice, as well as between practice and attitude, was observed. However, a weak positive correlation was found between knowledge and attitude ($r=0.186$; $p=0.006$) (Table 6).

DISCUSSION

The study was conducted to evaluate the knowledge, attitude, and practice of HCPs towards antibiotic resistance and its stewardship at tertiary care hospitals. The result showed that HCPs have positive attitude towards antimicrobial resistance and its stewardship. Despite the positive attitude of HCPs towards antimicrobial resistance and its

stewardship, they have poor knowledge and practice in hospitals.

In this present study, most of the HCPs are males and of age group 20-30 years. The majority of them have the experience of 1-10 years. This result is similar to the findings Tegagn et al⁶. Most of the HCPs were not familiar with the term antimicrobial resistance, antimicrobial stewardship, and antibiogram. This indicates the lack of stewardship programs for HCPs in hospitals. We observed that the most common source of information about antimicrobials was university course which is similar to the study conducted by Yang K et al and Kulkarni P et al.^{13,14} This result

is inconsistent with the study done by Sarraf et al.¹⁵ in which the sources of information were formal lectures (65.3%), continuing medical education (49.5%), and medical journals (44.5%). In the present study, the majority of HCP were aware of antimicrobial resistance as a serious public health issue, which is comparable with the study done by Abera et al. and Chandan et al.^{2,16}

According to present study, the factors contributing to the development of antimicrobial resistance were: widespread or misuse of antibiotics, bacterial mutations, poor hand-washing practices in hospitals, poor infection control, and poor patient adherence. Similar results were found in the study conducted by Pulcini et al. and Kheder et al.^{9,17} Majority of HCPs in the present study thought that, strict antibiotic policy in the hospital for their appropriate use can decrease the case of resistance. More than two third of the participants were confident about prescribing and using antimicrobial agents. In similar study Thriemer et al.¹⁸ found a higher level of confidence (88.6%) in prescribing and the use of antimicrobial agents whereas Srinivasan et al.¹¹ found only 21% of participants confident in prescribing antimicrobial agents.

More than two third of the participants agreed that appropriate use of antimicrobials can prevent resistance whereas in similar study by Tegagn et al.⁶ only 39.3% agreed with the same. More than half of the participants believed, continued development of new antimicrobial can cope with the current antibiotic resistance, which is quite similar to the findings of various other studies.^{6,19} Most of the participants thought that there should be good knowledge in HCPs regarding

antibiotics use, and they also thought that nurses and pharmacists can play vital role in antimicrobial stewardship. This shows a positive attitude in HCPs regarding handling of antimicrobials to prevent resistance. About 86.6% of participants agreed that while dispensing antibiotics, patients should be advised about complying with the treatment given. This shows that there should be proper knowledge in HCPs about rational prescription and patient education during dispensing medicines. In the present study, most of the participants (78.2%) believed that the management of antimicrobial resistance at the hospital is the common responsibility of all the HCPs, which shows the awareness of HCPs towards AMR. Still, various awareness programs should be conducted for HCPs, as well as for patients, to decrease antibiotic misuse and prevent the resistance from antibiotics.

While inquiring about the practice, we observed that 86.6% were sure about prescribing the appropriate dose of antibiotics, and only 13.4% were not sure about it. This shows that most of HCPs are confident in choosing an appropriate dose of antibiotics which conveys a good knowledge and practice in this regard. This study is similar to the one conducted by Singh M et al.¹⁰ and was not consistent with the study conducted by Srinivasan et al.¹¹ Our study found that 77.3% of HCP consult a senior physician before prescribing higher antibiotics which again shows a good practice and rational use of antibiotics. Only 39.4% had practice of sending samples for culture and sensitivity test before starting antibiotics, this may be due to empirical selection of antibiotics for critical conditions of the patients.

The majority of HCPs were unaware of an antimicrobial stewardship program in hospitals, and more than two third have not done any training related to antimicrobial use and its management. Majority of HCPs thought that antimicrobial stewardship should be conducted in hospitals and further training regarding antimicrobial use is required. This shows that the proper training and awareness programs for HCPs is very crucial to reduce the chances of antimicrobial resistance.

There are some limitations in the study. This study is based on convenience sampling. Selection bias may exist in the result due to the voluntary nature of this study. The sample size was also limited. Thus, the result may not be generalized to all HCPs working in different hospital settings.

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CONCLUSION

The majority of HCPs showed a positive attitude towards rational use of antibiotics. However, there was poor knowledge and practice. Thus, this study concludes that there is a need for training, awareness programs, and antibiotic policy implementation in hospitals. This will help to improve the quality of prescription, reduce misuse of antibiotics and its resistance.

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