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Knowledge, attitude, and perceived barrier of pharmacy professionals in antimicrobial stewardship in central hospitals of Kathmandu, Nepal

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Abstract:

Introduction: Antimicrobial stewardship (AMS) has been defined as "the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance. Antimicrobial resistance (AMR) is an extremely complicated global health challenge. Our responsibility in human health care becomes even more important as the development and discovery of newer antimicrobial agents (AMA) and newer classes of AMA is rapidly depleting, despite the reality that their use and abuse are on the emergence all over the world.

Objectives: To evaluate the knowledge, attitudes and perceived barrier of pharmacy professionals in antimicrobial stewardship in the central hospitals of Kathmandu.

Methodology: A descriptive cross-sectional study was conducted in 151 pharmacy professionals working in the allopathic hospital. All the central level hospital pharmacies were included in the study. A validate questionnaire were used to estimate knowledge, attitudes and perceived barrier of pharmacy professionals. Data were entered in excel and transferred in SPSS for analysis.

Results: A total of 151 questionnaires were distributed, and all the questionnaires were retrieved producing 100% response rate among which 61.6 %(93) males and 38.4 %(58) females participated in this study. The participants respond that they had 60%.9(92) DTC, 32.5 %(49) AMS and 47.7 %(72) antimicrobial formulary in their hospital. Most of the responders 95.4 %(144) heard about the antimicrobial stewardship. 68.9 %(104) responded that they were able to identify situations where antibiotics treatment is not necessary and suggesting cessation. Very few 43.0(65) responded they have sharp knowledge about ADR. 43.7(66) of pharmacists strongly agreed and 55.6(84) agreed that the Antimicrobial stewardship is important to review the appropriateness of antibiotic prescriptions, so patients received the best possible treatment for Diseases. 67.5(102) strongly agreed that AMS program helps to reduce the spreading of antimicrobial resistance. Most respondents believed that AMS program reduces the antimicrobial resistance and improve patient output. Almost all participants agreed to incorporate AMS in the hospital. Majority agree 50.3(76) that communication between pharmacist and doctors making it difficult to practice AMS. More than 50% of responds that pharmacist's advice related to antibiotics is not well received by the doctors. Many of participants strongly agreed 51.0(77) that there is lack of support from the hospital administration about AMS activities.

Conclusion: On the basis of information collected, the study has come with the conclusion that for the good practice of antimicrobial stewardship in the hospitals firstly, AMS program needed to be incorporated in the hospitals which reduces the abuse of antibiotics, as well as to lower antimicrobial resistance and enhance patient outcomes. The main obstacles for the

pharmacy professionals throughout the study were lack of AMS training, lack of knowledge in ADR, a hospital administrator's lack of support from hospital administrators, lack of effective communication between the pharmacist and doctors in the hospitals, and patient neglect during counseling.

INTRODUCTION

Antimicrobial stewardship(AMS) has been defined as "the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance.(Gerding, 2001). Antimicrobial drugs should only be used when absolutely essential to prevent AMR, which is an undeniable global medical issue(Wickens et al., 2013).The goal of antimicrobial stewardship programs is to improve the results for each patient while limiting unintended consequences,such as the development of resistance organisms and unfavorable effects on the patient(Dellitetal.,2007).In order to encourage logical and researchbased prescribing, su ch programs frequently include evidencebased recommendations, training materials, and regular feedback on antibiotic usage to p rescribers.Antimicrobial stewardship is being led by pharmacists all over the world, with interdisciplinary working methods being detailed in nations likeUSA, Australia, France, Ireland, and, to a lesser extent, other European nations. Every year, AMR causes 700,000 to several million deaths worldwide(Neill, 2016).2 million individuals in the US alone get infections that are resistant to antibiotics, and 23,000 people pass away every year (Control & Prevention, 2011).

Antimicrobial resistance (AMR) is an extremely complicated global health challenge. Our responsibility in human health care becomes even more important as the development and discovery of newer antimicrobial agents (AMA) and newer classes of AMA is rapidly depleting, despite the reality that their use and abuse are on the emergence all over the world.(Organization, 2014a) Antimicrobial stewardship programs (ASP) are designed to improve individual patient outcomes while minimizing unintended consequences such as the development of resistant organisms and unwanted side effects. Antibiotic use which is not selective, insufficient, or improper is the major cause of antimicrobial resistance (AMR) all around world(Laxminarayan et al., 2013).Antimicrobial resistance is on the rise, and there aren't enough new antibiotics to treat drug-resistant infectious diseases. This poses a major threat to global health security(S. J. Howard, Catchpole, Watson, & Davies, 2013).

Antimicrobial stewardship involves the multifaceted approach aimed at achieving its goals of combating the emergence of resistance, improving clinical outcomes, and controlling costs by improving antimicrobial use. (administration, 2018; Fishman, 2006; You, 2015) The discovery of potent antimicrobial agents was one of the greatest contributions to medicine in the 20th century. When introduced, they had an immediate and dramatic impact on the outcomes of infectious diseases, making once-lethal infections readily curable .(File, Srinivasan, & Bartlett, 2014) Antibiotics provides the outstanding cure against disease and lengthening the once life. The first antibiotics used is penicillin and this drug saves the lives of millions peoples. Tremendous use of antibiotics results in to antimicrobial resistance (AMR). Over the past ten years, the number of pharmacist-directed antimicrobial stewardship programs (ASPs) has expanded.(Drew, 2009). Additionally, it has been noted that each nation's inadequate regulatory framework may contribute to a rise in the use of over-the-counter antibiotics(Chokshi, Sifri, Cennimo, & Horng, 2019). The World Health Organization (WHO) has stressed the need of providing medical students with appropriate and effective training in the prudent prescription of antibiotics(Mendelson, Balasegaram, Jinks, Pulcini, & Sharland, 2017). Future medical professionals must thus be well trained to handle the difficulties of antibiotic usage in routine clinical practice (Abbo et al.,

2013).Indepth understanding of infectious disorders, their diagnosis, the use of antibiotics, and the processesof pathogen resistanc e are all included in today's medical school(Mendelson et al., 2017).

Antimicrobial stewardship programs (ASP) aim to optimize individual patient outcomes whilst minimizing unintended consequences, such as the generation of resistant organisms and unwanted effects in the individual patient(Dellit et al., 2007; Organization, 2014c). Antimicrobial Stewardship (AMS), which aims to utilize antibiotics rationally in terms of dosage, length of therapy,and method of administration (Doron&Davidson,2011).

The primary causes of AMR development are the improper usage and over use of antibiotics (Pruden,Arabi,&Storteboom,2012). These practices include the incorrect use of antibacterial agents in household products, the irrational use of antimicrobials in huma ns and animals, and improper handling, storage, and disposal of antimicrobials(Uchil,Kohli,KateKhaye,&Swami,2014).In particul

ar in nations with limited resources and treatment options, the decreasing number of innovative antibiotics places lives at risk by i ncreasing the likelihood of fatal diseases (Parsonage et al., 2017). The lack of current guidelines and continuing medical education for prescribers, poor regulatory regime, poor surveillance of the usage and resistance of the necessary antimicrobials , and self-medication all contribute to this issue's severity(Parsonageetal.,2017).

The Global Action Plan (GAP) on AMR was introduced at the World Health Assembly in 2015 to address these issues, drawing a ttention to the necessity of creating multisectoral national AMR action plans(Organization, 2015). Several nations have started AMS program at the moment, but there are few opportunities to research and explain the procedure for including policy bodies and national stakeholders (Dar et al., 2016). Hospital clinical pharmacy services in England typically involve daily ward visits, a review of the medication record, the giving of specific guidance on medication use, and pharmacist participation in multidisciplinary ward rounds to offer expert opinion on medication management. In spite of the rising antimicrobial resistance, it has been proposed that increased clinical pharmacy activities in the area of anti-infective may aid in optimizing care, enhancing results, encouraging healthy prescribing, minimizing inappropriate use, and possibly slowing the emergence and spread of resistance (Davey et al., 2013; Dellit et al., 2007; Mol et al., 2005; Rhodes, Evans, & Alhazzani, 2013).

The Drugs Act 2035 is the only legislative instrument designed to regulate the use of allopathic drugs in Nepal. The main aims of the Act are to prohibit misuse or abuse of drugs and allied pharmaceutical materials, to prohibit false and misleading information related to the efficacy and use of drugs and to regulate and control production, marketing, distribution, export-import, storage and the use of drugs that are not efficacious, not of standard quality and not safe for use by people(administration, 2018).The American Society of Health-System Pharmacists states that pharmacists have an important role to play in AMS and infection prevention and control programs(Organization, 2014b).

NEED OF THE STUDY.

Increase in antimicrobial resistance coupled with the lack of new antibiotics to treat drug-resistant bacterial infections are major threats to global health security(Organization, 2014b).Available evidence shows that pharmacy professionals play an important role in the development of ASP by revising and writing antimicrobial guidelines, participating on antimicrobial ward rounds, educating healthcare professional about antimicrobials, and monitoring antimicrobial consumption and expenditure.(Wickens et al., 2013) (Wickens & Jacklin, 2006) A study conducted in clinical and economic outcomes of antimicrobial stewardship program concluded that an antimicrobial expenditures ,which had increased by 14.4% annually decline by 9.75% in the first year of the program and remained stable in subsequent years, with total cumulative cost saving estimated at $1.7 million.(Bartlett & Siola, 2014; Nowak, Nelson, Breidenbach, Thompson, & Carson, 2012)

In 21st century chief doctor in the UK wants to put the antimicrobial resistance to the national risk register and be taken seriously. US government describes antimicrobial resistance is one of the serious health threats. In Canada outbreak of superbug frequently make headlines as they kills the patients. All germs have ability to develop the resistance as more antibiotic exposure leads to more antimicrobial resistance.

As in Nepal, the AMR is increasing (Yadav, Pant, Thapa, & Majnhi, 2016). Different studies suggest various reasons for increasing the cases. One of the major reasons for this is self medication. Most of the population takes wide spectrum antibiotics randomly without consulting the medical personnel. Even the doctors or the prescribers suggest antibiotics without bacterial confirmation or susceptibility testing. In the AMR the knowledge, practice and skill of both pharmacists and prescriber plays important role. But in our context there is very few studies have been carried out in this topic. So my study will be focused on Knowledge, attitude, and perceived barrier of pharmacy professionals in antimicrobial stewardship in central hospitals of Kathmandu, Nepal which will help to minimize the microbial resistance which is being most challenging to save the existing drug.

RESEARCH METHODOLOGY

Study design and setting: The study was descriptive cross sectional study, which was followed by questionnaire to collect the information from the pharmacy professionals working in pharmacy of the central hospital of Kathmandu.

Study site: The study was conducted in the central hospitals of Kathmandu and the respondents will be the pharmacy professionals working in the hospital pharmacy.

Study population: The respondents were pharmacy professionals working in the hospital pharmacy of central hospitals.

Study duration: Study was conducted for 6 months.

Sample Size:
Sample size was calculated using Cochrane formula.

$n= \frac{z^2}{e^2}pq$

Where, z=1.96
p= 10%
q=1-p=1-0.1=0.9
e=0.05

$= \frac{.96\times1.96\times0.1\times0.9}{0.05\times0.05}$

=138

10% non-respondents rate =138+13=151

=151

Sampling technique:
The questionnaire was employed to the pharmacy professional working in the hospital pharmacy of central hospitals of Kathmandu.

Selection criteria:
Inclusive criteria: Pharmacy professionals working in the allopathic central hospitals of Kathmandu were considered as inclusion criteria for study.

Exclusive criteria: Ayurvedic, Homeopathic and unani hospitals were excluded for study.
Data collection techniques:
Lists central hospitals in Kathmandu were obtained from the ministry of health and population (https://www.mohp.gov.np/eng/health-institutions/government/central-hospitals). A questionnaire was sent to the pharmacy department in the hospitals with a hardcopy of the Questionnaire and it was delivered by hand.

Data collection tools:
Detailed study of various literatures on similar previous researches was performed to identify potential items for the study instruments such that the questionnaire matches the objectives of the study. Based on the review of studies conducted in different area, research questionnaire had been developed in English language. The questionnaire was furthered finalized consulting the senior clinical pharmacists.
The questionnaire thus prepared had total of 36 questions that were divided in different four categories socio-demographic, Hospital characteristics, knowledge, attitude and barriers of the pharmacy professionals respectively.

Data Analysis:
Data were analyzed in SPSS version 22. Descriptive statistics like frequency and percentage were calculated.

RESULTS AND DISCUSSION

A total of 151 questionnaires were distributed, and all the questionnaires were retrieved producing 100% response rate.

Demographic characteristics of respondents:
A total of 151 questionnaires were distributed among which 61.6 (93) males and 38.4 (58) females participated in this study. The study participants were within the age range 21 to over 47 years. About 104 (68.9) of the participants were Diploma in Pharmacy holders, and 37(24.5) were bachelor of pharmacy while a few 10(6.6), were masters degree holders. The respondents had experience of maximum 18 years and least 1 year.

Table.1.Demographic Questions:

Characteristics	Category	n (%)
Gender	Male	61.6 (93)
	Female	38.4(58)
Education	D.Pharm	104(68.9)
	B.Pharm	37(24.5)
	M.Pharm	10(6.6)

Hospital characteristics:
Among151 number of the responders, 60.9(92) responded that they were having DTC, 32.5((49) responded having AMS and 47.7(72) were having formulary in their hospital.

Table.2Hospital characteristics:

Characteristics	Category	Frequency(n)	Percentage (%)
DTC	YES	92	60.9
	NO	59	39.1
AMS	YES	49	32.5
	NO	102	67.5
Formulary	YES	72	47.7
	NO	79	52.3

Knowledge of the pharmacy professionals in AMS:
Most of the responders 95.4(144) heard about the antimicrobial steward, 68.9(104) responded that they were able to identify situations where antibiotics treatment is not necessary and suggesting cessation. 68.2(103) responded that they are able to adjust dose and frequency. 64.2(97) responders responds that they were able to participates in patient care round in AMS team .68.9(104) were able to recommend appropriate duration of antibiotics. Very few 43.0(65) responded they have sharp knowledge about ADR and most 81.5(128) were able to identify first and second antibiotics.

Table .3. Knowledge of the pharmacy professionals in the antimicrobial stewardship program:

Characteristics	Category	Frequency(n)	Percentage (%)
Heard about AMS	Yes	144	95.4
	No	7	4.6
Identify situations where antibiotic treatment is not necessary and suggesting cessation	Yes	104	68.9
	No	47	31.1
Dose and frequency adjustment			
	Yes	103	68.2
	No	48	31.8
Patient care rounds as a member of the AMS team	Yes	97	64.2
	No	54	35.8
Recommend appropriate duration of antibiotic treatment	Yes	104	68.9
	No	47	31.1
Identifying first and second antibiotic	Yes	123	81.5
	No	28	18.5

Knowledge about the ADR	Yes	65	43.0
	No	86	57.0

Pharmacy professional's attitude about Antimicrobial Stewardship program (AMS):
Above describes the pharmacist attitude about antimicrobial stewardship program (AMS) 43.7(66) of pharmacists strongly agreed and 55.6(84) agree that the Antimicrobial stewardship is important to review the appropriateness of antibiotic prescriptions, so patients can receive the best possible treatment for Diseases. 67.5(102) and 27.2(41) strongly agree and agree respectively that AMS program will help to reduce the spreading of antimicrobial resistance and very few 2.0(3) strongly disagree.40.4 (61) and 55.6(84) responders strongly agree and agree respectively on the statement that patient and hospital would benefit from AMS. Responders have positive attitude on reducing misuse of antibiotics in hospital by AMS. 56.3(85) of respondents strongly agreed and 41.7(63)) agreed in adequate training should be provided to the pharmacist on antimicrobial use. Most respondents believed that AMS program reduces the antimicrobial resistance and improve patient output (47.7(72) of respondents strongly agreed and 40.4(61) agreed). Majority 54.3(82) and 31.1(47), disagree and strongly disagree with the statement that AMS activities will make no difference. Around 98 % participants have positive attitude on incorporating AMS in the hospital.

Table.4. Pharmacy professionals attitude about Antimicrobial Stewardship program (AMS)

Characteristics	Category	(n)	(%)
Antimicrobial stewardship is important to review the appropriateness of antibiotic prescriptions, so patients can receive the best possible treatment for Diseases	Strongly Agree	66	43.7
	Agree	84	55.6
	Neutral	1	.7
Antimicrobial stewardship is important to reduce the spreading of antimicrobial resistance.	Strongly Agree	102	67.5
	Agree	41	27.2
	Neutral	5	3.3
	Disagree	3	2.0
Patients and hospital would benefit from an ASP	Strongly Agree	61	40.4
	Agree	84	55.6
	Neutral	3	2.0
	Disagree	3	2.0
Antimicrobial stewardship is important to reduce misuse of antibiotics in the hospitals.	Strongly Agree	81	53.6
	Agree	64	42.4
	Neutral	4	2.6
	Disagree	2	1.3
Adequate training should be provided to the pharmacist on antimicrobial use.	Strongly Agree	85	56.3
	Agree	63	41.7
	Neutral	1	.7
	Disagree	2	1.3
Antimicrobial stewardship program reduces the antimicrobial resistance and improve patient outcomes	Strongly Agree	72	47.7
	Agree	61	40.4
	Neutral	7	4.6
	Disagree	10	6.6

	Strongly Disagree	1	.7
AMS activities will make no difference.	Strongly Agree	6	4.0
	Agree	11	7.3
	Neutral	5	3.3
	Disagree	82	54.3
	Strongly Disagree	47	31.1
AMS program should be incorporate at the hospital.	Strongly Agree	70	46.4
	Agree	77	51.0
	Neutral	4	2.6

Perceived barriers to participate in AMS activities:

44.4(67) disagreed and 35.1 agreed that their knowledge on antimicrobials (indication, dose and adverse effects) is limited. Most of the respondents 61.6(93) disagree that they don't feel confident in participating AMS activities.68.9(104) respondents strongly disagree with that statement that they are unable to identify first and second antibiotics of choice for the common inspection(such as pneumonia,UTI ,skin and soft tissue infections etc.). 47.7(72) and 19.2(29) , agreed and strongly agreed respectively that they are not welcomed by the physician to Participate in AMS. Majority of responders 57.0(86) disagree that they do don't have enough time to participate in AMS activity. Many of participants strongly agreed 51.0(77) that there is lack of support from the hospital administration about AMS activities.52.3 (79) disagree that the prescribers in the hospital don't care about antibiotic prescribing or restriction policy. 11.3(17), 25.8(39), 54.3(82) participants strongly agree, agree and disagree respectively that they have no right in restricting the access of antimicrobials to patients when a doctor has prescribed them. Most of the responders disagree 55.6(84) and strongly disagree 11.9(18) that they have no access to reliable drug and clinical information about antimicrobials. Responders have almost equal thought about lack of number of pharmacist in the hospitals make impractical to participate in AMS. Majority agree 50.3(76) and strongly agree 29.8(45) with the statement that lack of efficient communication between pharmacist and doctors making it difficult to practice AMS. More than 50% of responders admit that pharmacist's advice related to antibiotics is not well received by the doctors. 29.8(45) strongly agree, 28.5(43) agree and 33.8(51) disagree that patient doesn't want to receive medication counseling during dispensing.

Table.5. Perceived barriers to participate in AMS activities:

Characteristics	Category	(n)	(%)
My knowledge on antimicrobials (indications, dose, adverse effects, etc.) is limited	Strongly Agree	10	6.6
	Agree	53	35.1
	Neutral	18	11.9
	Disagree	67	44.4
	Strongly Disagree	3	2.0
I do not feel confident in participating in AMS activities	Strongly Agree	6	4.0
	Agree	35	23.2
	Neutral	9	6.0
	Disagree	93	61.6
	Strongly Disagree	8	5.3
Not able to Identifying first and second antibiotic of choice for the treatment of common infections (such as Pneumonia, Urinary Tract Infections, Skin and Soft tissue	Strongly Agree	6	4.0

infections etc.)	Agree	29	19.2
	Neutral	4	2.6
	Disagree	104	68.9
	Strongly Disagree	8	5.3
I am not welcomed by the Physicians to participate in AMS activities.	Strongly Agree	29	19.2
	Agree	72	47.7
	Neutral	24	15.9
	Disagree	20	13.2
	Strongly Disagree	6	4.0
I do not have enough time to participate in AMS activities	Strongly Agree	10	6.6
	Agree	48	31.8
	Neutral	6	4.0
	Disagree	86	57.0
	Strongly Disagree	1	.7
There is a lack of support from the hospital administration about AMS activities	Strongly Agree	77	51.0
	Agree	27	17.9
	Neutral	14	9.3
	Disagree	28	18.5
	Strongly Disagree	5	3.3
Prescribers in my hospital do not care about antibiotic prescribing and/or restriction policy	Strongly Agree	16	10.6
	Agree	37	24.5
	Neutral	11	7.3
	Disagree	79	52.3
	Strongly Disagree	8	5.3
I have no right in restricting the access of antimicrobials to patients when a doctor has prescribed them	Strongly Agree	17	11.3
	Agree	39	25.8
	Neutral	10	6.6
	Disagree	82	54.3
	Strongly Disagree	3	2.0
I do not have access to reliable drug and clinical information about antimicrobials at my hospital	Strongly Agree	5	3.3
	Agree	33	21.9
	Neutral	11	7.3
	Disagree	84	55.6
	Strongly Disagree	18	11.9
A small number of pharmacists at my hospital make it impractical for me to participate in AMS activities.	Strongly Agree	5	3.3
	Agree	64	42.4
	Neutral	15	9.9
	Disagree	65	43.0
	Strongly Disagree	2	1.3
Lack of efficient communication between pharmacists and doctors making it difficult to practice AMS	Strongly Agree	45	29.8
	Agree	76	50.3
	Neutral	12	7.9
	Disagree	18	11.9
Pharmacist's advice related to antibiotics is not well received by the doctors	Strongly Agree	43	28.5
	Agree	47	31.1
	Neutral	33	21.9
	Disagree	28	18.5
Patient does not want to receive medication counseling during dispensing.	Strongly	45	29.8

Agree		
Agree	43	28.5
Neutral	10	6.6
Disagree	51	33.8
Strongly Disagree	2	1.3

Level of knowledge, Attitude and Perceived barrier:

From the study it is found that the level of knowledge is high among 13.90% respondents, 49.66% had moderate and only 36.42% had low level of knowledge. The level of attitude was high in only 29.80%, 56.29% had moderate and 13.90% had low level of attitude. Most of the participants that is about 64.90% had moderate level of barrier, 22.5% had low level and 12.5% only had high level of barrier. Mean± SD of knowledge was 3.45±1.2, attitude 4.25±3.2 and barrier 7.25±0.5

Variable	Level	n (%)
Knowledge	High	21(13.90)
	Moderate	75(49.66)
	Low	55(36.42)
Attitude	High	45(29.80)
	Moderate	85(56.29)
	Low	21(13.90)
Barrier	High	19(12.5)
	Moderate	98(64.90)
	Low	34(22.5)

Fig: level of knowledge, attitude and perceived barrier

Mean± SD of knowledge, Attitude and Perceived barrier:

Variable	Mean± SD
Knowledge	3.45±1.2
Attitude	4.25±3.2
Barrier	7.25±0.5

Fig: Mean± SD of knowledge, Attitude and Perceived barrier:

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