

Review Article

Tackling Antimicrobial Resistance in Tertiary Hospital, Antimicrobial Stewardship Programme (ASP)

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Dr. Rajasekaran has 40 years of professional experience in medicine with 9 years in rural service and over 30 years of teaching experience in medicine at premier institutes of Tamilnadu for both undergraduates and postgraduates. His original work on modified management of Acute copper sulphate poisoning, presented at Toxicon is quoted as reference in ISBN indexed toxicology Book and the same is accepted by Tamilnadu Health system projects for the copper sulphate poisoning. He has authored, presented and published several papers in national, state and city conferences and delivered lectures in national, state and district fora on various medical topics. He has a great passion for bedside teaching.

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Introduction

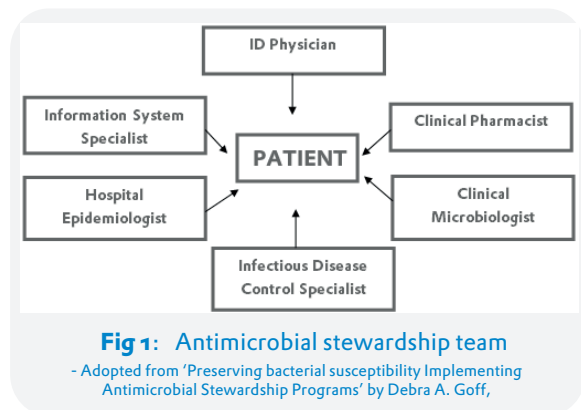
Global threat of antimicrobial resistance (AMR) is a big challenge which has to be tackled at the earliest. The use of antimicrobials, improved sanitation and vaccination has reduced the incidence of infectious disease mortality¹. In the present day while more and more microbial resistance is being reported, the pharmaceutical companies are not showing interest in research to develop newer antimicrobials. This may lead us to "preantibiotic era" with no antibiotic available to manage the infections². India has been named to be the source of NDM-1 (New Delhi Metallobetalactamase) producing super bugs which has created a panic among the health care industry³. This has increased the awareness of strict infection control and antibiotic stewardship across the country and the globe.

Around a year ago a joint meeting of representatives of medical societies and policy making bodies met to tackle the challenge of AMR. Consensus of this meeting is named as "Chennai Declaration". The aim of the declaration is to initiate a national policy to the rising AMR. The declaration in the executive summary has suggested to the government organisations such as Ministry of Health, Drug Controller of India, state health departments, and policy making bodies like Medical Council of India and National Accrediting Board for hospital (NABH) to play a vital role in controlling the AMR. The declaration has also requested to have an infection control team at every hospital, State Health Departments and have a task force to monitor the functions of the teams⁴. Tertiary hospital like Chettinad Health City needs definitely an infection control team and antimicrobial stewardship programme (ASP) to tackle the AMR.

Antimicrobial stewardship programme and members of the team (Fig.1.)

ASP may be defined as an ongoing effort by the health care institution to optimise antimicrobial use among the hospital patients in order to improve patient outcomes, ensure cost effective therapy and reduce adverse sequel of antimicrobial use including AMR. Members

of the ASP should include infectious disease physician (IDP), clinical microbiologist, clinical pharmacist, infection control professionals, and institutional epidemiologist and information system specialists⁵.



Goals of ASP⁶⁻⁷

- Improve the cure rate, reduce the surgical infection and decrease the mortality and morbidity
- Reduce the unintended complications of antimicrobials
- Reduce the antimicrobial resistance
- Reduce the cost of management of the infections

Infectious disease physician (IDP) in ASP⁸

The IDP should have eight strategies namely education, formulary restrictions, pharmacy justification, pharmacy substitution, computer surveillance, laboratory item cost listing, purchase plans and multi disciplinary approach. He must develop an antimicrobial management program keeping the AMR in mind. Steps for IDP to apply for establishment of an antimicrobial management program⁸

1. Develop knowledge about the local antimicrobial budget and patterns of usage.
2. Collect the necessary data to publish a quarterly

- prices of all formulary antimicrobials.
3. Gather baseline usage and cost data and attempt to compare them to those of equivalent institutions
 4. Outline a structure for participation in the ASP team and estimate the annual costs for funding, including salary for the IDP.
 5. Meet with administrators of hospitals and managed care companies to discuss implementation.
 6. Focus on the most frequently used and most costly agents on the formulary.
 7. Publish a manual, Guidelines for Antimicrobial Use, and provide appropriate educational or multimedia formats for educating the prescribing staff.
 8. Ensure a fail-safe mechanism to resolve disagreements with the prescribing staff
 9. Develop innovative educational methods including computerized interplay to explain the use of new antimicrobials, antivirals, and anti-infectious biologics.
 10. Re-evaluate the ASP annually with quality assurance personnel and review the cost-effectiveness with the chief of staff, the president of the hospital, and the Vice President for Clinical Affairs.

Clinical pharmacist in the ASP⁹

Whenever the clinical pharmacist receives a restricted antibiotic prescription he must notify the prescriber about the requirement of the authorisation. He can also refer the list of restricted antibiotics prescribed for review with IDP or physician authorised for approval to maintain the proper prescription safety. Though this may lead to a wedge between the physician and pharmacist it should be realised that it is done in the interest of the patients and society. Clinical pharmacist can develop institutional guidelines on antimicrobials use and also conduct education programmes for the staff.

Clinical microbiologist and ASP

The clinical microbiologist and microbiology laboratory play a pivotal role in the ASP. The early identification of the pathogenic microbes and their susceptibility test performance is very essential in the control of AMR¹⁰. The clinical microbiologist must report most appropriate and selective susceptibility pattern. He must abstain from reporting rare susceptibility pattern even if it is there to avoid inadvertent therapies¹¹.

The laboratory should be actively involved in the AMR surveillance. Periodic reporting of local common pathogen and their antibiotic susceptibility will enable the ASP team to decide on empirical antimicrobial therapy¹².

Infectious disease control staff and hospital epidemiologist

Infectious disease control staff should be well aware of the source of AMR and their mode of spread in the health centres¹³. They must also know the significance of the AMR in the patient and their prevention and

spread. Organizing epidemiological surveillance, checking the efficacy of the methods of disinfection along with improving the hospital cleanliness are some of the essential duties that may be carried out by the infection control staff¹⁴.

The hospital epidemiologist should monitor the guidelines compliance (regarding the AMR) of the hospital staff. They must also get the guidelines compliance data and use it to improve the impact of the ASP. They must have surveillance of AMR constantly to detect and investigate the outcome of the ASP¹⁵.

Hospital administrators and management role in ASP¹⁵

The ASP members' efforts should be recognised and endorsed by the administration and management. In addition to allotting required fund, the ASP team members should be given autonomy and a free hand in policy making for controlling the AMR.

"Front - end" and "Back - end" Strategies of the antibiotic stewardship¹⁶

In an analysis of antibiotic prescription pattern in India, it was noticed that new and costly drugs were used without ascertaining sensitivity pattern²⁶. The goal of the ASP is to control the misuse of antimicrobials apart from taking care of the doses and appropriate use of them. To achieve this, antibiotic control strategies could be applied at the antimicrobial prescribing point (Front end) or after the antimicrobial is prescribed (Backend).

In 'Front end strategy' the control of antimicrobials is achieved by Formulary restriction, preauthorisation, an interactive discussion and guidelines. The back end strategy is carried out by the feedback audit, where the de-escalation, dosage optimisation and switching of the route of administration of antimicrobials are done.

Education and training¹⁷

One of the ways the physicians can be motivated to change their antimicrobial prescribing pattern is by 'academic detailing'. In academic detailing process, the baseline knowledge of antimicrobial prescribing pattern is assessed by interviews followed by programs for them and their opinion leaders. In these programs authoritative and unbiased sources of information are given presenting both sides of controversial issues.

The stake holders are allowed to take part in the interactive sessions at the end of which they are given essential messages by suitable educational materials. This educational strategy may be carried out by the clinical pharmacist or by the IDP periodically. These messages can also be spread by interactive educational sessions during the grand rounds in the large teaching hospitals.

Antimicrobial restriction strategies

To impose the ASP guidelines compliance for antimicrobial use by the physicians external control may

be implemented^{18,19}. Only selected antimicrobials are freely dispensed in the pharmacy. Other antimicrobials are dispensed on 'criterion based strategies' which include 'prior authorization criterion' for which prior approval of the specialist physician is required or 'closed formulary strategies' where it may not be available at all.

Antibiotic cycling strategies

If an antibiotic is out of use or used minimally for certain period the resistance by the microbial decline theoretically²⁰. Using this principle the drugs can be substituted on rotation especially for gram negative infections. However there are certain contradicting evidences²¹ for this strategy, hence computer assisted strategy may be preferred.

Review and feedback

The guidelines are issued and daily review is done for the appropriateness of the antibiotic and to suggest an alternative antibiotic if necessary. This may educate the physician and not interfere with autonomy of their prescription²².

Computer assistance²³

The review and the feedback mentioned above are achieved using the information technology. The computer assistance may provide the patient specific data which are taken by expert systems to provide patient specific recommendations at the point of the patient care. The computer system should be flexible and reprogrammable according to the stewardship requirements¹⁵.

Defining the priorities, and measuring the progress and success (Fig.2)

This can be achieved by the driver diagram²⁴. The driver diagram has three or more levels. The diagram has 1) vision or goal 2) primary driver which is high level requirement to attain the goal 3) the activities required for the same. Each primary driver if they are very complex can have its own set of simple steps namely "secondary driver".

Conclusion

The key to the success of an ASP in a teaching hospital depends upon the management support, the multiprofessional ASP team, frequent evidence based institutional guidelines, education and training of the stakeholders, the effective communication system in the institution and above all the effective patient safety. Recommendations of the GARP²⁶ (global antibiotic resistance partnership) India aims at 1)reducing the need of antibiotics 2) antibiotic targeting 3) avoiding antibiotics in agriculture and 4) giving priority to national surveillance for AMR, while improving diagnostic laboratory capacity, setting up of ASP in the hospitals and restricted use antibiotic for non-therapeutic purposes. If these are strictly followed the AMR in India and across the Globe may show a marked decline.

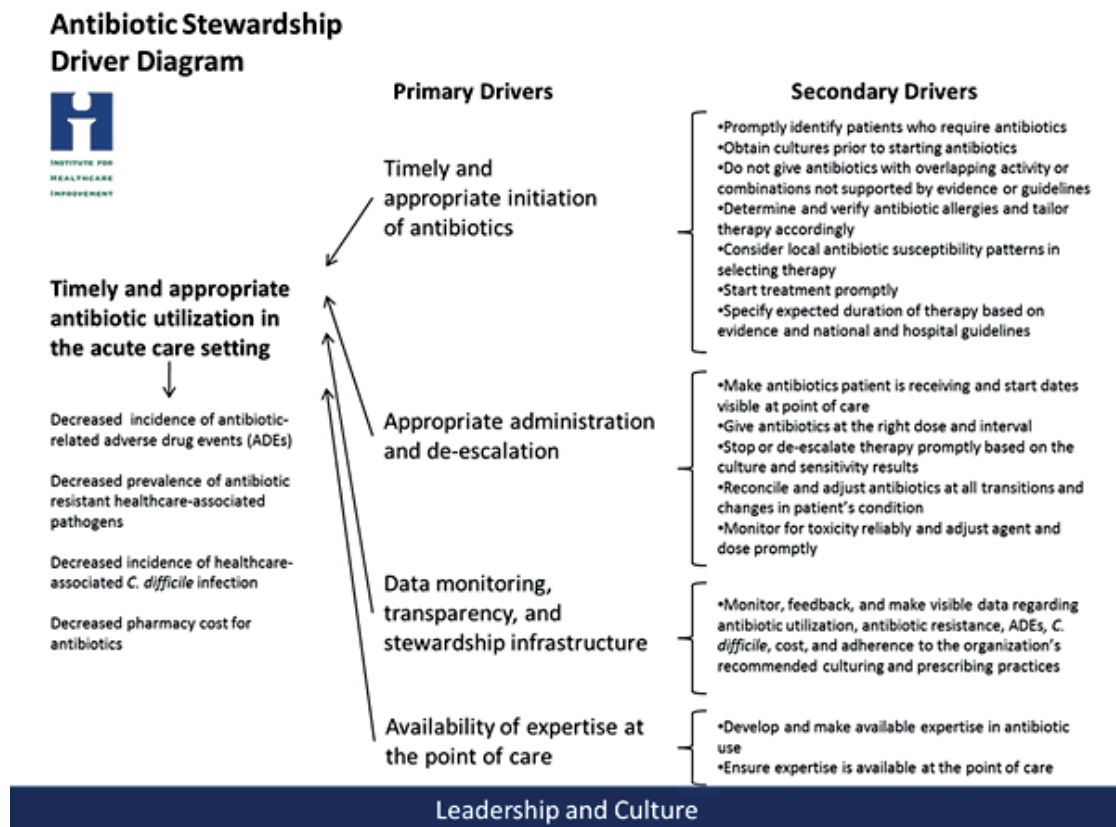


Fig2: Antibiotic stewardship Driver Diagram (<http://www.cdc.gov/getsmart/healthcare/images/driver-diagram.gif>)

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