Community awareness initiative about antimicrobial resistance: An educational intervention by medical undergraduates

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Abstract:

BACKGROUND: Antimicrobial resistance (AMR) is a global problem and an important consequence of inappropriate use of antimicrobial agents (AMAs). Studies have observed that a lack of awareness of AMR among healthcare professionals as well as consumers results in the irrational use of AMAs, a significant driver of AMR.

MATERIALS AND METHODS: This educational intervention study was undertaken to assess community awareness regarding AMAs and AMR and to educate them. Ten volunteer students from II MBBS were made aware of AMR, its impact and measures to reduce resistance through a lecture by Pharmacology faculty. Students interacted with 220 family representatives in the community to assess their knowledge about AMAs and AMR using a 15-item pre-validated questionnaire. Charts, videos, and role-play were used to impart knowledge about the rational use of AMAs, AMR, and its consequences. Participants' understanding was ensured with feedback taken on Lickert scale.

RESULTS: Students interacted with the study participants and found that most were aware of the term 'antibiotic' (90.8%), but 67% were clueless regarding antibiotic resistance. The purpose of AMA use was not adequately known to 43% as they mentioned using these for diarrhea, viral fever, cough, cold, and sore throat. AMAs were purchased by 40% of participants as OTC medicine, whereas Azithromycin and Amoxicillin were the AMAs they could remember by name. The reasons for buying OTC antibiotics were the inconvenience of doctors' clinic timings, unaffordable consultation charges, and easy antibiotic availability. Students also learned about communication etiquette during this community interaction. This educational intervention proved helpful as the participants agreed that the unnecessary use of AMAs makes them ineffective and AMR is preventable by simple measures.

CONCLUSION: A multifactorial approach involving prescribers, regulatory Government authorities and general public is needed to control irrational use of antimicrobials. Timely interventions are necessary to increase the awareness of AMR in the community.

Keywords:
Antimicrobial agents, antimicrobial resistance, community awareness

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Introduction

Antimicrobial agents (AMA), the mainstay in controlling infections, have significantly reduced infection-related mortality. However, of late, we have started moving to the pre-antibiotic era due to the emergence of antimicrobial resistance (AMR). This has become a global threat.[1,2]

Antibiotic resistance occurs when bacteria and other microbes adapt and become less susceptible to AMAs. With the increasing AMA resistance, the time is not far when treating simple infections will become

difficult and may lead to death. Ever-increasing AMR trends and the tardy emergence of new antibiotics hinder the effective treatment of bacterial infections and threaten the success of modern medical and surgical interventions. Global estimates show that 700,000 people die of drug-resistant infections annually. This is likely to increase to 10 million by 2050 if solid steps are not taken to decelerate AMR.[3] Low and middle-income countries are going to have a significant share of AMR-associated economic and human losses as a high incidence of infectious diseases co-exists with increased rates of AMR.[4-6]

On this background, the Global Action Plan was adopted by the World Health Assembly in May 2015. Apart from encouraging research to obtain more AMAs, the main objective of this plan was to improve awareness about AMR in healthcare providers and the community.[7]

On the one hand, the resistance is increasing; on the other hand, only a few new antimicrobials are in the pipeline. In developing countries like India, infectious diseases are still prevalent and the use of AMAs is very high (24-64%).[8] Widespread use of AMAs is the leading cause of the development of resistance.[9] Apart from getting antimicrobial prescriptions, self-administration of AMAs is present in developing countries like India because of inadequate regulations and the over-the-counter availability of AMAs without prescription.[10] In addition, many patients cannot afford the high cost of medical consultations.[11,12]

Evidence from the literature suggests that there is a lack of knowledge regarding antibiotic use in the community, and more importantly, there is also a lack of awareness about the development of AMR because of its irrational use.[13]

In today's time, raising awareness about AMAs and AMRs is of utmost importance. This study was planned to increase community awareness about AMR and address this perceived need.

Materials and Methods

Study design
It is a Prospective Educational -interventional study that was carried out at a tertiary care center in Pune city.

Study participant and sampling
Study participants who were residing within 5 km of the tertiary care center. A convenience sampling approach was used. The community population was easily reachable, willing, and available, just as these II MBBS students were available for a brief period of time (2 hours per day, 5 days per week for 2 months). Two hundred twenty families were responded throughout this time frame.

Inclusion criteria
Age: 18 years – 70 years and who were willing to participate were included.

Exclusion criteria
Those who were not willing to participate and those who departed the area more than five kilometers from the tertiary care center.

Data collection tool and technique
The study was conducted by volunteer students from second-year medical students on the population residing within a 5 km radius of the tertiary care center.

A team of Ten volunteer students was specially educated on AMR and its consequences by conducting lecture classes by faculty.

To ensure the students' understanding, pre- and post-tests with a pre-validated questionnaire consisting of five open-ended questions were conducted. Students approached 220 families and interacted with them based on a pre-validated questionnaire.

Using references from previous research, the questionnaire was formulated with the study population in mind. It was validated by the faculty of Pharmacology and subject experts for precision and required modifications were performed as per suggestions.

Validation criteria include:
(a) Time required to fill up the questionnaire (10 –15 min)
(b) Questions were appropriate and not repetitive.
(c) Questions were clear, concise, non-ambiguous, and in logical order.

This pre-validated questionnaire was used for the study.

For effective educational intervention in the community, Charts, videos, slogans, and PowerPoint presentations were prepared by students. Students felt that poor communication skills and language would be the barriers they may have to face, so they were trained in role-play activities by the faculty.

Written informed consent was taken from the participants.

Apart from the demographic details, the initial questionnaire consisted of questions regarding the knowledge and perception of using AMAs and AMR (such as Have you consumed AMAs previously? For what purpose? To whom have you consulted before taking AMAs? Are you aware of the AMR?) So,

repeating the same questionnaire for the post-test was not rational.

After the intervention, we collected their feedback on the Lickert scale, which included about five questions we framed, which indicated a change in their perception of the use of AMAs and understanding of the AMR. In the feedback on the Lickert scale, more than 95% of participants strongly agreed and agreed that they would neither use antibiotics without a prescription nor force the doctors to prescribe antibiotics and would complete the course of antibiotics. They also realized that the unnecessary use of AMAs makes them ineffective and thatAMR is preventable through simple measures.

Ethical consideration
After obtaining ethics committee approval (BVDUMC/ IEC/265 – Dated February 15, 2023) study was started.

Statistical Analysis: The categorical data was expressed in percentages and frequencies as it was entered and placed into the Google form. Descriptive and graphical methods were used to analyze quantitative data.

On the Lickert scale, participants' comprehension and students' comments regarding the exercise were recorded.

Results

Student perception of antibiotic use and resistance
Students were aware of the antibiotics, their uses and resistance mechanisms, and the causes and consequences of AMR, but they were not aware of the severity of the problem. After the lecture class, they realized that AMR is a serious global problem. Misuse, irrational, excessive use of antibiotics is a big issue. They agreed that along with the government, we as health care providers should contribute toward controlling the development of resistance by simple measures like community awareness programs.

In reply to how you will bring awareness in the community—students suggested different ways like displaying posters and flyers, using audiovisual aids, going door to door and explaining the consequences of excessive use of AMAs, conducting camps in colleges and factories -making short films, advertisements using social media and displaying it in malls and motivating people to maintain hand hygiene.

Among all the measures, questionnaire-based surveys and educational intervention with charts, PPTs, and audiovisual aids were finalized.

Students felt that language and communication skills, lack of interest in people, and illiteracy would be barriers for them. Guidelines for Effective Communication were discussed, and a role-play activity was conducted to demonstrate effective communication and training.

Community perception of antibiotic use and resistance
In our study, among 220 participants, 46.2% were female, and 53.8% were male. The level of education achieved by respondents was as follows: secondary level (23.5%), under graduation (44.9%) and post-graduation (13.2%) and primary level 18.4%. 36% of respondents were from the age group 18-30, 48.2% were from 30-60%, and 15.8% were from 60 to 70 years.

The word antibiotic was known to 73.8% of respondents, while 67% were clueless about the word antibiotic resistance. About 98.2% of respondents had consumed antibiotics previously. Antibiotics were typically consumed twice a year (52.4%). 90.5% of those surveyed used antibiotics for a cough and cold (90.5), Sore throat (65.5), 78.7% for a fever, and 33.5% for diarrhea. Azithromycin (28.5%) and amoxicillin (10%) were the AMAs they could remember by name.

According to 76.9% of respondents, doctors and pharmacists were giving information about—dosage, duration, and frequency, but they were not talking about resistance, adherence, and adverse effects. In this study, 14% of patients did not finish the prescribed antibiotic treatment course, and more than 25% modified their dose and drug without consulting their physicians.

After taking an antibiotic, 66.5% report feeling better. For those who did not feel better after finishing their antibiotic course, 73.3% went back to the doctor for advice, 23% went to the pharmacist, and 2% modified their antibiotic dosage without consulting a physician.

In our study, 67% of respondents were clueless about the word antibiotic resistance. Those who were aware of the word could only explain that resistance means the ineffectiveness of antibiotics. They were unaware of the causes and consequences of antibiotic resistance.

Students presented role plays, infographics, and brochures to raise awareness of antibiotic resistance among the public. They have discussed with them the consequences of antibiotic resistance, the precautions they should take while using antibiotics, and how to avoid developing antibiotic resistance.

In the feedback on the Lickert scale, more than 95% of participants agreed that they neither use antibiotics without a prescription nor force the doctors to prescribe antibiotics and would complete the course of antibiotics. They also realized that the unnecessary use of AMAs

makes them ineffective and that AMR is preventable through simple measures.

Discussion

Antimicrobial resistance (AMR) is a severe worldwide problem. It is an essential consequence of the irrational use of antibiotics by the general public and healthcare providers.[14,15]

In 2019, there were an estimated 4.95 million deaths globally due to AMR. It has been noticed that a person's knowledge, attitude, and beliefs about antimicrobials drive their use. This can be seen in their consultation behavior when they request antimicrobials from their GPs or by self-medication.[16]

Therefore, one important strategy to control AMR and influence behavior is appropriate communication about unnecessary antimicrobial use and the spread of AMR.[17]

This educational interventional study was undertaken to assess the community's knowledge and awareness of AMAs and AMR and to educate them. Ten volunteer students from the second MBBS were selected to conduct this study. Initially, students knew about antibiotics but were unaware of the causes, consequences, and impact of AMR on the community (pre-test). Students were made aware of AMR, its impact, and measures to reduce resistance through a lecture by Pharmacology faculty. Their understanding was ensured by taking a post-test.

Different studies have observed that a lack of knowledge and awareness of AMR can result in the irrational use of antibiotics, a major driver of AMR.

To address this issue, a group discussion was arranged to discuss different ways of intervention, barriers to this intervention, and measures to overcome them. It was decided to impart knowledge to the community with the help of charts, videos, and role-play activities. Students prepared self-explanatory charts, which had a good impact. Demonstration of effective communication by role-play helped them to communicate their message to people confidently.

With the structured questionnaire, students interacted with people in the predefined area to assess their knowledge about AMAs and AMR. They imparted knowledge about the rational use of AMAs, AMR, and its consequences with the help of charts, videos, and role-play activities. The feedback on the Lickert scale guaranteed their understanding.

Students interacted with family members. A person having deciding power for antibiotic use was considered the family representative.

Knowledge about the term 'antibiotic' was good (90.8%) among the respondents. People with higher education had an edge over the others. A study conducted in the Rupandehi District in Nepal also observed that education was the only sociodemographic factor associated with knowledge, attitudes, and practices related to antibiotic use.[18] Respondents with higher education had better knowledge and more appropriate attitudes and practices, a finding consistent with other studies.[19-21]

A study in Japan found a positive association between high education levels and knowledge of AMR.[22] Similar findings from Norway indicated that less educated and poorer people are targets for AMR communication.[23] Moreover, it is undeniable that education determines health literacy, including antibiotics and AMR. A study in London showed that 32% of people in affluent areas have more exposure to antibiotic campaigns than in deprived areas at 17%.[15]

Our study observed that people were consuming antibiotics for conditions like diarrhea, viral fever, cough-cold, and sore throat [Figure 1] due to the lack of clarity about the purpose. Our results are consistent with the results of studies conducted by Patil and Agarwal[24] and Bertoldi *et al.*[25] in which antibiotics were used by people primarily for viral fever, cold, and sore throat.

Studies conducted in Britain and Lebanon showed that 42% and 39% of people believed that antibiotics were used for cold and flu.[26,27] Cough syrups, antipyretic, and analgesic drugs were the frequently consumed self-medicated Over the counter (OTC) drugs. Surprisingly, we observed that 40% of people also purchased antibiotics as an OTC medicine. Azithromycin (28.5%) and amoxicillin (10%) were the commonly consumed antibiotics readily available over the counter. During COVID-19, these AMAs were prescribed frequently, which could be why people prefer them and remember their names. In a cross-sectional survey conducted in west Maharashtra, they observed that amoxicillin and azithromycin were highly dispensed OTC AMAs.[24]

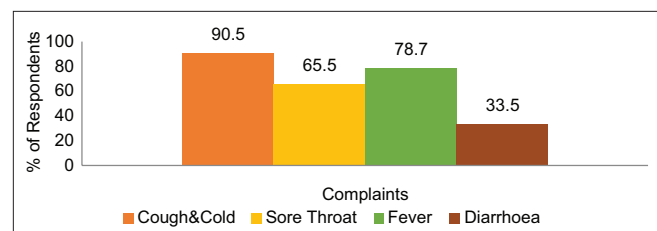In India, getting antibiotics without a Physician's prescription is easy. Dispensing antibiotics without

Figure 1: Complaints for which antibiotics are consumed

prescriptions is considered to play a fundamental role in AMR. Different studies suggest that countries with high levels of AMR have an increased incidence of non-prescription antimicrobial sales and use in the community. India is a country with increased sales of non-prescription antibiotics. The government has prepared laws and regulations regarding the sale of antibiotics, yet pharmacists sell antibiotics without prescription because of lax implementation of regulations in India; the Drugs and Cosmetics Act 1940 and the Drugs and Cosmetics Rules (DCR) 1945 designate all antibiotics as prescription drugs under the Schedule H category.[28,29]

In 2014, a Schedule H category was amended to include second- and third-generation antibiotics into a new category called Schedule H1, which also curbed non-prescription sales.

However, several studies before and after 2014 indicate that consumers can still purchase antibiotics without a valid prescription as pharmacists still dispense antibiotics to their customers/clients/patients by attending to their symptoms.[30-33]

In our study, 62% of people took antibiotics after doctor consultation. Around 30% of people preferred to take it from the pharmacist, and 10% took it as self-medication. [Figure 2] People are reluctant to consult doctors because of the high consultation fees, unavailable doctors, and inconvenient consultation timing, among other reasons. 35% of people also do not know its importance. [Figure 3] A qualitative study conducted in Haryana and Telangana revealed the exact reasons for OTC drug consumption: lack of easy access to public healthcare facilities, economic and time constraints, lack of stringency in implementing laws, scanty inspections, and safeguarding of commercial interests.[34]

In our study, it was observed that people got information regarding the dose, route, and duration of antibiotics (76.9%) from doctors and pharmacists.

14% of respondents did not finish the course, as 25% of respondents preferred to go to a Pharmacist to change the antibiotic and few even modified dosage according to their convenience. This suggests that people were unaware that the inappropriate use of antibiotics can lead to AMR. In our study, about 67% of people were unaware of the AMR and the dangerous outcome of it. Our findings are consistent with the survey conducted in Cyprus, where 21.2% of respondents had never heard of the term antibiotic resistance.[35]

To control the irrational use of AMAs, a multifactorial approach involving prescribers (health care workers including physicians and pharmacists), regulatory government authorities, and the general public is needed. Timely interventions are required to increase the awareness in the community. Promoting appropriate antibiotic use can be successful when local context, target population, and barriers are considered in the intervention's design.

In this context, this educational intervention activity was planned and implemented. Volunteer medical students imparted knowledge about antibiotic resistance and measures to prevent it to the community. It was their first experience to interact with the community. Group discussion and practice with the role-play helped them a lot. Students learned a lot during their interactions with people. People initially used to be reluctant to listen to the information due to a lack of time. To overcome this, students practiced delivering the information briefly in an exciting and impactful manner with the help of short videos and charts.

This intervention proved to be fruitful, as most of the participants realized that unnecessary use of AMAs makes them ineffective, and AMR is preventable by simple measures. Students also learned communication etiquette and realized their duty toward the community.

The strength of our study is that since we had volunteers who were second-year MBBS students, it helped them build interpersonal communication skills that will be useful to them in the future. They also realized that they had a responsibility to the community to raise
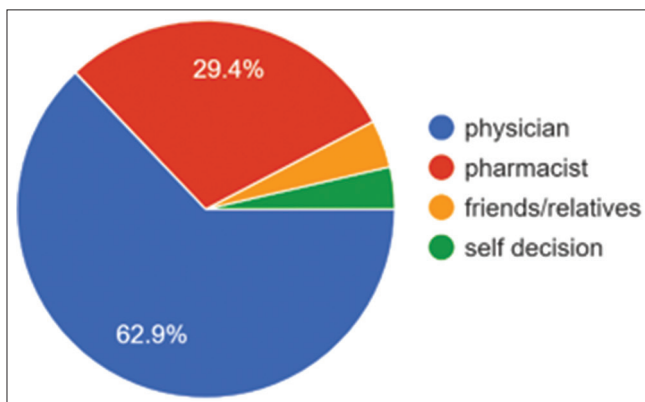

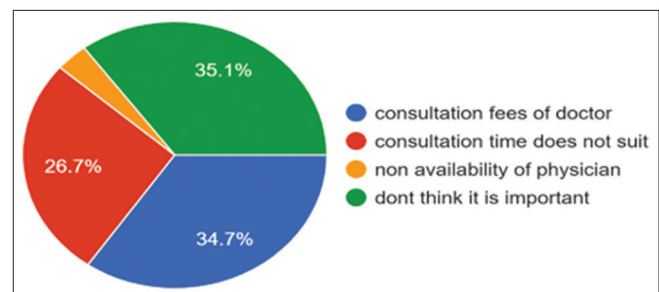**Figure 2:** Consultation before starting antibiotics

Figure 3: Reasons to Avoid Physician's Consultation

awareness about the proper use of AMA. This will assist in mitigating the AMR problem to some extent as community knowledge of the prudent use of AMA has been raised.

Limitation and recommendation

The tiny sample size came from a location close to our tertiary care facility within 5 km. Large-scale research can be performed on it to raise community awareness of AMR and AMA use.

Conclusion

To control the irrational use of AMAs, a multifactorial approach involving prescribers (health care workers including physicians and pharmacists), regulatory government authorities, and the general public is needed. Timely interventions are needed to increase the awareness in the community.

Conflicts of interest

There are no conflicts of interest.

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