

A Brief Report on

AMR FRONTLINE WORKSHOPS

Building Awareness and Action on Antimicrobial Resistance

A WORKSHOP SERIES FOR MEDICAL STUDENTS



September, 2024

AMR Frontline Workshops: Building Awareness and Action on Antimicrobial Resistance among Medical Students and Healthcare Professionals

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Superheroes Against Superbugs (2024)

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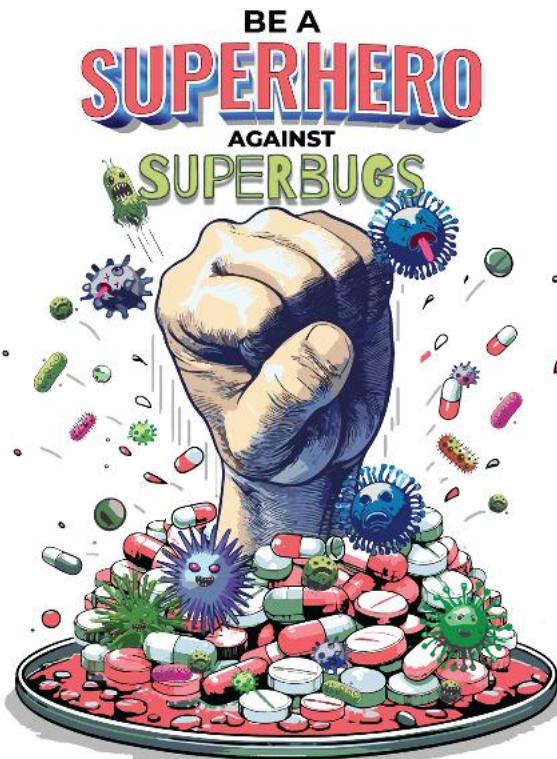
ABOUT US

Superheroes Against Superbugs (SaS) is an educational and public engagement initiative launched in 2018 with the aim to raise awareness of antimicrobial resistant (AMR) infections in India. SaS largely partners with the youth to foster a community poised to take informed action. It brings together experts from medicine and science, utilizing tools of art and games to gather people's attention to the cause and invest them in the cause of AMR prevention. SaS aims to create a society of informed antibiotic users by not just imparting scientific knowledge but also providing the youth with the necessary tools to leverage this knowledge for action and change within their communities.

The Alliance for Pathogen Surveillance Innovation-India (APSI), supported by **The Rockefeller Foundation, USA**, has partnered with SaS since January 2023. The APSI initiative is an innovative multi-city consortium with the mission to advance India's public health surveillance by developing platforms for detecting infectious disease-causing agents in environmental samples, notably in wastewater. This collaborative effort spans four major cities—Bengaluru, Delhi-NCR, Hyderabad, and Pune—and seeks to augment surveillance capabilities for infectious diseases like COVID-19, influenza, and dengue using molecular biology tools. They are also tackling AMR by establishing procedures for monitoring resistance patterns in environmental samples, aiming to correlate these with clinical outcomes.

Looking ahead, APSI envisions incorporating their surveillance work into broader public health protocols, developing cost-effective tools for environmental surveillance, and fostering partnerships to enhance public health responses, thereby enabling informed policy-making and efficient disease management across India.

India finds itself at a critical juncture in the battle against AMR, with recent studies underscoring escalating resistance trends nationwide. The National Action Plan on AMR launched by the Government of India and the Global Action Plan on AMR both underscore the imperative to enhance AMR awareness through effective communication, education, and training initiatives. SaS and APSI-India are aligned with this mission, committing their efforts to **sensitize the medical community and future healthcare professionals about the nuances of AMR**. The AMR Frontline Workshops are an outcome of this alignment.



AMR FRONTLINE WORKSHOPS : A FIRST-OF-ITS-KIND WORKSHOP FOR MEDICAL STUDENTS

Rising AMR cases put medical doctors at the forefront of the issue. On one hand, they face increasingly limited and complicated treatment options due to a shrinking number of effective antimicrobial drugs, and on the other hand, they often bear the blame for unnecessary prescription of antimicrobial drugs. It is, therefore, imperative that doctors in training understand the urgency of the issue, how they contribute to the problem, and their role in addressing it.

The AMR Frontline Workshops aim to inform the medical students, the next generation of healthcare providers, about **the reality of infectious disease treatments today, in light of AMR**. In line with APSI's mission to strengthen public health surveillance, these workshops aim to encourage future healthcare providers to adeptly address the complexities of infectious diseases and AMR. The offerings of the

workshops include **awareness of the clinical situations that medical professionals have to face regularly** due to AMR, the **preventive and mitigating solutions** that currently exist, as well as the **new-age scientific tools** that APSI scientists are developing and require medical practitioners to understand and collaborate with.

The SaS team conducted these educational workshops at medical colleges situated within each of APSI's clusters—Hyderabad, Delhi-NCR, Pune and Bengaluru—reflecting a targeted approach to enhance the capacity and knowledge base at a local level. Conducted in collaboration with local APSI partner organizations in these different clusters, the workshops were influential in fostering **stronger partnerships between local APSI institutions and the medical communities** in these localities.



"The world is heading toward a post-antibiotic era, in which common infections will once again kill."

-Dr. Margaret Chan (Former WHO Director-General)

1.1 TARGET AUDIENCE AND OBJECTIVES

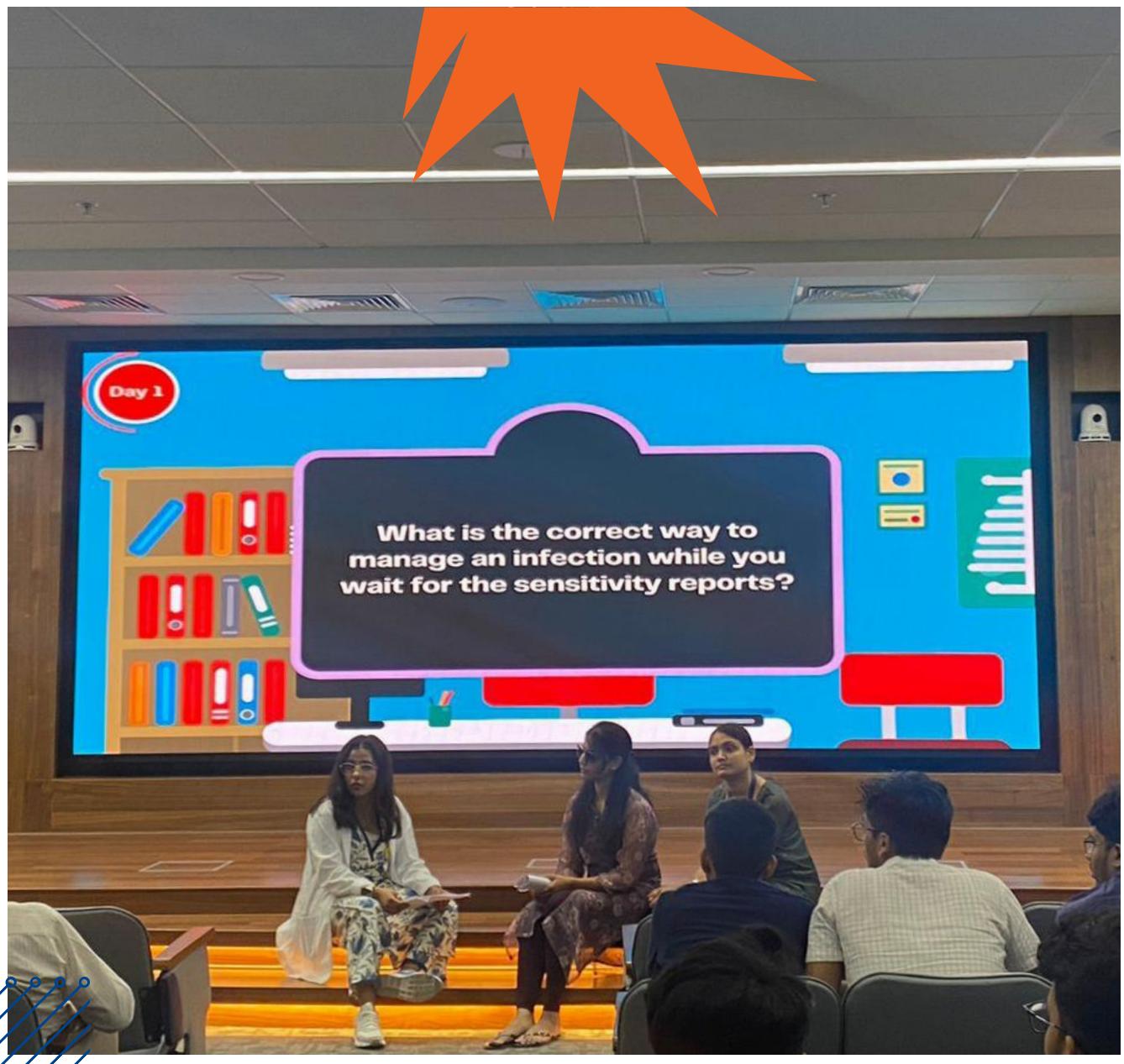
The AMR Frontline Workshops target medical students in their **foundational years of study**, specifically those in the second year of their MBBS education. During this period, students are introduced to the fundamentals of microbiology and pharmacology. However, other than a passing reference to AMR, there is **no focused teaching** of the concept of AMR or its management in clinical settings. They are also not exposed to hands-on laboratory-based work that provides them with the necessary practical knowledge. Hence, their scientific understanding of many of the newer tools developed for use by clinicians remains rather limited.

The workshops are designed to closely align with the academic curricula of the medical students, build on their existing knowledge and offer value-additions by emphasizing the real-life clinical scenarios of AMR cases, actionable solutions at an individual level, and introducing the new tools that can be used by them or whose development they can contribute towards.

The latter includes an introduction to APSI's AMR surveillance program done in close collaboration with clinicians across India as a worthwhile example.

The **objective is to introduce AMR awareness**, not just in terms of the problem but also **possible solutions**, early in their medical education. Medical students go on to contribute to healthcare not only by working as practicing doctors but also by working in research, the healthcare industry as well as in policy-making among others. The workshop aims to prepare students to address AMR proactively as they transition into these various roles in future. This approach hopes to ensure that the principles of infection control, AMR stewardship and an appreciation of collaborations between medical doctors and scientists become an intrinsic part of their practice.





1.2 WORKSHOP DESIGN

SaS makes an active effort to distinguish the workshops from the regular lecture-based educational sessions and seminars in medical colleges. It ensures that students are active participants rather than passive recipients of information. The content and concepts in the workshops are presented through a blend of expert talks, interactive activities and games. The speakers are selected for their specific areas of expertise, and informed in advance of the exact details they are expected to cover in the workshop.

Until August 2024, the SaS team has facilitated the delivery of a total of nine highly interactive and engaging AMR Frontline Workshops for over a thousand individuals in the four APSI cluster cities - Hyderabad, Delhi, Pune, and Bengaluru.

The formats of the workshops take into account the logistical constraints and intellectual needs of both the participants and the hosting institutions. Each workshop is designed using the following headers:

1. WORKSHOP FORMAT

- Full Day Workshops: An immersive experience that allows for an in-depth exploration of each topic.
- Half Day Workshops: A condensed version for a quick yet thorough understanding.
- Two-Hour (Online/Offline) Workshops: A short-duration interaction offering a brief introduction to AMR and related practices.

2. LOCATIONS AND PARTICIPATION

- Conducted in various medical colleges and institutes across multiple cities.
- Each workshop accommodates a range of participants, typically from 30 to 175 medical students.

3. COLLABORATIVE LEARNING THROUGH EXPERT TALKS

SaS believes that medical students learn most effectively from experienced leaders who offer substantial clinical expertise and practical insights. Engaging talks from senior leaders and experts from the fields of medicine and research form an important component of the workshops and provide

a comprehensive understanding of the issue to the participants. Details of the speakers and topics are provided below:

AMR Advocate: This speaker is a senior clinician, public health expert, or policymaker with extensive experience in AMR. They explain the basics of AMR, its emergence as a global health concern, and the need for a One Health approach involving human, animal, and environmental factors. The session also covers global and national efforts to combat AMR, providing participants with a broader perspective beyond clinical care.

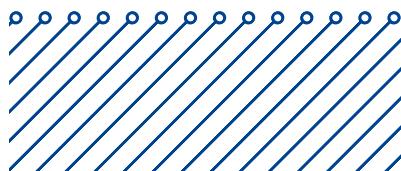
Clinical Microbiologist: This expert in infection prevention and AMR stewardship shares practical measures to prevent infections in healthcare settings, such as hand hygiene, equipment sterilization, and environmental cleanliness. They also discuss monitoring resistance patterns, antibiotic policies, and responsible antibiotic use, including prescribing practices guided by frameworks like the AWaRe classification.

Clinical Expert: A clinician who regularly treats patients with AMR discusses the realities of managing these cases and deciding on appropriate treatments. Through case studies or role-plays, participants explore the challenges clinicians face when dealing with AMR infections.

AMR Scientist from APSI Consortium: Scientists and technologists specializing in AMR surveillance and diagnostic tools present the latest advancements in tracking AMR patterns in healthcare and the community, including environmental methods like wastewater surveillance. They highlight the importance of surveillance in early detection and prevention of disease outbreaks, showcasing the techniques used by APSI-India.

Other Experts: Additional experts, such as veterinarians working on One Health or engineers developing AMR diagnostics are involved when relevant opportunities arise.

(See Annexure 2 for a full list of experts who participated in these workshops.)



4. ENGAGEMENT THROUGH INTERACTIVE ACTIVITIES

SaS curated interactive activities and games for these workshops based on the key focus areas to reinforce students' knowledge and learning. They are listed below:

- **Taboo:** An ice-breaker game where students guess AMR-related terms using verbal hints
- **Jeopardy Jamboree:** A two-level quiz competition with a fast-paced online quiz played in the qualifier round and a jeopardy-style quiz played in the final round. It contains questions from different themes including antibiotics, AMR surveillance, AMR stewardship, infection prevention & control, and diagnostics & therapeutics.
- **Pathogen Patrol - IPC mapping:** An activity to devise strategic plans to implement standard Infection prevention & control practices within the designated geographic areas in a hospital (eg, OPD, waiting area, surgical ward, emergency ward, etc.)
- **AMR Crossword:** A Sunday crossword, AMR edition to keep the participants engaged in between breaks
- **Prescription Hunt:** An AMR edition word puzzle with hidden names of antibiotics
- **Medical theatre:** Interactive case studies where students get to problem-solve AMR cases
- **Lab tours,** where possible, to showcase AMR diagnostics and research, and infection control practices
- **Poster competition:** An opportunity for the participants to creatively reflect on their learnings and key takeaways, which they can use to engage with their peers and college communities

5. INNOVATIONS IN THE WORKSHOPS

Given such a workshop for medical students was designed for the first time, SaS introduced innovative structures and experimented with different activities throughout the series to find what is most engaging and useful for the medical community:

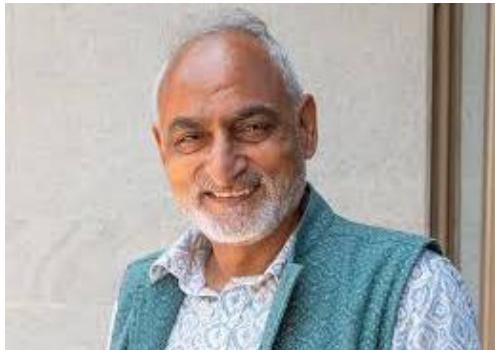
- The inaugural workshop at L.V. Prasad Eye Institute (LVPEI), saw participation from over 85 second-year medical students from institutions

such as Apollo Institute of Medical Sciences, Hyderabad, Osmania Medical College, Hyderabad and AIIMS Bibinagar. Alongside expert talks and activities, students participated in a Medical Theater roleplay, toured LVPEI's research facilities for a demo of antibiotic susceptibility testing, and to understand research into alternatives to antibiotics like antimicrobial peptides. A visit to the Ramayamma International Eye Bank provided practical insights into aseptic practices for infection prevention and cornea preservation.

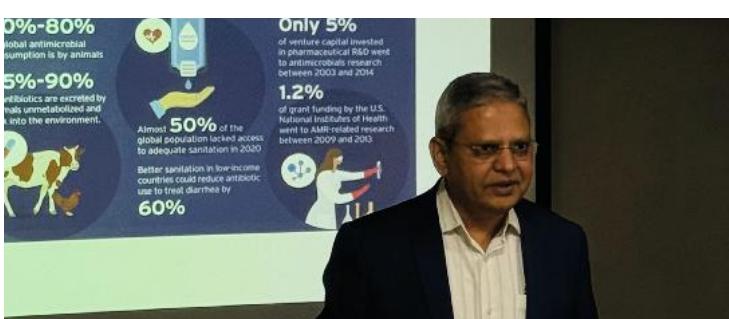
- The 4th workshop in the series, held at the Centre for Cellular and Molecular Biology (CCMB) in Hyderabad, engaged 28 second- and third-year medical students from 26 different medical institutions across India. These students were part of the Medical Students Research Training (MedSRT) program at CCMB, demonstrating a strong interest in research beyond their standard curriculum. The smaller group allowed for a focused discussion on workshop learnings and feedback.
- Unlike the other workshops in this series which targeted 2nd year medical students, the 5th workshop at Government Institute of Medical Sciences, Greater Noida engaged over 120 practicing healthcare professionals, including nursing students, medical interns, junior resident doctors, and senior doctors. This 2-hour session included an interactive panel discussion, in addition to in-depth expert lectures.
- The sixth workshop, held online with the Association for Socially Applicable Research (ASAR), engaged 43 medical students nationwide. Adapting to the online format, activities included a pop quiz, case studies from TV series addressing multidrug resistance, and an AMR Trivia quiz.
- The final workshop at Bangalore Baptist Hospital (BBH), Bengaluru, targeted 200 practicing clinicians and followed a Continuous Medical Education format, offering accredited credits. Led by BBH in collaboration with the National Centre for Biological Sciences and SaS, the event featured panels on AMR research, clinical challenges, and diagnostics. Interactive activities, including case discussions and games, allowed participants to explore practical AMR applications.

A brief overview of each of the 9 workshops including format, target audience, number of participants and the links to detailed reports is provided in Annexure 1.

SPEAKERS



▪ Most agents a
▪ Antibiotic th
▪ recommended
▪ Fever >4 days
purulent nasa
may point tow
bacterial aeti
Amoxicillin/ Azithromycin



EVALUATION OF THE WORKSHOPS

This section is divided into two parts:

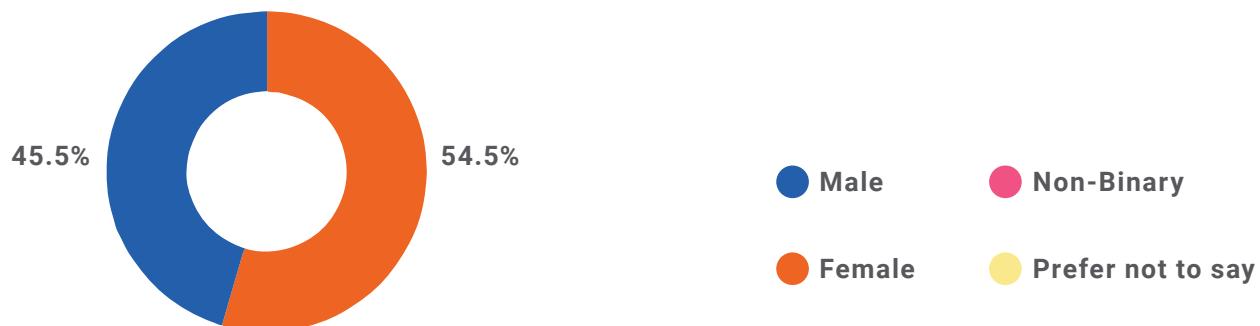
Learning Evaluation – Examining the changes in participants' knowledge resulting from the workshop.

Feedback Evaluation – Providing a detailed analysis of participants' perceptions and experiences with the workshop after its completion.

2.1 LEARNING EVALUATION

SaS evaluated shifts in participants' knowledge resulting from the workshop using pre- and post-workshop questionnaire forms. The pre-workshop online form included a set of 7 questions designed to gauge participants' understanding of AMR, while the post-workshop form contained 10 questions covering similar topics. The questions were framed to address the most important topics discussed in the workshop and the key takeaways students are expected to know by the end of the session. Students were asked to select all correct answers from multiple-choice options. A detailed evaluation of the responses from the comprehensive one-day workshop at BJMC, Pune, is presented below:

Gender: 66 Responses



This table summarises the evaluation of the responses to the questionnaires

Question	% correct responses		Relative % increase in knowledge*
	Pre-Workshop	Post-Workshop	
What do you understand by the phrase Antimicrobial Resistance (AMR)? Answer: <i>The ability of microorganisms to withstand the effects of antimicrobial drugs</i>	87.8	97	10.5
Why is it important to take initiative in combating AMR? Answer: <i>To ensure the continued effectiveness of antibiotics for future generations</i>	77.6	86.4	11.3
What according to you is the right response when an infection is suspected in a patient? Answer: <i>Start empirical treatment while waiting for results of susceptibility testing</i>	53.1	75.8	42.7
How can healthcare providers contribute to solving the problem of AMR? Answer: <i>By implementing infection control measures, like hand hygiene and sanitation</i>	57.1	87.9	53.9
What gives rise to antibiotic resistance? Answer: <i>Indiscriminate use of antibiotics in animal husbandry</i>	51	89.4	75.3
What gives rise to antibiotic resistance? Answer: <i>Improper discarding of antibiotics in the environment</i>	51	69.7	36.3

* refers to proportional improvement relative to the starting point. It is calculated as

$$\frac{(\% \text{ correct responses post-workshop} - \% \text{ correct responses pre-workshop})}{\% \text{ correct responses pre-workshop}} \times 100$$



- The analysis revealed that students already had a high level of general understanding of AMR, as indicated by their comprehension of the term "AMR" (87.8%) and the importance of addressing the issue (77.6%) in the pre-workshop forms. This aligns with the expectation that second-year students know of AMR superficially, and are in a position to explore the concepts in greater depth. Despite their existing knowledge, the workshop enabled a modest but significant increase in their understanding of the definition of AMR (10.5% relative increase) and the importance of combating AMR (11.3% relative increase).
- The workshop's focus areas—AMR stewardship and infection control measures—showed a substantial increase in knowledge. There was a 42.7% relative increase in knowledge on how to respond to suspected infections and a 53.9% relative increase regarding infection control measures. This indicated that the workshop was particularly effective in enhancing understanding of these topics and in conveying the importance of stewardship and infection control practices. This

is a significant outcome, as these are areas that students can directly implement at an individual level to combat the issue as future clinicians.

- The workshop also aimed to help students appreciate the multifactorial nature of AMR. This was reflected in the highest relative increases in knowledge: a 75.3% relative increase in students' acknowledgement of misuse of antibiotics in animal husbandry and a 36.3% relative spike in realizing environmental pollution caused by improper antibiotic disposal as potential causes of AMR. These results suggest that the workshop effectively improved students' understanding of the causes of antibiotic resistance beyond human misuse.

Overall, the workshop appears to have been successful in increasing knowledge across various aspects of AMR, with particularly notable improvements in areas that were less well-understood beforehand or directly relevant to their future clinical practice.



2.2 FEEDBACK EVALUATION

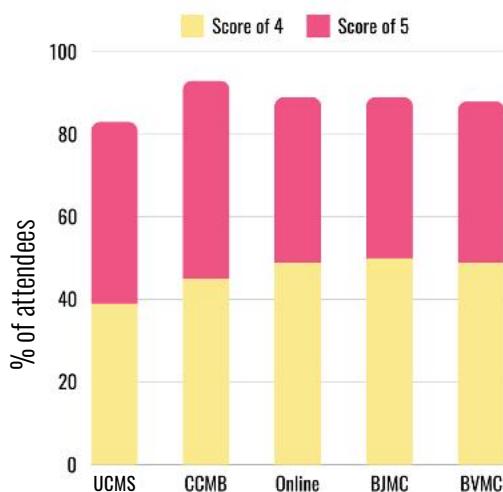
SaS collected participants' perceptions of the workshops and suggestions for improvement via feedback forms. These analyses were considered after each workshop to enhance subsequent sessions. This process also allowed SaS to evaluate what worked, what didn't, and the overall impact of the workshops on participants. However, some sessions faced time constraints, which limited opportunities for activities and formal feedback collection.

Below is a combined analysis of feedback from participants across five workshops. Out of 376 attendees from these five workshops, 276 participants provided feedback: CCMB in Hyderabad (27 respondents), UCMS in New Delhi (49 respondents), BJMC in Pune (66 respondents), BVMC in Pune (99 respondents), and the online workshop (43 respondents). This summary highlights the key points from the feedback, rather than the full analysis.

1. ENHANCED UNDERSTANDING OF AMR:

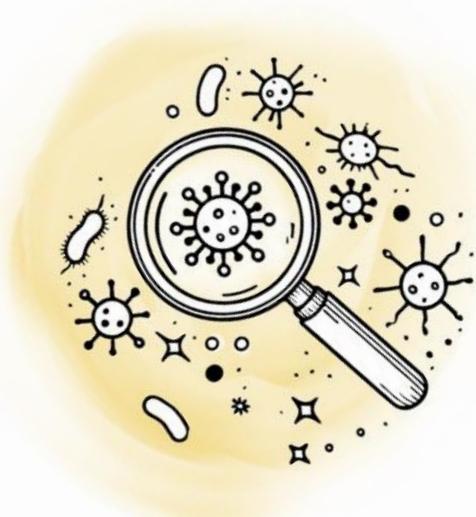
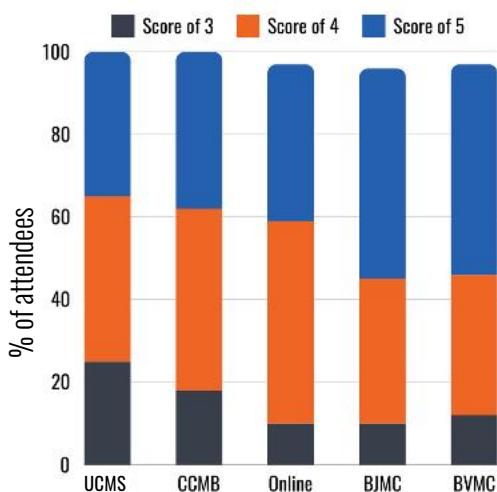
A key anticipated outcome for the workshop participants is an enhanced understanding of AMR. Notably, 88% of attendees rated their improvement in understanding between 4 (46%) and 5 (42%) on a 5-point Likert scale (Figure a).

Figure a) Responses to the question "How much do you feel your understanding of AMR has improved after attending this event? (1 being not at all, 5 being significantly improved)"



Nearly all attendees reported feeling more confident in their ability to contribute to solutions for AMR after the session, with 84% of participants rating their confidence as 4 or 5 on a 5-point Likert scale, and the remaining participants giving a score of 3 (Figure b).

Figure b) Responses to the question "On a scale of 1 to 5, how confident do you feel in your ability to take action against AMR after participating in this event? (1 being not confident, 5 being very confident)"



2. ACTIONABLE INSIGHTS:

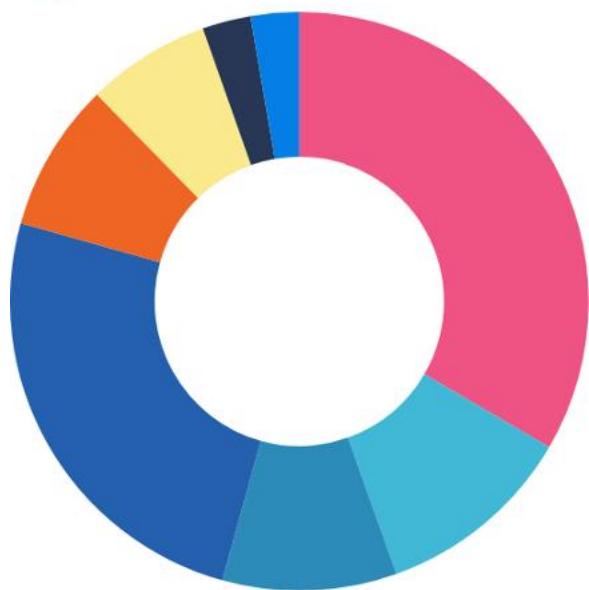
Another important outcome of the workshops is that attendees are left with actionable takeaways. When asked about the three key actions they would take after the workshop to prevent AMR, the students' responses covered most major topics discussed during the sessions, including rational prescription practices, judicious use of antibiotics, hand hygiene, infection prevention and control (IPC), AMR stewardship, staying updated on the latest developments in AMR, surveillance, research, and educating peers, patients, and the public about AMR (Figure c).

The top three responses to this open-ended question were: focusing on the judicious use and rational prescription of antibiotics (56%), spreading awareness about AMR and patient education (39%), and emphasizing hand hygiene, IPC practices, and AMR stewardship (36%)—all of which align with the key solutions for AMR in clinical settings highlighted in the workshop.

Additionally, 12% of attendees identified surveillance and research as action items, while another 12% expressed interest in policy and advocacy work for AMR management. This reflects a comprehensive understanding of AMR's multifaceted nature and supports the workshop's mission to encourage these young professionals to contribute to this issue beyond their clinical practice.

Figure c) Responses to the question “As a future healthcare professional, list three actions you would like to adopt to help combat AMR”

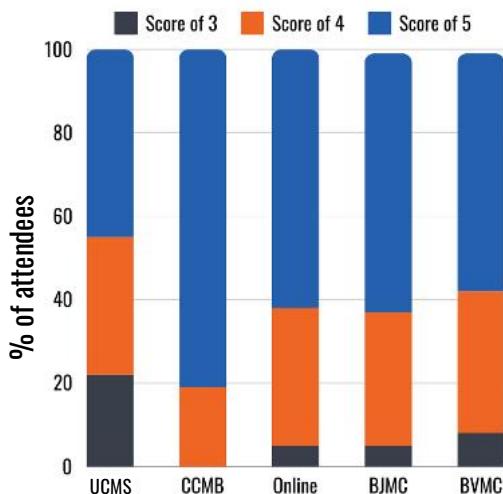
- Judicious Use of Antibiotics
- Rational Prescription
- Hand Hygiene & IPC practices
- Awareness & Patient Education Professional
- Development & Knowledge Enhancement
- Antimicrobial Stewardship
- Proper Disposal of Pharmaceutical Waste
- Restriction of Non- Prescription Antibiotics



3. KNOWLEDGE SHARING:

The workshops aim to motivate participants to become champions for the cause of AMR by actively sharing the knowledge they gain with their immediate circles. The workshops inspired 92% of participants to share their AMR knowledge with peers and family, indicating a broad potential impact beyond the immediate attendees, with 62% rating this motivation at 5 and 30% rating it at 4 on a 5-point Likert scale (Figure d).

Figure d) Responses to the question “On a scale of 1 to 5, how likely are you to share the information you learned about AMR with your peers and family? (1 being not likely, 5 being very likely)”



4. CONTINUED ENGAGEMENT:

Students gave an overwhelmingly positive response when asked if they would like to join an AMR club at their college (77%) and if they would like similar workshops conducted at their college (98.9%). This shows that they are enthusiastic about continuing to engage in dialogue on the topic.

5. INTEREST IN FURTHER LEARNING:

The feedback revealed a strong desire for more detailed AMR sessions and practical demonstrations, indicating that the workshops successfully motivated students to learn more about AMR. Participants found learning about research solutions, such as APSI's surveillance work, very informative, as such topics are often not included in their regular medical education or discussed widely within medical colleges.

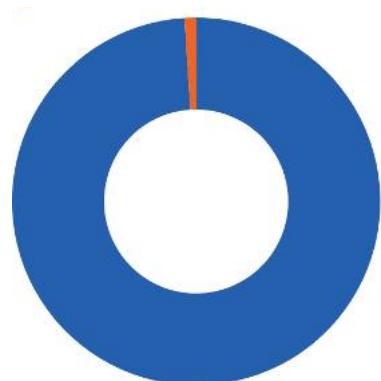
6. SUGGESTIONS FOR IMPROVEMENT:

Most workshop participants (95%) felt that the workshop format, that blended expert talks with games and activities, worked very well and that the information presented was clear (Figure e). Quizzes and the game - Taboo were frequently rated as the most enjoyable activities, underscoring the value of such games in medical education and in engaging students with serious and complex issues like AMR.

Figure e) Representative graphs from BJMC workshop

Was the information presented during the workshop clear and easy to understand?

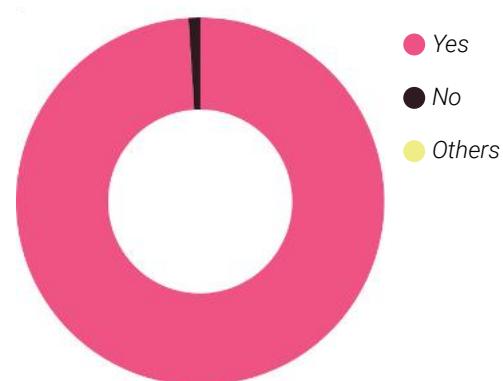
66 responses



- Yes
- No
- The PowerPoint presentations should have been more interesting and the font/graphics to be readable

Were the workshop activities well-organized and engaging?

66 responses



Despite this positive feedback, there was a call for even more engaging and hands-on activities to enhance the immersive learning experience. Focus Group Discussion at CCMB also revealed a preference for more in-depth, clinical case-based questions integrated into games and quizzes, to make them directly relevant to their curriculum and careers. This feedback has been incorporated into future sessions.

In conclusion, the learning evaluation and the participant feedback highlighted significant improvements in knowledge, confidence, and engagement, demonstrating that the workshop effectively addressed its objectives. The interactive format and engaging sessions and activities resonated well with attendees, aiding the understanding of the subject matter and inspiring actionable insights. The success of this approach sets a good foundation for future initiatives with the medical community.

REFLECTIONS FROM EXPERTS, ORGANISERS AND PARTICIPANTS

"The workshops conducted by SaS were compelling and brought the problem of AMR into focus for medical students. The workshops highlighted the importance of practical solutions such as infection control and AMR stewardship. Infection control ceased to be 'just another topic from the syllabus' for them and became a real issue to be dealt with. They provided an opportunity to enthuse young minds by demonstrating, through APSI's work, how scientific methods, such as surveillance, play a critical role in addressing these challenges and how clinicians can actively contribute to research advancements. The innovative structure of the workshops led to the continuous engagement of the audience."

By **Dr Shraddha Karve**, Research Faculty Fellow at Ashoka University, Sonepat.



" We are delighted to have been a part of the AMR Frontline Workshop at BJ Government Medical College, Pune, in collaboration with the Superheroes against Superbugs (SaS) and Pune Knowledge Cluster Foundation (PKCF). The entire process was seamless, thanks to the exceptional coordination led by the dedicated SaS team. The workshop offered our medical students highly engaging and interactive sessions, making the learning process both enjoyable and deeply rewarding. This initiative marks a significant step in empowering our future guardians of health with the critical knowledge to tackle antimicrobial resistance. It has greatly enriched our institution and the educational experience of our students. We look forward to collaborating with SaS on many more such impactful workshops for our students."

By **Dr Rashmita Das**, Associate Professor, Department of Microbiology, BJMC, Pune.



"It is not very often that science communicators reach medical college students, and the SaS workshop was one such engagement. I particularly noticed the detailed materials that the workshop was conducted with, props, cards, and learning tools, in addition to a range of engagement formats such as talks, quizzes, discussions and sharing. While as a medical doctor and clinical microbiologist, I gave a talk on hospital infection control, as a stakeholder in the fight against antimicrobial resistance, I can say that I learnt as much as I shared."

By **Dr Karishma Kaushik**, Clinical Microbiologist & Executive Director, IndiaBioscience

"Through this workshop, I was introduced to a diverse group of individuals united by a common goal: to combat AMR. I was particularly impressed by the speakers at the APSI-AMR workshop held at CCMB Hyderabad. I want to highlight Dr. Shivaranjini Santhosh's session, which stood out for its practical insights into AMR. Unlike typical talks, she provided real-life examples of how AMR affects our society in unexpected ways. The SAS team's nuanced approach to meeting their objectives was particularly inspiring. It demonstrated that a successful event involves not just speakers and an audience, but a collaborative exchange of knowledge. We learned new aspects of AMR from the speakers and also contributed valuable insights, making the experience mutually beneficial. I am grateful to SAS for the opportunity to volunteer and assist with future workshops. Being a student volunteer has been a rewarding experience, reinforcing my commitment to contributing to society."

By **Mr Shreecharan Senthil**, Medical student of Apollo Medical college chittoor and participant of AMR Frontline Workshop at CCMB, Hyderabad

OUTCOMES OF THE WORKSHOP SERIES

These first-of-its-kind workshops for medical students in India have successfully

1. Engaged a total of 1,006 participants, including 686 medical students and 320 medical professionals (practicing clinicians and nursing staff), as of August 2024, to sensitise and encourage them to learn more about AMR and contribute to its solutions.
2. Reached students from 64 medical colleges nationwide, encouraging them to recognize the need to train future medical professionals on AMR and providing them with an engaging and effective strategy to fill this gap in the medical curriculum.
3. Involved AMR champions from across the country as co-experts in these workshops, introducing them to APSI's mission through these interactions. Notable contributors included Dr. Anuj Sharma, AMR Lead at WHO – India Office; Dr. Sonal Saxena, worked with Ministry of Health, Government of India on Antimicrobial Stewardship and Medical Education ; and Dr. Ranga Reddy Burri, President of the Infection Control Academy of India. A full list of experts can be found in the Annexure 2.
4. Engaged leadership and senior doctors from medical colleges as experts in these workshops, thereby connecting them with APSI's AMR surveillance efforts. For instance, UCMS became a clinical partner in the Delhi cluster following the workshop.
5. Involved APSI researchers, partners, and leadership as speakers to provide in-depth insights into surveillance aspects, enhancing awareness of the critical role of surveillance in mitigating AMR among medical institutions and students.
6. SaS developed interactive educational resources to assist anyone looking to engage with medical students on AMR. The list includes activities designed to make discussions on AMR more fun, relatable and engaging for both medical students and experts championing the cause to contribute meaningfully to the conversations.



KEY LEARNINGS AND WAY FORWARD

1. RELEVANCE OF CONTEXT:

It is crucial to place the information we deliver in a context that is directly relevant to participants. Given the highly competitive nature of medical education and the dense syllabus, students engaged more effectively when they understood how learning about surveillance, research, and the science behind AMR would benefit their everyday clinical practice. This approach piqued their interest and curiosity about topics like research and surveillance, which are not typically covered in general medical discourse in the country.

2. SCOPE OF AWARENESS WORKSHOPS:

AMR is a vast field, and awareness workshops can only serve as a starting point to motivate students to explore the topic further. Even a full day is insufficient to delve deeply into each subject covered. The workshops provide a foundation upon which students need to build their expertise.

3. WORKSHOP DURATION:

Although the workshops are offered in various formats—2-hour sessions, half-day, and full-day—experience from these workshops indicates that at least one full day is necessary to provide participants with a comprehensive understanding of each topic and to ensure they leave with a well-rounded grasp of the subject. Due to the extensive content, some sessions lacked sufficient time for activities and feedback.

4. VARIATION IN ENGAGEMENT:

Student interest and engagement varied significantly depending on how the workshop was presented. In colleges where attendance was compulsory, students showed less interest compared to those with voluntary pre-registration, even if it meant attending on a Sunday.

5. IMPORTANCE OF INTERACTIVE AND HANDS-ON SESSIONS:

The feedback revealed that medical students enjoy hands-on/lab sessions a lot. There is, therefore, a lot of merit in incorporating them as much as possible while engaging with this target audience.

6. BIGGER PICTURE:

By creating the opportunity to meet scientists and healthcare technologists, the students see their role in the bigger ecosystem, allowing them to think of their training in medicine more broadly.

7. FOCUSED ENGAGEMENT AND INTEGRATION INTO MEDICAL CURRICULUM:

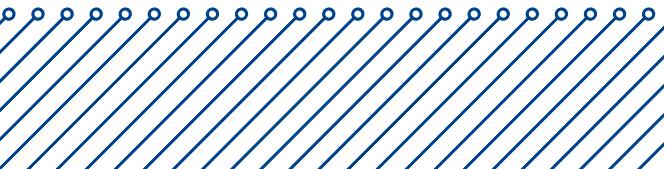
The workshops revealed that medical students typically learn about AMR only at a theoretical level during their MBBS training. Students expressed greater appreciation when they understood the science behind AMR, its impact on their future roles as medical practitioners, and the specific tools and knowledge needed to be AMR-smart and responsible. Participant reflections indicated a strong desire for more in-depth AMR sessions and practical demonstrations. This underscores the need for a more integrated approach to AMR training in medical education, beyond just ad hoc workshops.

CONCLUSION

So far, the series of **AMR Frontline Workshops** have educated and motivated over **1006** medical students, instilling a deeper understanding of AMR and its implications. The feedback underscores the effectiveness of interactive and practical learning approaches in engaging students and enhancing their comprehension of complex topics like AMR.

The workshops not only increased awareness and preparedness among future healthcare professionals but also sparked a keen interest in further exploration and action against AMR. By focusing on the multifaceted nature of the issue beyond its clinical dimensions through sessions on research and surveillance, the workshops aim to empower the participants to actively contribute to addressing the challenge in their future roles as clinicians, policy makers, researchers, or as informed citizens, ultimately becoming champions for the cause of AMR.

The Department of Medical Education, Government of Karnataka, is now partnering with **APSI** and **SaS** to extend the AMR Frontline Workshops to final-year medical students across Government Medical Colleges in the state. This collaboration underscores that the time is right to engage with the medical community on AMR and could be the potential first step to a more integrated approach to AMR training in medical education.



ANNEXURES

6.1 ANNEXURE 1

BRIEF OVERVIEW OF EACH WORKSHOP INCLUDING FORMAT, TARGET AUDIENCE, NUMBER OF PARTICIPANTS AND LINKS TO DETAILED EVENT REPORT.

S. No.	Host Institution	Date	Workshop Format	Target Audience	Number of Participants	Event Reports
1	LV Prasad Eye Institute (LVPEI), Hyderabad	23 June 2023	Full Day	MBBS Students from 3 Medical Colleges	85	
2	University College of Medical Sciences (UCMS), Delhi	12 December 2023	Half Day	MBBS Students from UCMS	120	
3	Government Institute of Medical Sciences (GIMS), Greater Noida	13 December 2023	Half Day	MBBS Students from GIMS	175	
4	Centre for Cellular and Molecular Biology (CCMB), Hyderabad	23 December 2023	Full Day	MBBS Students from 26 Medical Colleges across the country	28	
5	Government Institute of Medical Sciences (GIMS), Greater Noida	16 February 2024	Half Day	Nursing Students and Healthcare Professionals from GIMS	120	
6	Association for Socially Applicable Research (ASAR)	02 March 2024	Online(2 hours)	MBBS students from 30 Medical colleges across the country	43	
7	BJ Government Medical College (BJMC), Pune	09 June 2024	Full Day	MBBS students from BJMC	75	
8	Bharati Vidyapeeth Medical College (BVMC), Pune	11 June 2024	Half Day	MBBS students from BVMC	110	
9	Bangalore Baptist Hospital (BBH), Bengaluru	30 June 2024	Full Day	Healthcare Professionals from BBH and other hospitals in Bangalore	200	

TOTAL AUDIENCE REACHED = 1006

The workshops in different clusters were held in partnership with various APSI partnering institutions.

Hyderabad Cluster: LVPEI and CCMB

Delhi Cluster: Ashoka University

Pune Cluster: Pune Knowledge Cluster (PKC)

Bangalore Cluster: NCBS and Tata Institute for Genetics and Society

6.2 ANNEXURE 2

LIST OF INVITED EXPERTS/SPEAKERS CATEGORIZED INTO THE FOLLOWING FOUR BROAD CATEGORIES:

- AMR Advocate:** Senior clinician, public health expert or policy maker working on AMR for a long time.
- Clinical Microbiologist:** Experts with extensive experience in Hospital Infection Prevention and Control and AMR Stewardship.
- Clinical Expert:** Clinicians dealing with AMR cases in daily clinical practice
- AMR Scientist:** Those working on AMR surveillance analyses and developing new tools for diagnostics and surveillance
- Other Expert:** Related areas to AMR that do not fall under the above categories

S. No.	Name of Speaker	Expertise	Affiliation
1	Dr Ranga Reddy Burri	AMR Advocate	President, Infection Control Academy of India
2	Dr Prashant Garg	AMR Advocate and Clinical Expert	Executive Chair & leader in corneal infections, AMR and eye banking, L V Prasad Eye Institute, Hyderabad
3	Dr Anuj Sharma	AMR Advocate	Team Focal Point for AMR & IPC, World Health Organisation - India Office
4	Ms Sehr Brar	AMR Advocate	Office of Technical Focal Point for AMR, IPC and Labs, World Health Organisation- India Office
5	Dr Vijay Pal Singh	AMR Advocate/ One-Health Expert	Technical Expert: Food Safety, WHO-India; Principal Technical Officer & Associate Professor, CSIR
6	Dr Joveeta Joseph	Clinical Microbiology	Head of Microbiology Services, L V Prasad Eye Institute Network, Hyderabad
7	Dr Bansidhar Tarai	Clinical Microbiology	Associate Director & Head, Microbiology, Molecular Diagnostics & Infection Control, Max Hospitals, New Delhi
8	Dr Sonal Saxena	Clinical Microbiology	Director Professor & Head, Dept. of Microbiology, Maulana Azad Medical College, New Delhi
9	Dr Prabhav Aggarwal	Clinical Microbiology	Associate Professor, Dept. of Microbiology, Maulana Azad Medical College, New Delhi



The list does not include the speakers from the Bengaluru CME workshop at Bangalore Baptist Hospital.

S. No.	Name of Speaker	Expertise	Affiliation
10	Dr Umabala Pamidimukkala	Clinical Microbiology	Professor, Dept. of Microbiology, Nizam's Institute of Medical Sciences (NIMS), Hyderabad
11	Dr Rajesh Karyakarte	Clinical Microbiology	Professor & HOD, Department of Microbiology, BJ Government Medical College, Pune
12	Dr Sushama Pednekar	Clinical Microbiology	Associate Professor, Department of Microbiology, BJ Government Medical College, Pune
13	Dr Karishma Kaushik	Clinical Microbiology	Clinical Microbiologist; Executive Director, IndiaBioscience, India
14	Dr Sivaranjini Santosh	Clinical Expert	Paediatrician, Magna Centre, Hyderabad
15	Dr Bhupesh Bagga	Clinical Expert	Head, Ramoji Foundation Centre for Ocular Infections, LV Prasad Eye Institute, Hyderabad
16	Dr Arati Kinikar	Clinical Expert	Professor & HOD, Department of Pediatrics, BJ Government Medical College, Pune
17	Dr Komal Singh	Clinical Expert	Infectious Diseases Consultant, Bharti Hospital & Research Center, Pune
18	Dr Shraddha Karve	AMR Scientist	Research Faculty Fellow, Ashoka University, Sonipat.
19	Dr Rakesh Mishra	AMR Scientist	Director, Tata Institute for Genetics and Society, Bengaluru
20	Dr Surabhi Srivastava	APSI Team	Chief Scientific Officer, Tata Institute for Genetics and Society, Bengaluru
21	Dr Aradhita Baral	APSI Team	Senior Program Manager, Health Research, Ashoka University
22	Mr Sachin Dubey	Other Expert/ Diagnostics	Founder & CEO, Module Innovations Pvt Ltd.
23	Dr Hitakshi Sharma	Other Expert/Public Health	Public Health Physician and Researcher, Formerly at Maulana Azad Medical College

6.3 ANNEXURE 3

A LEARNING RESOURCE OF KEY THEMES FROM THE WORKSHOP AND A CURATED LIST OF EDUCATIONAL RESOURCES.



Use your phone's camera or a QR scanner app to scan the QR code. Hold it steady for 2-3 seconds. Then, follow the link that appears to access detailed information.





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