



EVALUATION OF KNOWLEDGE AND AWARENESS OF AMA USE, AMA POLICY AND ANTIBIOGRAM AMONG RESIDENT DOCTORS AFTER 4 YEARS OF IMPLEMENTATION OF AMA POLICY IN A TERTIARY CARE HOSPITAL.

Pharmacology

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ABSTRACT

Introduction-Antimicrobial resistance is an important concern for the public health authorities at the world level. The widespread use of antimicrobial agents has been the cause of the emergence of AMA (antimicrobial agents) resistance pathogens. Antibio gram is an overall profile of antimicrobial susceptibility results of a microbial species to a battery of antimicrobial agents. The AMA policy is an effort to rationalize the use of antimicrobial drugs in the hospital keeping in mind the current sensitivity patterns of hospital bacteria and availability in the drug store.

Objectives:To assess the knowledge and awareness of resident doctors regarding antimicrobial use, AMA policy of the hospital, Antibio gram in hospital.

Methods:Cross-sectional, questionnaire-based study was conducted. Percentages of marks obtained were calculated and graded using the IIT scale.

Results:70% of the resident has the knowledge, about which topical preparation is used for infection due to Methicillin Resistance Staphylococcus aureus (MRSA) infection. Only 5% (3) resident doctors scored marks between 81 to 90 (i.e. excellent). 66.6% of resident doctors mentioned that standard treatment guidelines are the source for choosing empirical antimicrobial agents for their patients.

Conclusion:This study demonstrated that knowledge and awareness of AMA use along with AMA policy and antibio gram among resident doctors is gradually improving. It also highlights the need for suitable educational interventions which will improve the antimicrobial prescription to the maximum.

KEYWORDS

INTRODUCTION

In India, the infectious disease burden is highest in the world and a recent report showed the inappropriate and irrational use of antimicrobial agents led to an increase in the occurrence of antimicrobial resistance^[1]

Antimicrobial resistance is an important concern for the public health authorities at the world level. However, in developing countries like India, recent hospital and some community-based data showed increase antimicrobial resistance. Antimicrobial agents are among the most commonly used and misused of all drugs. The widespread use of antimicrobial agents has been the cause of the emergence of AMA resistance pathogens^[2]

The problem of AMA-resistant bacteria is increasing in the hospital setting, as well as in the community.^[3] In the early days of AMAs, booming drug development meant that even when resistance developed, a new drug was always available to treat the increasingly resistant bacteria. Fourteen new classes of AMAs were introduced between 1935 and 2003.

But currently, the options for treating increasingly resistant infections are becoming more and more restricted.^[4]

Reducing inappropriate AMA use is the best way to control resistance. Although awareness of AMAs misuse is increasing, over-prescribing remains widespread, this is driven largely by patient demand, time pressure, diagnostic uncertainty, and delay in the diagnostic procedures like culture sensitivity report. If the gain in the treatment of infectious disease is to be preserved, the clinician must be more precise in the use of antimicrobial agents.^[2]

One of the ways towards more precise use of AMA is using an antibio gram while prescribing antimicrobial agents. Antibio gram can be defined as an overall profile of antimicrobial susceptibility results of a microbial species to a battery of antimicrobial agents which should reflect patient care needs along with the institution's formulary.^[5]

When properly prepared and analyzed, an antibio gram is an important resource for doctors. When we don't have patient-specific cultures and sensitivity reports the antibio gram may guide empirical therapy decisions based on likely organism and their probable susceptibilities to anti-infectives available at the institution.^[5]

Doctors and infection control personnel use antibio gram data in monitoring resistance trends, identifying outbreaks, developing quality improvement initiatives, and forming infection control policies and procedures. Pharmacy and Therapeutics committees use data antibio gram when making anti-infective formulary decisions and establishing drug use policies.^[5] Formulation & implementation of an AMA policy is a first step in implementing the rational use of AMAs. It is also a step towards controlling the spread of antimicrobial resistance in a hospital.

Antimicrobial stewardship has been defined as "the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with less toxic to the patient and least impact on subsequent resistance. The goal of antimicrobial stewardship is to use the appropriate AMA along with the prevention of misuse of AMA and to minimize the development of resistance."^[4]

For fulfillment of these goals, doctors must know the appropriate AMA to be used for the said organism. Also, the doctor should know the hospital AMA policy and antibio gram. It is also necessary that the doctor could interpret the antibio gram properly for the use of appropriate AMA.

Purpose of the study:

As antimicrobial resistance is of concern for India, authors decided to undertake this study for knowledge and awareness of AMA use along with AMA policy and antibio gram after 4 years of implementation of AMA policy.

Aims and Objectives

- 1) To assess the knowledge and awareness of resident doctors regarding:
 - Antimicrobial use
 - AMA policy of the hospital
 - Antibio gram in hospital

MATERIALS AND METHODS:

A cross-sectional survey was carried out among resident doctors attending wards and patients of a tertiary care hospital in Pune. Participation was voluntary. Before the administration of the questionnaire, the background and intentions of the survey were explained, and resident doctors were encouraged to participate. The study was conducted after approval of the institutional ethics

committee of a tertiary care hospital in Pune. A questionnaire was administered to the resident doctors. In the questionnaire, 13 were the multiple-choice questions with four options were given, 6 questions were of yes/no type question. The correct response was given 1 mark and zero marks were given to the wrong answer or unmarked question. Percentages of marks obtained were calculated and graded using the IIT scale for total marks obtained by each resident doctor. For other parameters percentage obtained were calculated

Sample size:

A sample of 60 resident doctors was included in this study.

Inclusion criteria:

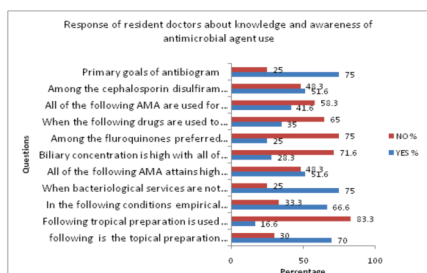
1. Resident those who prescribes medicines and have completed at least 6 months of residency in Sassoon general hospital Pune
2. Resident doctors those were ready to give consent.

Exclusion criteria:

1. Residents of anesthesia, and paraclinical department
2. Resident doctors those have not completed 6 months of residency
3. The resident who does not want to participate voluntarily in this study were excluded.

RESULTS:

The percentage of the resident who solved the MCQ correctly and those who have not solved were calculated and a graph was drawn.



The response of resident doctors about knowledge of antimicrobial agent used in percentage (Graph.1)

Graph1 suggests that 70% of the resident have the knowledge, about which topical preparation is used for infection due to Methicillin Resistance Staphylococcus aureus (MRSA) infection. Whereas only 16.6% of residents have knowledge about which topical preparation is used to prevent pseudomonas infection in burns. 66.6% of the residents could answer in which condition empirical antimicrobial therapy can be started before culture and sensitivity report, 75% of the residents could answer that when bacteriological services are not available empirical combination therapy to be preferred to cover all likely organism. Whereas 51.6% of resident have knowledge about which antimicrobial agents attains high concentration in cerebrospinal fluid (CSF). Only 28.3% of resident have knowledge about antimicrobial agents that attend high biliary concentration and 25% of resident have knowledge about fluoroquinolone preferred for meningococcal infection. Whereas 35.5% of residents have knowledge about the AMAs which also covers anaerobic infections and metronidazole is not required necessarily to treat such infection. Only 41.6% of resident have knowledge about antimicrobial agents (AMA) used to treat Methicillin Resistance Staphylococcus Aureus (MRSA) infection whereas 51.6% of residents knew about cephalosporin, having disulfiram like interaction with alcohol and 75% of residents have knowledge about the primary goals of the antibiogram.



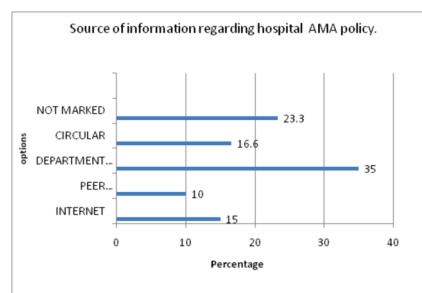
Graph.2 - The percentage of resident who obtained grades as per grading of IIT

Graph .2 show that marks obtained by an individual resident about knowledge and awareness based question were calculated. It has been seen that none of the resident doctors scored mark between 91 to 100 (i.e., outstanding), only 5% (3) resident doctors scored marks between 81 to 90 (i.e., excellent), 8.3% (5) resident doctors scored marks between 71 to 80 (i.e., very good) and between 61 to 70 (i.e., good). 13.3% (8) resident scored marks between 51 to 60 (i.e. above average), 38.3% (23) resident doctor's marks between 35 to 50 (i.e. pass) and 26.6% (16) residents scored marks below 35.

Table.1 Percentage response of resident doctors about awareness towards AMA policy and antibiogram.

Questions/statements	yes%	no %
Are you aware of the term AMA policy?	65	35
Does your hospital have its own AMA policy?	58.3	41.6
Is the recent AMA policy important useful in the empirical selection of AMA for your patient?	75	25
AMA policy is an obstacle more than help to clinical care.	13.3	78.3
Are you aware of the term antibiogram?	58.3	41.6
Is an antibiogram helpful in tracking resistance trends in infections?	66.6	33.3

Table.1 show that questions about attitude of the resident regarding AMA policy and antibiogram were asked 65% of resident doctors were aware about term AMA policy and 58.3% of resident have awareness that this institute have their own AMA policy for hospital, whereas about 75% resident agreed that AMA policy is important and useful in empirical selection of AMAs for their patients. 78.3% of residents said that AMA policy is not an obstacle but merely it is helpful. 58.3% of residents were aware of term antibiogram whereas about 66.6% of resident agreed that antibiogram is helpful in tracking resistance trends in infections



Graph .3 Source of information regarding hospital AMA policy

Above graph .3 shows that 58.3% of resident have knowledge that their hospital has AMA policy. Out of this 58.3%, only 35% of residents marked departmental discussion as a source of information for hospital AMA policy and about 16.65% resident had said that circular is the source of information, while 10% and 15% of resident marked as peer discussion and internet respectively. While 23.3% resident doctors had not marked any options.

Table.2 shows how the resident doctors decide empirical antimicrobial agents for their patients.

Resident doctors decision about selecting an empirical antimicrobial agent			
How you decide the empirical AMA for your patient.	Senior prescription	Standard treatment guidelines/AMA policy	Medical representative
Percentage	11.6	66.6	21.66

66.6% of resident doctors mentioned that standard treatment guidelines are the source for choosing empirical antimicrobial agents for their patients, while 21.6% of resident doctors said medical representative as the source of empirical AMA use, whereas 11.6% of resident doctors said senior doctor's prescription as a source.

DISCUSSION:

Among the world, India is the largest consumer of AMAs. The efficacy of several AMAs is endangered by the emergence of resistant microbial pathogens⁽⁶⁾ The crude mortality from infectious diseases in India today is 417 per 100,000 persons. Consequently, the impact of AMR is likely to be higher in the Indian setting.⁽⁷⁾

In 2008, about 29% of isolates of *Staphylococcus aureus* were methicillin-resistant, which had risen to 47% in 2014⁽⁷⁾ Further to avoid resistance or to limit the resistance pattern resident doctors should have knowledge about MRSA and AMA which are used in it. This study showed that 70% of the resident doctors have knowledge about which topical preparation is used for infection due to Methicillin Resistance *Staphylococcus Aureus* (MRSA) infection. Only 41.6% of resident doctors have knowledge about AMA used to treat systemic MRSA infection Outer-membrane barriers, presence of efflux pumps, and endogenous antimicrobial inactivation are the reasons because of which *P. aeruginosa* shows a primary resistance to most of the antimicrobial agents. The selection of a suitable AMA is complicated by the ability of *P. aeruginosa* to develop resistance to multiple classes of antibacterial agents, and the appropriate choice of AMA to begin treatment which is essential in optimizing the clinical outcome.⁽⁸⁾ It is also necessary to prevent pseudomonas infection.

In the study, it has been seen that 16.6% of resident doctors have knowledge about which topical preparation is used to prevent pseudomonas infection in burns. This knowledge is important in the selection of AMA in gram-negative infections. This suggests need of giving training to resident doctors about overall AMA use.

The empirical AMA therapy is defined as the initial AMA regimen started within 24 hours of admission.⁽⁹⁾ One of the best approaches is to use broad-spectrum antimicrobial agents as initial empiric therapy so that multiple possible pathogens would be covered that are commonly associated with the specific clinical syndrome. This is true for both hospitals as well as community-acquired infections. During the selection of empiric antimicrobial therapy for such infections, the site of infection and the organisms most likely to be colonizing that site should be considered by the clinicians. Doctor also should have prior knowledge of bacteria known to colonize a given patient and local bacterial resistance patterns or antibiograms that are available for important pathogens at most hospitals should be taken into consideration⁽¹⁰⁾ In our study we found that 66.6% of resident could answer in which of the following condition empirical antimicrobial therapy can be started before culture and sensitivity report and 75% of resident doctors could answer that when bacteriological services are not available which empirical combination therapy should be preferred to cover all likely organism. This suggests that the knowledge of doctors with regard to choosing empirical AMA is satisfactory.

'How you decide the empirical AMA for your patient?' for this question 66.6 % doctors said that they use standard treatment guidelines whereas 21.66% doctors said MR as a source for their empirical AMA selection whereas surprisingly only 11.6% resident doctors follow their senior doctor for empirical AMA selection.

It is seen that 35.5 % of resident doctors have knowledge about the AMAs which also covers anaerobic infections and metronidazole is not required necessarily to treat such infections. This result is suggestive that around 65% of resident doctors are using metronidazole unnecessarily, which contributes to additional adverse drug reaction of metronidazole and an increase in the cost of treatment.

In the adequate management of central nervous system (CNS) infections, it is required that antimicrobial agents penetrate the blood-brain barrier (BBB) and also achieve concentrations in the CNS adequate for the eradication of the infecting pathogen. An understanding of antimicrobial pharmacokinetics and pharmacodynamics is also important for the selection of the most appropriate treatment regimen for CNS infections.⁽¹¹⁾ This study shows that 51.6% of resident doctors have knowledge about which antimicrobial agents attain a high concentration in cerebrospinal fluid (CSF).

The newer fluoroquinolones are attractive alternative agents for treating numerous infectious diseases because of its broad-spectrum antimicrobial activity, bioavailability, penetration into tissues, once a day dosing. The increase in bacterial resistance in clinical isolates has been reported and developing resistance and the inappropriate use of ciprofloxacin is a concern to many doctors. Therefore, it is important for all clinicians to review the chemical, microbiologic, and pharmacologic features and the clinical uses of the fluoroquinolones.⁽¹²⁾ In our study, only 25% of resident doctors have knowledge about fluoroquinolone preferred for meningococcal infection i.e. 75% resident doctors are not aware of fluoroquinolone pharmacology this

suggests the need of more training about fluoroquinolones as a treatment option to treat infections.

Consumption of alcohol is common for some people. Alcohol when consumed with certain drugs it shows disulfiram like reaction. The manifestation varies from mild reactions like facial flushing, nausea or vomiting, to a severe reaction including angioedema, hypotension, shock, or death⁽¹³⁾ hence which drugs /AMAs cause such reactions should be known to the resident doctors to avoid it. 51.6 % of resident doctors had knowledge about cephalosporins, having disulfiram like interaction with alcohol.

Irrational AMAs prescription is a major cause of concern and bacteria once exposed to AMAs have the capacity to adapt and develop resistance. The current situation is that there are very few newer AMAs in the pipeline. The AMA policy is an effort to rationalize the use of AMAs in the hospital keeping in mind the current sensitivity patterns of hospital bacteria and the availability of AMAs in the medical store of the hospital. Every hospital ideally should have its own AMA policy according to the sensitivity pattern. This tertiary care center has its own AMA policy⁽¹⁴⁾. In this study, 65% resident doctors were aware of the 'term' AMA policy and about 75% resident doctors agreed that AMA policy is important and useful in the empirical selection of AMAs for their patients, 78.3% of resident doctors said that AMA policy is not an obstacle but merely it is helpful. But it is important finding that only 58.3% of resident doctors have knowledge that this institute has its own AMA policy for the hospital.

Out of this 58.3 %, 35% of resident doctor's marked departmental discussion as a source of information for hospital AMA policy and about 16.65% resident doctors had said that circular is the source of information, while 10% of resident doctors marked as peer discussion. Whereas 15% of resident doctors marked as the internet is the source of information for AMA policy.

This suggests that after 4 years of preparing and introduction of AMA policy in this institute around 40% of doctors are unaware of it. This indicates the need for introduction and importance of AMA policy to the resident doctors in their orientation program.

The reporting of cumulative and ongoing summaries of institutional patterns of antimicrobial susceptibilities is called antibiograms. Antibiograms are often used by clinicians to assess local susceptibility rates and as an aid in selecting empiric antimicrobial therapy. It helps monitor resistance trends over time within the institution. Antibiograms can also be used to compare susceptibility rates across hospitals and track resistance trends.⁽¹⁵⁾ This study showed 58.3% of resident doctors were aware of the term antibiogram whereas about 66.6 % of resident doctors agreed that an antibiogram is helpful in tracking resistance trends in infections. 75% of resident doctors have knowledge about the primary goals of the antibiogram.

CONCLUSION:

This study demonstrated that knowledge and awareness of AMA use along with antibiotic policy and antibiogram among resident doctors are gradually improving. It also highlights the need for suitable educational interventions which will improve the antimicrobial prescription to the maximum.

Proper guidance regarding hospital antibiotic policy, antibiogram and actual knowledge about the pharmacology of antimicrobial agents are required in resident doctors. This would improve the efficient and effective use of AMA and minimize the development of antimicrobial resistance

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