Awareness to Clinical Antimicrobial Sensitivity Reporting: a questionnaire-based study.

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Abstract: Antimicrobial resistance (AMR) has emerged as one of the leading public health threats of the 21st century. The clinical microbiology reporting of culture and antimicrobial susceptibility test, if communicated and understood correctly, may lead to effective treatment without increasing the AMR burden. This questionnaire-based study was conducted to access the awareness of microbiology reporting and resistance related comments among clinicians. A questionnaire consisting of 10 questions was prepared and circulated among clinicians of different departments to assess the level of awareness to microbiology reporting maintaining their confidentiality, and their responses were recorded manually. 62 (91%) out of 69 clinicians were aware of the remarks written on the microbiology report, and 35 (51%) clinicians were agreed that these remarks were relevant to guide them for antimicrobial prescriptions. When asked about remarks like "MRSA and High content gentamycin and streptomycin sensitivity interpretation", 34(50%) and 24(35%) responded correctly, respectively. On asking about their action to remarks like "Contaminated" and "Commensal flora", 51(73%) clinicians provided the right answer. Some direct questions related to avoidance of particular antibiotics as for example use of Tigecycline in Bacteremia and Nitrofurantoin (intrinsic resistance) in cases of proteus spp. 20 (29%) and 42(62%) participants were aware of the standard guidelines respectively, while 29(42%) clinicians responded correctly that in case of ventilator associated pneumonia (VAP), intermediate sensitivity colistin should be given inhalationally. There is an urgent need for the microbiology laboratory to incorporate various comments, advices and additional messages. Also, there should be a clear communication and case based discussion between clinician and microbiologist.

Key Words: antimicrobial resistance, antimicrobial susceptibility testing, awareness.

Introduction: Bacterial antimicrobial resistance (AMR)—which occurs when changes in bacteria cause the drugs used to treat infections to become less effective—has emerged as one of the leading public health threats of the 21st century. The Review on Antimicrobial Resistance, commissioned by the UK Government, argued that AMR could kill 10 million people per year by 2050, and this leads to higher medical costs, prolonged hospital stays, and increased mortality [1]. Healthcare providers play an essential role in preventing infections and stopping the spread of drug resistant organism. In most developed countries, one of the most pressing concerns is how to prevent the transmission of infectious diseases within hospitals, either between patients or to medical staff and visitors [2-4]. Patients might visit our practice with an infection or can get infections when receiving health care in a facility, so it's our responsibility to curb the bug before creating disaster. If we are not aware of the standard protocols, guidelines, then of course, we are taking part in worsening the situation either intentionally or unintentionally. The clinical microbiology reporting for culture and antimicrobial susceptibility test is the most important investigation reported from a microbiology laboratory. Furthermore there is a wide communication gap between clinicians and microbiologists making the situation more serious. [5] So this study is conducted in the form of questionnaire to increase the awareness to microbiology reporting among clinicians, so that the gaps either communication or ignorance can be filled up with necessary actions that will help to reduce the burden of AMR in our set up.

Materials and Methods: A questionnaire of 9 multiple choice questions were prepared and circulated among clinicians of different departments particularly Surgery, Orthopaedic Surgery, Gynaecology, Oto-rhinolaryngology, Medicine and Pediatric, Tuberculosis and Respiratory diseases and Intensive care units (ICU) from where we received our bulk of samples, to access the level of awareness to microbiology reporting and their understanding related to our comments, maintaining their confidentiality, and their responses were recorded manually. Questionnaire attached in annexure I.

Results: 62(91%) out of 69 clinicians were aware of the remarks written on the microbiology report while 7(9%) were not though we were not expecting even this much of unawareness. 35 (51%) clinicians were agreed that these remarks were very relevant to guide them for antimicrobial

prescriptions and they often get benefit from our remarks. When asked about remarks like "MRSA and High content gentamycin and streptomycin sensitivity interpretation", 34(50%) and 16(23%) responded correctly respectively but 31(46%) response were disappointing they said they will not use vancomycin in cases of MRSA. On asking about their action to remarks like "Contaminated", 51(73%) clinicians provided the right answer that resends the samples, while 6(9%) clinicians said that they usually ignore the report, and 6(9%) clinicians reported that they prescribed other antibiotics from there side without consulting from microbiologists. Some direct questions related to avoidance of particular antibiotics as for example use of Tigecycline in Bacteremia and Nitrofurantoin (intrinsic resistance) in cases of proteus spp. 20 (29%) and 42(62%) participants were aware of the standard guidelines respectively, and rest of the clinicians stated about incorrect antibiotics and 5(7%) were given no any answer it was really disappointing to mention that 25(36%) clinicians said that they will repeat the culture or wait for 3 days to see the responses if UTI is not responding in case of proteus spp. infection. 29(42%) clinicians responded rightly that in case of ventilator associated pneumonia (VAP), intermediate sensitivity colistin should be given inhalationally and 34 (49%) response were wrong they said either intravenous colistin should be given or any other combination can be used along with colistin.

Do you consider microbiology remark relevant to guide you for prescription?	Very often 16 (23%)	Often 35 (51%)	Sometimes 16 (23%)	Never 1 (1.5%)
For MRSA which of the antimicrobials cannot be prescribed	Cotrimoxazole 13 (19%)	Cefepime 34 (51%)	Vancomycin 18 (26%)	Didn't mark 3 (4%)
Which of the following treatment option has no benefit for High content gentamycin and streptomycin	Ampicillin+ Vancomycin 16 (23%)	Ampicillin+ Gentamycin 24 (35%)	Vancomycin+ Gentamycin 17 (25%)	Vancomycin+ Amikacin 3 (4%)
Antimicrobials should not be given in Bacteremia	Meropenem 4 (5%)	Tigecycline 20 (29%)	Colistin 36 (52%)	Piperacillin+ Tazobactum 3 (4%)
UTI patient culture positive for proteus spp. not responding to Nitrofuratoin your action	Wait for three days 7 (10%)	Change the antibiotics 42 (62%)	Repeat the culture 18 (26%)	No answer 1(2%)

In VAP patients with intermediate colistin sensitive, your choice would be	IV Colistin 15 (22%)	Inhalational Colistin 29 (43%)	Colistin+ Polymyxin-B 18 (26%)	Colistin+ Minocycline 1 (1%)
Your action when you receive a "CONTAMINATED" or "COMMENSAL" on reporting.	Resend sample 51 (73%) & 36 (52%)	Ignore the report 6 (8%) & 2 (3%)	Prescribe from their side 6 (9%) & 7 (10%)	Discuss with microbiologists 6 (9%) & 23 (33%)

Discussion: In our study, we found the relevance of comments on the microbiology report. About 98.5% of clinicians agreed that they benefited from the comments. So there is an urgent need for the microbiology lab to raise the standards of their clinical microbiology report by adding different comments, suggestions, and added messages. There are different kinds of comments, such as report categories, in-progress reports, filling out a requisition form, collecting a sample, footnotes in the AST table, infection control recommendations, suggestions about antimicrobial agents, comments about predicted susceptibility, and comments about intrinsic resistance. The usage of comments will substantially assist physicians in rationalizing their antimicrobial practice, improvising specimen collection and requisition form-filling procedures, and finally implementing the proper infection control procedures**.**

In this study, we also found a wide communication gap between clinicians and microbiologists. For the interpretation of comments like "Cefoxitin is a surrogate marker for MRSA", [6] the response of 46% of the clinicians was wrong. The probable reason for this could be not giving importance to the comment, and this may lead to the further spread of MRSA as many studies show that MRSA prevalence is increasing and has become a serious concern worldwide, including in India. [7-9] Likewise, in another comment, "Susceptibility to High content gentamycin and streptomycin", [6] responses were not very promising, only 23 % of the clinician responded correctly.

In Indian medical colleges, the majority of medical employees in microbiology departments are engaged in laboratory result reporting, educating medical students, and in certain instances, research. They have limited interaction with clinicians. For addressing these types of problems, regular communications and discussions of clinicians and microbiologists on a case basis are the need of the hour. The microbiology team must do clinical rounds, talk to the clinicians, and give

advice and suggestions as needed. It will help better clinical training for microbiologists, and better microbiological training for clinicians, in addition to enhancing patient outcomes**.** It will also support, complement, and augment the role of clinicians by providing improved diagnostics.

Conclusions: There is an immediate requirement for the microbiology laboratory to incorporate numerous suggestions, recommendations, and additional messages. Also, there must be clear communication and case-based discussion between the clinician and the microbiologist.

Limitation of Study: Single-centric study and less no of participants.

Annexure I

Q1. Have you noticed the remarks written on Microbiology report, if yes then where is it written on the report?

a. Upper part of the report
b. Lower part of the report
c. Right side of the report
d. Left side of the report.

Q2.Do you consider these remarks relevant to guide you for antibiotic prescription?

a. Very often
b. Often
c. Sometimes
d. Never

Q3. Cefoxitin is a surrogate marker for MRSA? For Cefoxitin screen positive strains which of the following antimicrobials cannot be prescribed.

a. Cotrimoxazole
b. Cefepime
c. Vancomycin
d. Linezolid

Q4. Susceptibility to High content gentamycin and streptomycin implies existence of synergy between aminoglycosides, penicillin and vancomycin. Which of the following treatment option has no benefit for HS and /or HG susceptible isolates?

a) Ampicillin + vancomycin
b) Ampicillin + gentamycin
c) Vancomycin + gentamycin
d) Vancomycin + amikacin

Q5. What is your action when you receive a report mentioning “CONTAMINATED”.

a. Resend sample
b. Ignore the report
c. Prescribe from your side
d. Discuss with microbiologist

Q6.what is your action when we report with a remark that “may be a commensal flora kindly correlate clinically”.

a. Resend sample
b. Ignore the report
c. Prescribe from your side
d. Discuss with microbiologist

Q7.which of the given antimicrobial agents should NOT be given in Bacteremia?

a. Meropenem
b. Tigecycline
c. Colistin
d. Piperacillin –Tazobactum

Q8. What will you do when a UTI patient not responding to Nitrofurantoin and you get a culture positive for proteus spp?

a. Wait for 3 days to see response
b. Change the antibiotics

c. Repeat the culture
d. Ignore the report.

Q9. In a Ventilator acquired pneumonia patients with intermediate sensitivity to colistin which of the following drugs is preferably given.

a. IV colistin
b. Inhalational Colistin
c. Colistin with polymixin B
d. Colistin with Minocycline

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