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Original Research Article

# A Study of Knowledge, Attitude and Practice of Antimicrobial Stewardship among Healthcare Workers in a Tertiary Care Hospital

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**Abstract:**

**Introduction:** Antimicrobial resistance (AMR) is a global problem due to widespread and irrational use of antimicrobial agents. Healthcare workers (HCWs) can reduce this problem by following antimicrobial stewardship (AMS) programmes.

**Aim:** This study was carried out to assess the Knowledge, Attitude, and Practice (KAP) of HCWs regarding antimicrobial stewardship.

**Material & Methods:** This cross-sectional study was conducted over 3 months with 165 participants, of whom 55% were resident doctors, 17% were consultant doctors, 18% were nurses, 10% were pharmacists. Data were collected with a validated self-administered electronic questionnaire and analysed using SPSS 16. Knowledge, Attitude and Practice scores were analysed with Shapiro-Wilk test and found not to be normally distributed. Pearson Chi-square test was used for categorical data with a significance level set at $p < 0.05$.

**Results:** Our study showed that knowledge and attitude score in pharmacists was the best among all groups. Practice score was not good in any groups. Knowledge, but not attitude and practice had significant correlation with work experience. A gap between knowledge and practice was found in 46.7% of participants.

**Conclusion:** Our study highlights the wide gap between knowledge and practice of AMS among HCWs. Various factors, including exposure to AMS during training, and total years of working experience, were found to be important predictors of KAP among the HCWs we surveyed. Our findings suggest the need for continuing education to bridge these gaps and promote rational antibiotic use to combat AMR.

**Keywords:** Antimicrobial stewardship, HCWs, Knowledge, Attitude, Practice.



## Introduction

Significant advancement in antimicrobial therapy in 1980's initiated with third generation cephalosporin and new fluoroquinolones, but increased usage of these drugs soon created a global problem. Inspite of using appropriate antimicrobial regimens clinicians encountered repeated infections [1].

Irrational and overwhelming use Antimicrobials are leading to antimicrobial resistance (AMR) which is a global problem now. Antimicrobial stewardship programme (AMSP) is defined as set of actions which promotes the responsible use of antimicrobials [1]. Healthcare Workers (HCWs) can significantly bring down antimicrobial resistance by practicing proper Antimicrobial Stewardship (AMS). World Health Organization (WHO) has developed global action plan as a key activity in reducing AMR across the countries [2].

Various countries have developed their own national action plan (NAP) which are at different stages of development and implementation [3,4,5,6,7,8]. One of the major activities within the NAP is to encourage AMSP along with antimicrobial utilization. In developing country like India, the prevalence of infectious diseases ranges from 28.05 to 29.57 per 1,000 population, which is quite alarming [9].

As per ICMR there has been 66% increase in per capita consumption of antimicrobials. However significant knowledge and practice gap exists among the doctors, regarding the principles and implementation of AMS. AMS is the most important component to fight against AMR thus ensuring optimal patient outcomes. Other studies reported that HCWs Knowledge, attitude, practice (KAP) towards the principles and activities of AMS can have significant impact on the usage of antibiotics. In this study, we analysed the KAP between various HCWs. The main objective of the study was to estimate the existing knowledge gap among

different HCWs regarding AMS, identify their attitudes, and evaluate inappropriate antibiotic prescribing.

## Material & Methods

**Study Design:** A Cross-sectional study was done via an electronically circulated questionnaire to evaluate the KAP of HCWs (Consultants, Residents, Pharmacists, and Nurses) concerning AMSP in a tertiary-care hospital in West Bengal. The study was performed after getting approval by institutional ethical committee.

**Study Population:** This study was conducted over 3 months period with 165 participants of which comprised of consultants, resident doctors, nurses & pharmacists who were working full-time. All other categories of HCWs were excluded.

**Questionnaire design:** By comparing studies and preparing questions from freely available online WHO course on AMSP: A competency-based approach. The questionnaire consists of 23 questions evaluated on a 5-point Likert scale.

**Sample Size and Sampling Methods:** Sample size is calculated using Cochran formula

$N=Z^2 \times P \times Q / L^2$

Where Z=1.96 at 95 % confident interval. P=estimated prevalence of good practice =0.5,Q=1-P and L=allowable error 10%, D= design effect of 1.5 and Non-Response Rate of 15% and found to be 165.

The participant's selection was done using a consecutive sampling method, including all available HCWs during the 3 months.

**Data Collection:** Socio-demographic characteristics of participants as well as separate domain sections were considered for final questionnaire to assess the KAP of AMS. The knowledge section had 10 questions, the attitude section had seven and practice sections had six questions, according to Likert scale responses, which were scored using a 5-point rating scale (strongly agree = 5, agree = 4, not sure = 3, disagree = 2, and strongly disagree = 1) for each question, which is like other studies.

Results concerning attitudes and practices were separated as "good" versus "poor", where a total score >75% was considered good and a total score < 75% was considered poor. We have taken reference from previous studies for the calculation of the KAP scores of HCWs. [Table 1]

**Table 1: Calculation of cut-off scores of knowledge, attitude and practice among HCWs**

| | | Total K Score | Total A Score | Total P Score |
|---|---|---|---|---|
| N | Valid | 165 | 165 | 165 |
| | Missing | 0 | 0 | 0 |
| Mean | | 42.35 | 25.54 | 21.68 |
| Std. Deviation | | 5.484 | 2.614 | 3.879 |
| Minimum | | 28 | 16 | 15 |
| Maximum | | 50 | 30 | 30 |
| Percentiles | 25 | 40.00 | 24.00 | 18.00 |
| | 50 | 43.00 | 26.00 | 21.00 |
| | 75 | 47.00 | 27.00 | 24.00 |

**Data Analysis:** Data collected from google forms were imported into a Microsoft Excel sheet, and thereafter exported to STATA version 16 for statistical analysis and the proportions of each group were defined. The Pearson Chi-square test was used for categorical data, with a significance level set at $p < 0.05$. The Chi-square tests were performed to determine the proportion of participants with good KAP of AMS. The normality of the KAP scores of HCPs was evaluated using the Shapiro–Wilk test. The Kruskal–Walli's test, which is a non-parametric test, was used to check the differences in the median scores of knowledges among the different HCWs. Post hoc tests were used to determine which of the types of HCWs had better KAP scores than others. But in case of P score as there is no significant difference in between these groups, so no Post Hoc test done here.

## Results

**Socio-Demographic Characteristics of participants:** 165 HCWs answered the questionnaire. In our study, males predominated over female.

Most of the participants belong to age group of 25 to 49 years. The greater part of participants consisted of resident doctors followed by nurses, consultants, and pharmacists. The majority had educational qualification of bachelor's degree followed by masters and diploma. The participants had work experience of 0–9 years, followed by 10-19 years. [Table 2]

**Knowledge, Attitude, and Practice Scores:** Most HCWs had good knowledge (n = 133, 80.6 %) but poor practice (n = 97, 58.8%) and poor attitude (n = 97, 58.8%) towards AMS. [Table 3]

**Table 2: Descriptive statistics of socio-demography of participants**

| Variable (n = 165) | Frequency (%) |
|---|---|
| **Age (years)** | |
| ≤ 24 | 6(3.6) |
| 25–49 | 157(95.2) |
| ≥50 | 2(1.2) |
| **Sex** | |
| Male | 94 (57) |
| Female | 71 (43) |
| **Healthcare Professional** | |
| Pharmacist | 16(9.7) |
| Consultant | 28 (17) |
| Nurse | 30 (18.2) |
| Resident | 91(55.2) |
| **Highest Level of Education** | |
| Master's | 28 (17) |
| Bachelor's degree | 121 (73.3) |
| Diploma | 16 (9.7) |
| **Experience (years)** | |
| 0–9 | 145 (87.9) |
| 10–19 | 20 (12.1) |

**Table 3: Knowledge, Attitude, and Practice Scores**

| Variable (n = 165) | Frequency (%) |
|---|---|
| | |
| **Knowledge Level** | |
| Good (≥75%) | 133 (80.6%) |
| Poor (<75%) | 32 (19.4%) |
| | |
| **Attitude Level** | |
| Good (≥75%) | 68 (41.2%) |
| Poor (<75%) | 97 (58.8%) |
| | |
| **Practice Level** | |
| Good (≥75%) | 68 (41.2%) |
| Poor (<75%) | 97 (58.8%) |

**Comparison in Knowledge, Attitude, and Practice Levels among various HCWs:** The Shapiro–Wilk test for normality showed that the Knowledge, attitude and practice scores of HCWs were not normal. [Table 4] As knowledge, practice, and attitude score were not normal so here no ANOVA test was done. Kruskal-Wallis Rank test was done here.[Table 5] Knowledge and attitude score in pharmacists were more than all groups. Practice is not good in all groups. Knowledge, Practice gap was found in 46.7%. Attitude and practice gap was found in 26%. [Table 6,7]

**Table 4: Shapiro–Wilk W test for normality of outcome variables**

| Variable | Observations | p-Value | Interpretation |
|---|---|---|---|
| Knowledge Score | 165 | 0.038 | Not normal |
| Attitude Score | 165 | 0.003 | Not normal |
| Practice Score | 165 | 0.524 | Not normal |

**Table 5: Correlation of knowledge, attitude, and practice scores among various HCWs**

| Variable | Test statistics | p-value | Post hoc test results |
|---|---|---|---|
| Knowledge score | $X^2$=8.434 | 0.038 | Pharmacists>consultant=0.215<br>Pharmacists>resident=0.024<br>Consultant>Nurse=0.999<br>Consultant>Resident=0.999<br>Nurse>resident=0.999 |
| Attitude score | $X^2$=13.803 | 0.003 | Pharmacists>nurse=0.463<br>Pharmacists>resident=0.003<br>Pharmacists>consultant=0.243<br>Consultant>resident=0.999<br>Nurse>consultant=0.999<br>Nurse>Resident=0.368 |
| Practice score | $X^2$=2.239 | 0.524 | No significant difference among the groups. So, no post hoc test done here. |

**Table 6: Knowledge and practice gap among HCWs**

| | | | Practice | | Total |
|---|---|---|---|---|---|
| | | | Poor | Good | |
| Knowledge | Poor | Count | 20 | 12 | 32 |
| | | % of Total | 12.1% | 7.3% | 19.4% |
| | Good | Count | 77 | 56 | 133 |
| | | % of Total | 46.7% | 33.9% | 80.6% |
| Total | | Count | 97 | 68 | 165 |
| | | % of Total | 58.8% | 41.2% | 100.0% |

**Table 7: Attitude and practice gap among HCWs**

| | | | Practice | | Total |
|---|---|---|---|---|---|
| | | | Poor | Good | |
| Attitude | Poor | Count | 53 | 44 | 97 |
| | | % of Total | 32.1% | 26.7% | 58.8% |
| | Good | Count | 44 | 24 | 68 |
| | | % of Total | 26.7% | 14.5% | 41.2% |
| Total | | Count | 97 | 68 | 165 |
| | | % of Total | 58.8% | 41.2% | 100.0% |

## Discussion

This study was conducted to correlate the KAP of AMS principles and application among the HCWs in a tertiary care hospital, West Bengal. Previous studies undertaken in lower middle-income countries had mainly focused on one HCW group ( nursing staff ) but in our study four groups of HCWs were compared namely residents, consultant, nurses and pharmacists. However, a proper evaluation of HCWs' current KAP of AMS will add to the knowledge base with the target of lessening AMR. In our study most (95.2%) of the HCWs were in the middle age (25 to 49 years) group, which is contrary to studies like Feng, Z. Hayat, K. et al where the participants were above 50 years [10,11,12,13]. Majority of HCWs in our study were residents (55.2%), nurses (18.2%) followed by consultants (17%) and pharmacists (9.7%). Among the study participants males predominated (57%) which is similar to other study like Md Ragaul et al [14]. Our study finding is not correlating with studies like Kimbowa, I.M. et al [13] who reported female predominance.

Over 73.3% of the HCWs assessed at least a bachelor's degree as their highest level of education, which is similar to studies like Ashraf, S. et all [15]. Most HCWs in our study having working experience of minimum 10 years, which is similar to other studies like Ashraf, S et al [15]. Most of our participants had good knowledge of AMS (n = 133, 80.6 %) but lacked the right attitude (n = 97, 58.8%), leading to poor practice (n = 97, 58.8%). This is alike study of Mohamed et al [16]. This finding is not correlating with study of Sefah IA et al [17]. In our study knowledge and attitude score in pharmacists were more than all groups which is correlating to other studies like Feng, Z et al [18]. Practice is not good in all groups. Knowledge, Practice gap was found in 46.7%.

Attitude and practice gap was found in 26%, which is not corroborating with studies like Sneddon, J. et al [19]. Nurses and pharmacists showed poor attitude towards AMS as compared to medical doctors. Sefah, I.A et al [20] reported lower than the 60% cut-off in KAP scores, while other studies like Lubwama, M et al [21], Ahmad, A. et al [22], had

used higher scores up to 80%. However, based on previously published literatures we chose the cut-off to be 75%. Other studies conducted in France, Scotland, and Nepal demonstrated that doctors had knowledge gaps and error related to antibiotic resistance and defining practices [23,24,25]. Knowledge-practice gaps in AMS and their implementation on a larger scale has become a global problem. Inappropriate prescribing practices and over the counter use of antimicrobials are adding on the problem of AMR.

**Conclusion:**

Our study revealed a significant gap between knowledge of AMS and its practice. These findings can be used to improve AMS with the final aim of curbing the global spread of AMR. HCWs should be encouraged to participate in courses like free open WHO AMSP course.

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**References:**

1. World Health Organization. Antimicrobial stewardship programmes in health-care facilities in low- and middle-income countries: a WHO practical toolkit .2019. License's BY-NC-SA 3.0 IGO. Available at: https://apps.who.int/iris/handle/10665/329404. Accessed_on_28th_August_2024.
2. WHO. Global Action Plan on Antimicrobial Resistance; WHO: Geneva, Switzerland, 2015; Available online:https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1 (accessed on 20 June 2023).
3. Chua, A.Q,Verma, M Hsu, L.Y, Legido-Quigley H. An analysis of national action plans on antimicrobial resistance in Southeast Asia using a governance framework approach. Lancet Reg. Health West. Pac. 2021; 7:100084.
4. Harant A. Assessing transparency and accountability of national action plans on antimicrobial resistance in 15 African countries. Antimicrob. Resist. Infect. Control. 2022; 11: 15.
5. Mpundu, M. Moving from Paper to Action—the Status of National AMR Action. Plans in African Countries. 2020. Available online: https://revive.gardp.org/moving-from-paper-to-action-the-status-of-national-amr-action-plans-in-african-countries/(accessed on 20 June 2023).
6. WHO. Implementation Handbook for National Action Plans on Antimicrobial Resistance: Guidance for the Human Health Sector; WHO: Geneva, Switzerland, 2022; Available online: https://www.who.int/publications/i/item/9789240041981 (accessed on 20 June 2023).
7. Godman B, Egwuenu A, Esangul E, Schellack N, Kalungia A.C, Tiroyakgosi C, et al. Tackling antimicrobial resistance across sub-Saharan Africa: Current challenges and implications for the future.Expert Opin. Drug Saf. 2022; 21:1089–1111.
8. Charani E, Mendelson M, Pallett S.J.C, Ahmad R, Mpundu M, Mbamalu O, et al. An analysis of existing national action plans for antimicrobial resistance-gaps and opportunities in strategies optimising antibiotic use in human populations. Lancet Glob. Health. 2023; 11:e466–e474.
9. Singh K Santosh, K Mangesh, S Vani, K Ravi, V Rohit, P Seema, et al. A KAP study of healthcare professionals on antimicrobial stewardship in a tertiary care hospital. J. Ind Acad of Clin Med. 2024; 3:244.
10. Tegagn G.T, Yadesa T.M, Ahmed Y. Knowledge, attitudes and practices of healthcare professionals towards antimicrobial stewardship and their predictors in Fitche Hospital. J. Bioanal. Biomed. 2017; 9: 2.
11. Feng Z, Hayat K, Huang Z, Shi L,Li P, Xiang C, et al. Knowledge, attitude, and practices of community pharmacy staff toward antimicrobial stewardship programs: A cross-sectional study from Northeastern China. Expert Rev. Anti-Infect. Ther. 2021; 19:529–536.
12. Badar V, Parulekar V.V, Garate P. Study of knowledge, attitude and practice amongst medical professionals about antimicrobial stewardship in tertiary care teaching hospital in India: A questionnaire-based study. Int. J. Basic Clin. Pharmacol. 2018; 7:511.
13. Kimbowa I.M, Eriksen J, Nakafeero M, Obua C, Lundborg C.S, Kalyango J, et al. antimicrobial stewardship: Attitudes and practices of healthcare providers in selected health facilities in Uganda. PLoS ONE. 2022; 17: e0262 993.
14. Md Ragaul Azim, K.M Nafiz Ifteakhar, Md Mahfujur Rahman, Quazi Nazmus Sakib, et al. public knowledge, attitudes, and practices (KAP) regarding antibiotics use and antimicrobial resistance (AMR) in Bangladesh. Heliyon. 2023; 9(10): 2405-8440
15. Ashraf S, Ashraf M, Imran M.A, Choudhary Z.A, Hafsa H, et al. Knowledge, attitude, and practice of clinicians about antimicrobial stewardship and resistance among hospitals of Pakistan: A multicenter cross-sectional study. Environ. Sci. Pollut. Res. Int. 2022; 29: 8382–8392.
16. Abelrahman M, Tahlil A, Osman M, Gedi S, Ali B, Muhumed M, et al. Knowledge, attitudes and practices regarding antibiotic use and resistance among pharmacists in the Banadir region of Mogadishu Somalia. Research Square. 2023; 1(4):3448-3473.
17. Sefah IA, Chetty S, Yamoah P, Meyer JC, Chigome A, Godman B, et al. A Multicenter Cross-

Sectional Survey of Knowledge, Attitude, and Practices of Healthcare Professionals towards Antimicrobial Stewardship in Ghana: Findings and Implications. Antibiotics (Basel). 2023; 12(10):1497.
18. Feng Z, Hayat K, Huang Z, Shi L, Li P, Xiang C, et al. Knowledge, attitude, and practices of community pharmacy staff toward antimicrobial stewardship programs: a cross-sectional study from Northeastern China. Expert Review of Anti-Infective Therapy. 2020; 19(4): 529–536.
19. Sneddon J, Cooper L, Afriyie D.K, Sefah I.A, Cockburn A, Kerr F, et al. Supporting antimicrobial stewardship in Ghana: Evaluation of the impact of training on knowledge and attitudes of healthcare professionals in two hospitals. JAC Antimicrob. Resist. 2020; 2: dlaa092.
20. Sefah I.A, Akwaboah E, Sarkodie E, Godman B, Meyer J.C. Knowledge on Antibiotic Use, antimicrobial resistance and antimicrobial stewardship programs and associated factors in a tertiary university in Ghana: Findings and Implications. Antibiotics 2022; 11:1679.
21. Lubwama M, Onyuka J, Ayazika K.T, Ssetaba L.J, Siboko J, Daniel O, et al. Knowledge, attitudes, and perceptions about antibiotic use and antimicrobial resistance among final year undergraduate medical and pharmacy students at three universities in East Africa. PLoS ONE 2021; 16:e0251301.
22. Ahmad A, Khan M.U, Moorthy J, Jamshed S.Q, Patel I. Comparison of knowledge and attitudes about antibiotics and resistance, and antibiotics self-practicing between Bachelor of Pharmacy and Doctor of Pharmacy students in Southern India. Pharm. Pract. 2015; 13: 523.
23. Akande TM, Ologe M, Medubi GF. Antibiotic prescription pattern and cost at University of Ilorin Teaching Hospital, Ilorin, Nigeria. Int J Trop Med. 2009; 4 (2): 50-4.
24. Remesh A, Gayathri AM, Singh R. The knowledge, attitude and the perception of prescribers on the rational use of antibiotics and the need for an antibiotic policy - a cross-sectional survey in a tertiary care hospital. J Clin Diag Res 2013; 7 (4): 675-9.
25. Fadare JO, Tamuno I. Antibiotic self-medication among university medical under graduates in Northern Nigeria. J Public Health Epidemiol. 2011; 3 (5): 217-20.