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Event Report

WAAW 2023- The 6th Institutional Composite CMEs on Integrated Antimicrobial Stewardship Practices at AIIMS, Rishikesh

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INTRODUCTION

The inappropriate use of antimicrobials is one of the world's most pressing public health problems. Infectious organisms get adapted to the antimicrobials designed to kill them, making the drugs ineffective.[1] People who get infected with organisms resistant to antimicrobials are more likely to have longer, more expensive hospital stays, and may be more likely to die as a result of an infection. It could cause 10 million deaths per year and an overall cost of $100 trillion to the global economy by 2050. The development of newer antibiotics is challenged at every step by the emerging antimicrobial resistance (AMR). The emergence of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-intermediate *Staphylococcus aureus* (VISA), and superbugs like New Delhi metallo-beta-lactamase 1 positive Enterobacterales have compromised the most effective treatment leading to high mortality rate and fear of progression to the pre-antibiotic era.[2] To curtail this major global health problem and to prevent further development of AMR a collaborative approach is required at different levels. Various measures for combating AMR can be directed at international, national, community, hospital, individual, and patient level. National Action Plan on AMR (NAP-AMR) 2017-2021 is an initiative from the Government of India to combat AMR.[3] Strategic objectives of NAP-AMR are aligned with the global action plan on AMR (GAP-AMR) based on national needs and priorities.[4] Among various options left to prevent AMR, 'Integrated Antimicrobial Stewardship (IAS)' is one of the cornerstones. Infection prevention stewardship, diagnostic stewardship, and antimicrobial stewardship, together constitute IAS, which is a coordinated program that promotes the right infection prevention and control practices, right diagnosis, and appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by Multidrug-resistant organisms.[5] To give public awareness of AMR and do right practices, the World Health Organization (WHO) declared World Antibiotic Awareness Week (2015-2020); the name was changed to World Antimicrobial Awareness Week (2021-2022), this year to World AMR Awareness Week (WAAW), it is celebrated from 18- 24 November every year.

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The aim of the celebration of World AMR Week at AIIMS, Rishikesh is to spread awareness regarding AMR and promote IAS practices among the general public and healthcare worker (HCW) and finally to draft a policy for better use of antimicrobials with the help of all departments (Department of Medicine, College of Nursing, Microbiology, Pharmacology, Community and Family Medicine and Nursing services) of the institute under the aegis of the Society of Antimicrobial Stewardship Practices in India (SASPI).

Table-1: Program Schedule of WAAW-2023

S.No.	Details	Day	Date	Venue	Beneficiaries
1.	A. Inauguration B. Workshop for HCWs on Integrated Antimicrobial Stewardship (IAS) Practices including C. adult vaccination	Saturday	18.11.2023	LT	1. Faculty, SR, JR 2. Nurses, 3. Pharmacist
2.	A. Walkathon for awareness regarding antimicrobial resistance B. Community awareness activity with local Pharmacy shops	Sunday	19.11.2023	1. Astha path 2. Local Shops	General Public & Pharmacist
3.	A. Role plays B. Panel discussion on antimicrobial resistance and stewardship practices at arts college or Senior secondary school, Rishikesh C. State action plan for AMR	Monday	20.11.2023	1. OPD 2. College/ School of Rishikesh 3. Health secretary's office	1. Public 2. Teachers and Students 3. Residents & faculties
4.	A. Role plays B. Ice-breaking sessions with HCW's & IAS Champion ward C. Foundation IAS course for residents & faculty members	Tuesday	21.11.2023	1. OPD 2. Various wards 3. LT	1. Public 2. Various wards of AIIMS, Rishikesh 3. Residents & faculties
5.	A. Role plays B. Ice breaking sessions with HCW's & IAS Champion ward C. Foundation IAS course for residents & faculty members	Wednesday	22.11.2023	1. OPD 2. Various wards 3. LT	1. Public 2. Pharmacist 3. Residents & faculties
6.	A. Quiz/Poster competition for nurses and students (Medical, Nursing & Paramedical) B. Foundation IAS course for residents & faculty C. members	Thursday	23.11.2023	LT	1. Nurses, Students (Medical, Nursing & Paramedical) 2. Residents & faculties
7.	A. Round table meeting with pharmacist and CHO's B. Closing ceremony	Friday	24.11.2023	LT	Pharmacy owners & CHO's

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INAUGURATION AND WORKSHOP

On Day 1 (18th November 2023), World AMR Awareness Week was inaugurated by the Executive Director, Dean Academics, Medical Superintendent and other eminent dignitaries of AIIMS, Rishikesh which was followed by a workshop on IAS practices for HCW, in which more than 100 participants of clinicians, residents, nurses, and administrators have actively participated. The IAS foundation course was started for residents and faculty members in collaboration with SASPI (21-23 November, 3-hour sessions each day) and depicted in Table 1. The key sessions were as follows.

The core concept of integrated antimicrobial stewardship by Dr Prasan K Panda, Department of Medicine

Growing AMR associated with antimicrobial use is an increasing threat to healthcare and the global community. AMR requires a global solution. Therefore, improving awareness regarding AMR through effective communication, education and training, strengthening knowledge through surveillance and research, reducing the incidence of infection, optimizing the use of antimicrobial medicines in human and animal health and developing the economic case for sustainable investment (in AMR) were the few strategies discussed in this session to counter the AMR.

Clinician's core competencies to become bedside steward by Dr Prativa Sahu and Dr Prasan K Panda, Department of Medicine

In clinical core competencies eight 'Ds' were discussed including the right diagnosis, drug, dose, delivery, decision on follow-up, monitoring patient response to treatment, ensuring infection control practices, right documentation and research. Also, various roles of HCWs towards the right eight 'Ds' of IAS practices were discussed in the presentation.

Clinical Antibiogram by Dr Vanya Singh, Department of Microbiology and Dr Sahil, Department of Medicine:

The need, types and components of clinical antibiograms were discussed. Also, why clinicians, microbiologists, and hospital administrators require the antibiogram was discussed in the deliberation. Table 2 represents the types of clinical antibiograms.

Table 2: Types of clinical antibiogram

Types	Definition	Data Presentation	Purpose	Clinical significance	Contextualization
Cumulative	Represents overall antimicrobial susceptibility for all isolates combined within a specified location or timeframe	Presents combined susceptibility rates for all isolates without detailed subgroup breakdowns	Offers an overall view of antimicrobial resistance	Useful for general trends May miss clinically significant differences in specific patient groups or conditions.	Offers an overall summary of susceptibility patterns for all isolates combined
Stratified	Segregates antimicrobial susceptibility data on specific parameters like patient demographics, specimen types.	Displays susceptibility data categorized by specific factors like patient age, specimen type, or clinical units,	Allows for the identification of subgroup-specific resistance trends	Provides nuanced data targeted antibiotic selection possible	Focuses on specific subgroup details, aiding in tailoring antibiotic therapy based on particular patient subsets or clinical scenarios

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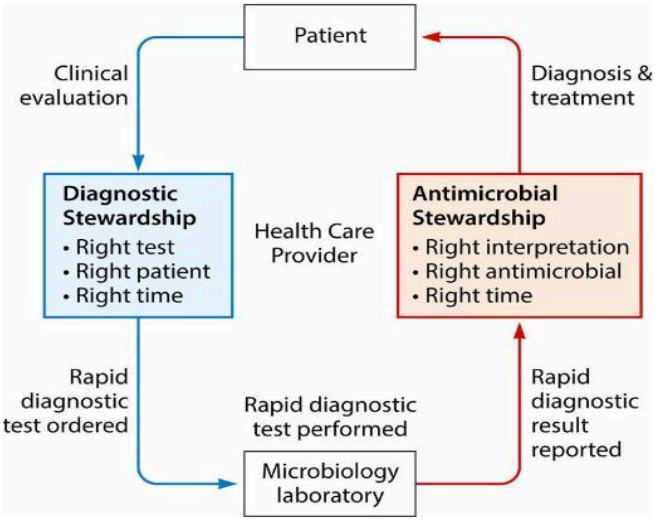
Diagnostic Stewardship by Dr. Vanya Singh and Dr Minakshi singh, Department of Microbiology

This deliberation highlighted the importance of right test by right method within the right time by emphasizing clinical and microbiology components. Pre-analytic, analytic and post analytic phases of diagnostic stewardship and methods of various sample collection, storage and transportation were discussed in details (Figure 1).

Figure 1: Diagnostic Stewardship process



Antimicrobial prophylaxis in surgery by Dr Amit K Tyagi, Department of ENT:

This session included discussions on antimicrobial surgical prophylaxis and appropriate antimicrobials to treat surgical site infections. Key highlights of the presentation on prerequisites and various categories of surgical antibiotics prophylaxis (SAP) are depicted in Figure 2 and Figure 3, respectively. The spectrum of coverage of prophylactic regimen for different wound categories is mentioned in Table 2

Figure 2: Key highlights of the presentation on prerequisites

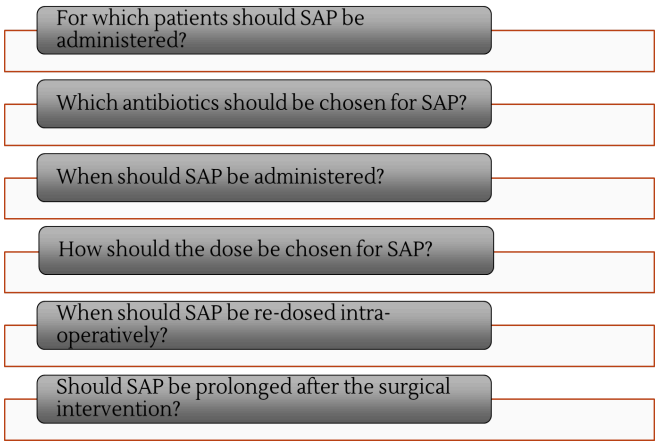


Figure 3: Various categories of surgical antibiotics prophylaxis (SAP)

CATEGORY	DESCRIPTION	INFECTION RISK
Clean	Incising uninfected skin without opening a Viscus	<2%
Clean-contaminated	Intra-operative breach of a viscus (but not colon)	8-10%
Contaminated	Breach of a viscus + spillage or opening of colon	12-20%
Dirty	Site already contaminated with pus. faeces or exogenous contaminant, eg. trauma	25%

Table 3: Category of wound and surgical prophylaxis

Surgical category	Likely pathogen	Spectrum of coverage
Clean	Gram positive specially GPCs	Skin flora including staphylococci
Clean contaminated	Gram Negative bacilli and enterococci	Enteric/ GU dictated by site

Hospital Source Control: Unmet need of an Integrated Antimicrobial Stewardship Practice by Dr Rifika and Dr Prasan K Panda, Dept. of Medicine:

This session had a detailed discussion regarding the evolving significance of source control in healthcare, and the 5 'Ds' of source control in healthcare care including drainage, debridement, device removal, definitive reconstruction and demarcation or isolation. Also, the source control as an integral component of IAS practices and steps to achieve the source control were the key highlights of the session. It was discussed how the institute has developed the PEAK-ME source

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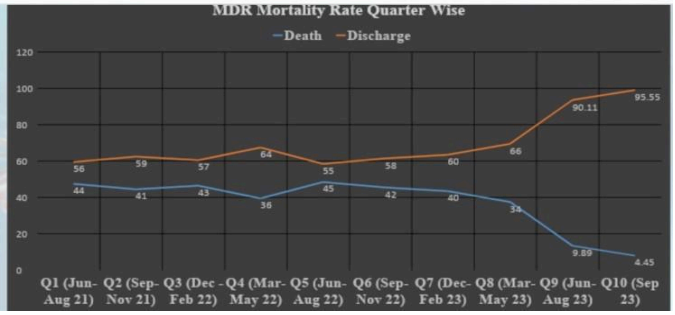
control program and achieved >30% mortality reduction in 2 year time period (Figure 4). PEAK-ME includes common MDR organisms: *Pseudomonas aeruginosa*, *Enterococcus faecium* & *faecalis*, *Acinetobacter baumannii*, *Klebsiella pneumoniae*, MRSA (methicillin-resistant *S. aureus*), and *Escherichia coli*.

Figure 4: Reduction of mortality in MDR infections



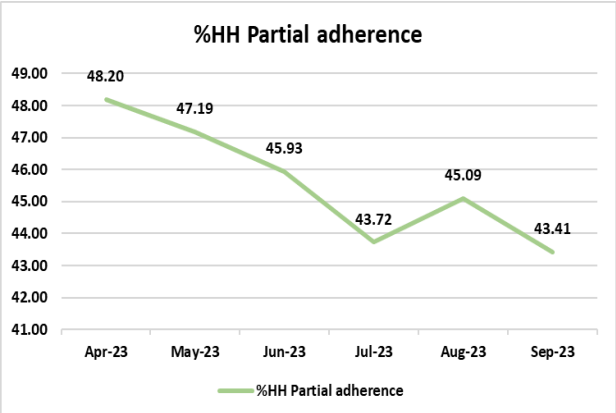
Health Care-Associated Infection (HAI) and Hand Hygiene by Dr Ambar Prasad, Dept of Microbiology and Infection Control Nurses, AIIMS, Rishikesh:

This session discussed health care-associated Infection (HAI), otherwise known as "nosocomial" or "hospital- acquired" infection. An infection occurs in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission. This includes infections acquired in the health-care facility but appearing after discharge, and also occupational infection among health- care workers of the facility.

The most common site of infection and their risk factors and various preventive strategies including hand hygiene were the key point of discussion in the present session.

Hand hygiene compliance rates in the last six months are depicted in Figure 5.

Figure 5: Hand hygiene compliance rate



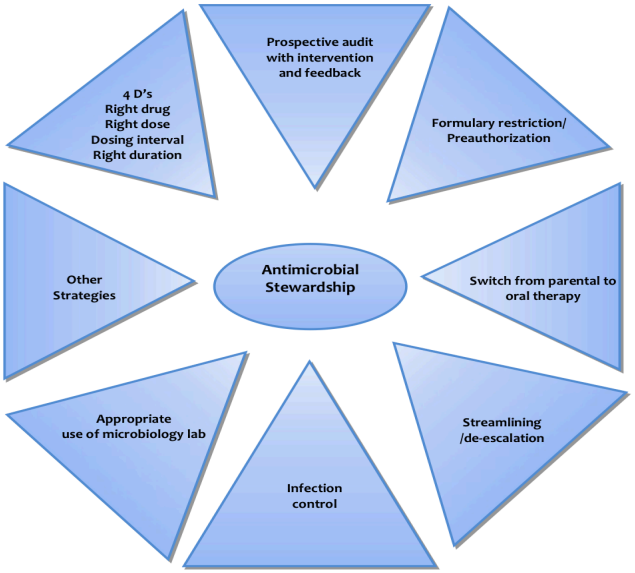
Prospective audit and feedback by Dr Puneet Dhamija, Dept of Pharmacology

In this session, two core strategies including front- end strategy and back-end strategy, pros and cons of preauthorization and prospective audit and feedback (Table 4) and components of the antimicrobial audit were discussed in detail (Figure 6).

Table 4: Types of stewardship audit

Pre-authorization	Prospective audit and feedback
Advantages - Reduces empiric initiation of inappropriate Abx -Encourages early and frequent review of culture data -Reduces costs **Disadvantages** -May delay therapy -Loss of prescriber autonomy -Impacts only restricted agents	**Advantages** -More data is available and hence uptake is better -Educative and collaborative effort which could address de-escalation and duration of therapy -Prescriber autonomy is maintained **Disadvantages** -Labor intensive -Compliance voluntary and prescriber reluctance to change if patient better

Figure 6: Components of antimicrobial audit



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IV to oral switch by Dr Puneet Dhamija, Dept of Pharmacology

For patients with a severe infection, it may be preferable to give intravenous (IV) antimicrobial treatment initially. If your patient is clinically improving and can adequately absorb oral medicines, they may be suitable to be switched early to oral administration known as I/V to oral switch. Recommendations for I/V to oral switch were discussed in detail (Table 5).

Why to switch??

- Low risk of IV infusion-site infections (thrombophlebitis)
- Lower cost of therapy
- Decrease in the overall cost of treatment
- Patient-friendly approach (early mobility, early discharge)

When to switch??

- Antimicrobial treatment indicated
- The patient has improved clinically
- Oral intake (food and fluids) well-tolerated
- Appropriate oral antibiotics are available
- No indication for prolonged IV therapy or high tissue antibiotic concentration

Table 5: Recommendation for IV to oral switch

INTRAVENOUS	ORAL
Benzylpenicillin 1.2g-1.8g 6- hourly Amoxicillin 1-2g 8-hourly Ampicillin-sulbactam 1.5-3 g 6-hourly	Amoxicillin 1g 8-hourly Or AmoxIcillin-clavulanate 875/125mg 12-hourly
AmoxIcillin-clavulanate 1.2g	AmoxIcillin-clavulanate 875/125mg 12-Hourly
Cefuroxime 750mg-1.5g 8- hourly	Cefuroxime 500mg 12-hourly
Ceftriaxone 1g – 2g daily	AmoxIcillin-clavulanate **875/125mg 12-hourly Or Cefuroxime 500mg 12- hourly (if respiratory infection) Or Cefixime 200mg 12-hourly or 400mg 24-hourly
Cefazolin 1g-2g 8 hourly	Cefalexin 500mg-1g 6 hourly
Piperacillin-tazobactam 4.5g 6 hourly OR 8 hourly	Amoxicillin-clavulanate 875/125mg 12-hourly 1 (Add ciprofloxacin 500-750mg 12-hourly or levofloxacin 500-750 mg daily if specific Pseudomonas cover needed)

Measurement of process and Outcome Indicators by Dr Bhupinder Solanki, Dept of Pharmacology

The components of AMS interventions are depicted in Figure 7.

The structural measure is to assess the capacity, systems and processes in a facility or an organization such as the establishment of leadership commitment, the record of AMS committee minutes, the number of meetings held, and reports issued to executives and other groups.

Process measure is to determine and quantify the day-to-day activities being conducted to drive improvement such as numbers of guidelines with dates of review or new point of care tools (e.g., clinical pathways) to implement and promote guideline concordant practice.

The outcome measure is to reduce the overall use of specific (broad-spectrum) antibiotics as well as no occurrence of unintended negative patient outcomes rather than improving the outcomes such as appropriateness of prescribing as per the guidelines.

Figure 7: Components of AMS intervention

Metrics: Two main measures for amount are generally accepted, defined daily dose (DDD) and days of therapy (DOT). DDDs have been set by the WHO. DDD focuses on population-based parameters and assumes that patients and hospitals are homogenous entities.

Both methods (DDD & DOT) are standardized with a denominator such as hospitalized patient-days, and 1000 patient-days is the convention. While both strategies

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have limitations, the results frequently, though not always, correlate (Table 6).

Table 6: Various metrics used in AMS

Hypothetical Regimens
Patient 1: vancomycin 1 g i.v. every 12 hr for 5 days, meropenem 1 g i.v. every 8 hr for 7 days
Patient 2: vancomycin 500 mg i.v. every 12 hr for 10 days, meropenem 1 g i.v. every 12 hr for 10 days
Patient 3: vancomycin 1 g i.v. every 12 hr for 7 days, meropenem 1 g i.v. every 8 hr for 14 days

Metric	Equation for Calculating Consumption per 1,000 Patient-Days	Calculations[c]
Defined daily doses (DDDs)[18]	DDD = (amount of antimicrobial used/WHO standard)/patient volume × 1,000	With use of WHO-defined standard DDDs (vancomycin, 2 g/day; meropenem, 2 g/day), calculations proceed as follows: Meropenem DDD = ([83 g used/2 g]/200) × 1,000 = 207.5 DDD per 1,000 patient-days Vancomycin DDD = ([34 g used/2 g]/200) × 1,000 = 85 DDD per 1,000 patient-days
Days of therapy (DOT)[23]	DOT = antimicrobial days/patient volume × 1,000	Vancomycin days = 22 Vancomycin DOT = (22/200) × 1,000 = 110 DOT per 1,000 patient-days Meropenem days = 31 Meropenem DOT = (31/200) × 1,000 = 155 DOT per 1,000 patient-days
Length of therapy (LOT)[19]	LOT = duration of antimicrobial use/patient volume × 1,000	Patient 1 duration = 7 days Patient 2 duration = 10 days Patient 3 duration = 14 days LOT = ([7 + 10 + 14]/200) × 1,000 = 155 LOT per 1,000 patient-days

[a]WHO = World Health Organization.
[b]Calculations are hypothetical and likely not representative of expected use values.
[c]Calculations assume a patient volume during the reporting period of 200.

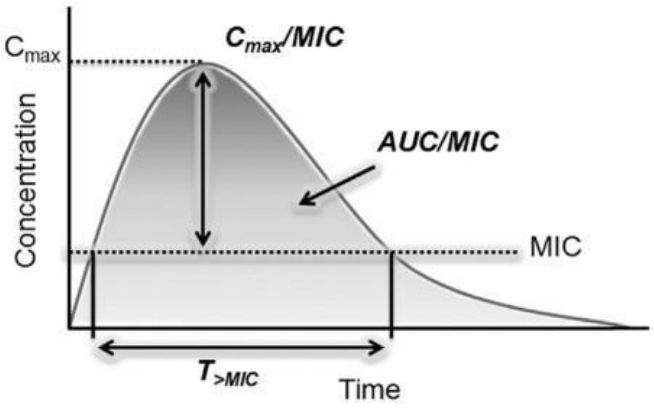
Anti-microbial PK-PD in Clinical Practice by Dr Puneet Dhamija, Dept of Pharmacology

The basics of PK-PD in Clinical Practice are:

- Minimum Inhibitory Concentration (MIC): Minimum concentration of the antibiotic drug able to inhibit the bacterial growth
- Minimum Bactericidal Concentration (MBC): Minimum concentration of an antimicrobial agent that reduces the viability of the initial microorganism inoculation by ≥99.9%
- Mutant Prevention Concentration (MPC): The threshold above which the selective proliferation of resistant mutants is expected to occur only rarely

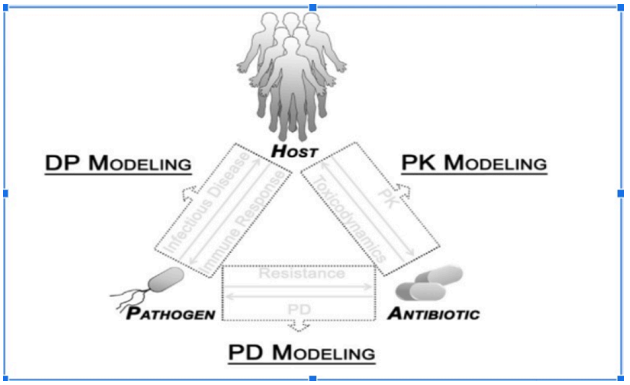
The various PK-PD indices are mentioned in Figure 8.

Figure 8: PK-PD Indices



There is an urgent need for novel antibiotics to treat life-threatening infections caused by bacterial 'superbugs'. Validated in vitro pharmacokinetic/pharmacodynamic (PK/PD) and animal infection models have been employed to identify the most predictive PK/PD indices and serve as key tools in the antibiotic development process (Figure 9).

Figure 9: Pharmacokinetic and Pharmacodynamic model



WALKATHON AND AWARENESS CAMPAIGN

On Day 2 (19th November 2023), a walkathon to spread awareness regarding AMR among the general public was organized, which was flagged off by Prof. Meenu Singh, Executive Director and around 200 HCWs participated. The route of the walkathon was from the Astha path to Awas Vikas colony and back to AIIMS, Rishikesh. Also on the same day, an awareness campaign was organized under the leadership of Dr Mahendra Singh, Dept of Community and Family Medicine along with the team.

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ROLE PLAY ON ANTIMICROBIAL RESISTANCE, STEWARDSHIP AND VACCINATION

On Day 3 (20th November 2023), role play by nursing officers was organized to create awareness among the general public regarding antimicrobial resistance at OPD atrium, AIIMS, Rishikesh in the presence of Prof. R B Kalia, Medical Superintendent, Prof. Ravi Kant, Head of the Department of Medicine, Ms Reeta Sharma, Chief nursing officer, Dr Prasan K Panda and various other HCW's. It was followed by panel discussion on preventing antimicrobial resistance together in the community area under the leadership of Dr Santosh Kumar, Additional Professor, Department of Community and Family Medicine.

COMMUNITY AWARENESS CAMPAIGN AND ICE BREAKING SESSION WITH HCW'S

On Day 4 (21st November 2023), role play by nursing students under the leadership of Ms Rakhi Mishra, Assistant Professor, College of Nursing was organized to spread the message among patients and caregivers attending various OPDs. On the same day, ice breaking session was conducted by 33 teams comprising of faculty members/residents/infection control nurses/ other staff at various wards/units of AIIMS, Rishikesh to assess the AMR practice with the help of pre-validated checklist followed by 3 days' foundation IAS course for faculty and residents.

On Day 5 (22nd November 2023), six teams comprising of professors, Deputy Nursing Superintendent and Assistant Nursing Superintendent visited the top 6 areas of IAS best practice to finalize the best IAS champion ward.

QUIZ AND POSTER COMPETITION FOR RESIDENTS, NURSES AND STUDENTS

On Day 6 (23rd of November 2023), a quiz and poster

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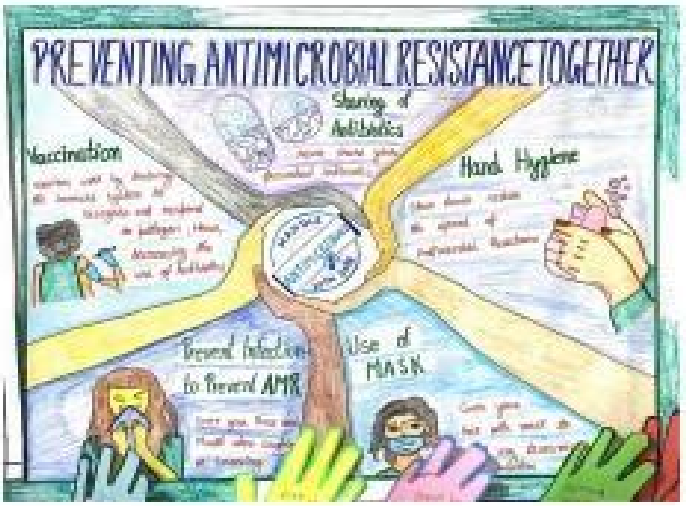
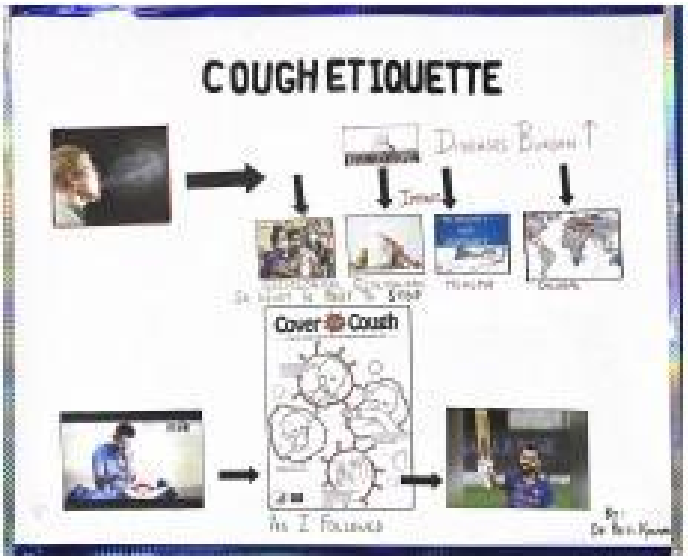
competition were organized for nurses, residents and students under the leadership of Dr Manisha Bist, Department of Pharmacology. Ms Niketa Kumari, Ms Alka Mittal and Ms Aarti Rana were the first, first and second runners respectively for the offline poster competition and Ms Deepika secured first position for the digital poster. Ms Sakshi and her team were the winners of the quiz competition. All the winners were awarded with certificates and mementoes in the respective category.





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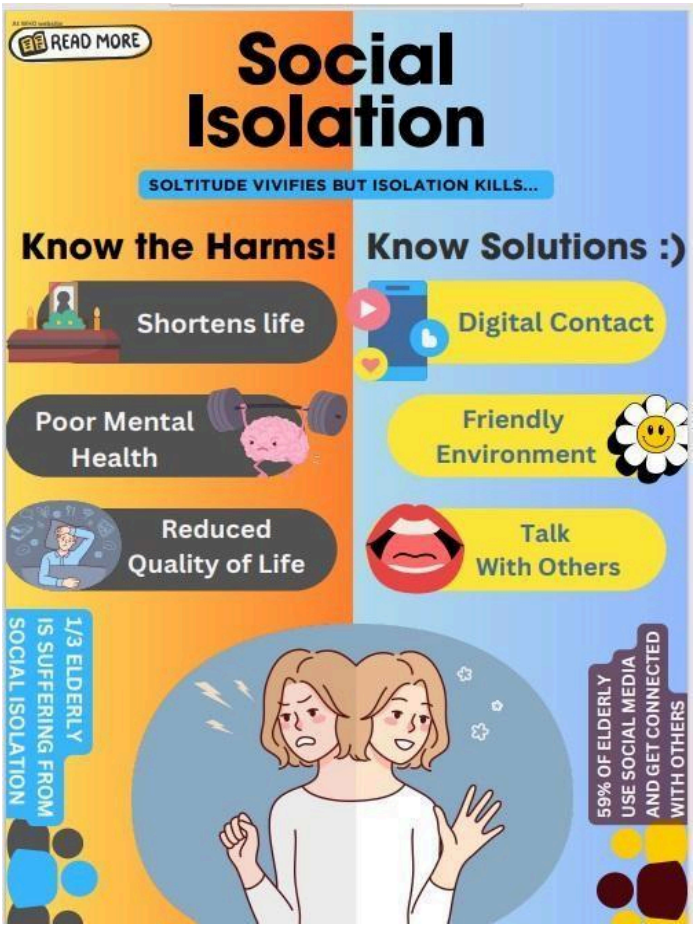

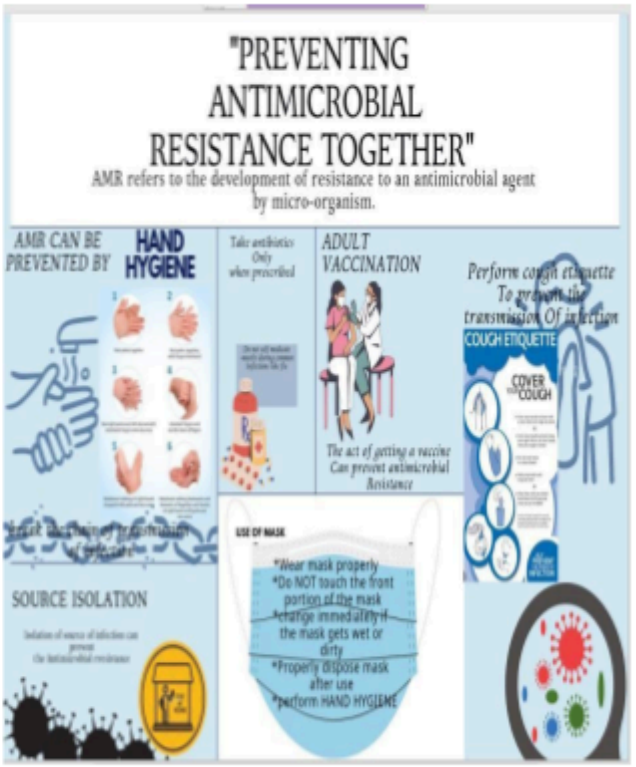

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ROUND TABLE MEETING WITH PHARMACIST AND COMMUNITY HEALTH OFFICERS

On Day 7 (24th of November 2023), a round table meeting was held with local pharmacist and community health officers to facilitate righteous prescription and delivery of antimicrobials to combat with antimicrobial resistance, followed by valedictory session in which winners of various competitions and best IAS unit were awarded with mementos and certificates. Over all, in true sense team WAAW 2023 AIIMS, Rishikesh was able to comply and achieve the 2023 year theme "Preventing antimicrobial resistance together" by involving various departments under one umbrella of WAAW 2023.

CONCLUSION

A series of events were performed for entire WAAW 2023, which included workshop and foundation course on IAS practice and adult vaccination for health care workers, walkathon to spread public awareness about AMR, role play on vaccination and antimicrobial resistance, panel discussion in community area to create awareness among general public, ice breaking session and identification of IAS champion unit at AIIMS Rishikesh, poster, and quiz competition for residents, nurses and students, and round table meeting with local pharmacists and community health officers to create awareness on AMR. There were more than 1000 participants during this mega week of events. Further a remarkable collaboration was established by signing a Memorandum of Understanding (MoU) between SASPI and AIIMS Rishikesh to take the resolution of AMR and stewardship practices to next level where foundation IAS course was launched for residents and faculty members in presence of Prof. Meenu Singh, Executive director and CEO (AIIMS Rishikesh), Prof. Jaya Chaturvedi, Dean Academics (AIIMS, Rishikesh), Dr. Prasan K Panda, Secretory SASPI, Prof Shailendra Handu, Joint-Secretary SASPI, Prof Puneet Dhamija, Board of Directors SASPI, and other AIIMS and SASPI members. The participants took resolutions to continue IAS practices in their daily duties and to meet again to re- assess themselves during next WAAW (Figure 10).

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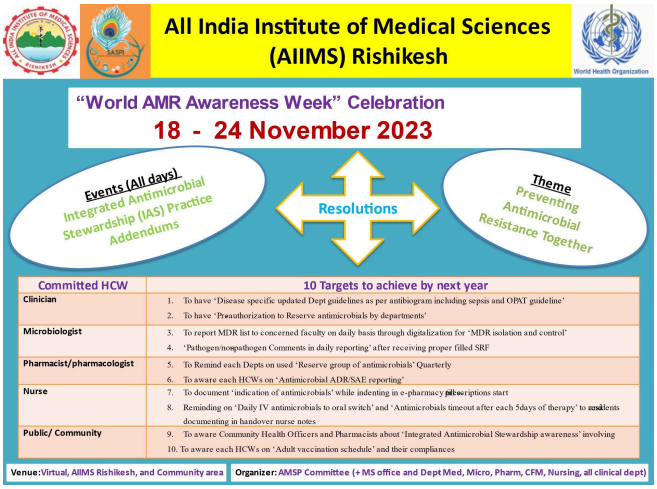
Figure 10: AIIMS, Rishikesh resolutions by committed HCWs during WAAW 2023



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CONFLICT OF INTERESTS STATEMENT

The authors declare no conflict of interest.

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None

AUTHORS' CONTRIBUTIONS

PKP: Methodology; Data curation; Analysis; Writing the draft
MS: Review & editing; Supervision; Validation
RM: Review & editing; Supervision; Validation
DK: Supervision; Review & editing
GS: Validation, Review & editing
AS: Validation, Review & editing

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