Policy Document

Policy document on antimicrobial stewardship practices in India

Kamini Walia[1], V.C. Ohri[1], Jayaprakasam Madhumathi[1] & V. Ramasubramanian[2]

[1]*Division of Epidemiology & Communicable Diseases, Indian Council of Medical Research, New Delhi &*
[2]*Department of Infectious Diseases, Apollo Hospitals, Chennai, India*

Antimicrobial resistance (AMR) in India has become a great threat because of high rate of infectious diseases. One of the key contributing factors is high antibiotic use due to poor prescription practices, self-medication, over-the-counter sale of drugs and lack of awareness. Antimicrobial stewardship programme (AMSP) have been proved to be successful in restraining sale and use of antibiotics to a large extent in many countries. An AMSP programme for a hospital is imperative for rational and evidence-based antimicrobial therapy. The ultimate aim is to improve patient outcomes, reduce emergence of bacterial resistance and ensure longevity of the existing antimicrobials. The primary goal of AMSP is to encourage cautious use of available antibiotics by training the healthcare workers and creating awareness. This article describes the strategies and recommendations for formulation of AMSP policy for India.

Introduction

Antimicrobial resistance (AMR) has become a public health emergency with the exponential increase in resistant microbes. Van Boeckel *et al*[1] have reported that antibiotic consumption has increased by 35 per cent from 2000 to 2010, with a higher use of last resort antibiotics carbepenems (45%) and polymyxins (13%). Increasing levels of drug resistance seen in pathogens of public health importance and dried up pipeline of new antibiotics have created a situation of emergency in India and globally. Hospitals in India are reporting high levels of resistance to fluoroquinolones and carbapenems and are also documenting increasing resistance to polymyxins such as colistin with an increase in the use of polymyxins in healthcare settings [2,3]. India was reported to be the largest consumer of antibiotics

in 2010 and contributed to 23 per cent of the increase in retail antibiotic sales among the BRICS (Brazil, Russia, India, China and South Africa) countries[4]. The recent trends of antibiotic resistance in India are alarming with increasing percentage of resistance to last resort antibiotics carbapenems and colistins[5]. There has been an increase in cephalosporin and broad-spectrum penicillin consumption from 2000 to 2015[6].

Given this compelling situation, there is a need to look for implementation of measures to reduce drug resistance. The World Health Organization (WHO) developed a global action plan (GAP) in 2015, which mandates Member States to produce national strategic plans for AMR through surveillance and reporting, antibiotic stewardship and preventing infection[7]. The WHO has identified antimicrobial stewardship

programme (AMSP) as one of the interventions in GAP. AMSP is a systematic approach for using antimicrobials rationally to control AMR and to reduce inappropriate use of antimicrobials[8]. Implementation of AMSP has been found to reduce excessive antibiotic usage and has resulted in reduced resistance rates in many countries[9]. AMS programmes have shown 22-36 per cent reduction in antimicrobial use and significant cost-savings[8].

Countries such as Australia, Chile, China, France, Scotland, South Africa, South Korea, Sweden, Taiwan, USA and Vietnam have successfully implemented antibiotic stewardship programmes[10]. Successful AMS programmes have demonstrated reduction in resistance rates, mortality and healthcare costs in many countries[11,12]. It has also been reported that AMSP implementation positively impacted outbreaks of resistant pathogens in healthcare settings where it was implemented[9].

Antimicrobial stewardship strategies

AMSP refers to comprehensive strategies designed for rational use of antimicrobial agents (AMAs) by optimal antimicrobial drug, dosing, duration of therapy and route of administration with minimal toxicity. The various AMSP strategies include building capacity for stewardship activities, developing policies and guidelines, establishing systems, educating healthcare workers and introducing useful interventions, specifically customized for the national setting[13,14]. The core strategies can be in the form of two major approaches, with the most successful programmes generally implementing a combination of both. The front-end or pre-prescription approach to stewardship uses restrictive prescriptive authority which requires approval to use certain restricted antibiotics, except trained clinicians. The back-end or post-prescription approach to stewardship uses prospective review and feedback. Based on the review and feedback, the clinicians are recommended by the AMSP team to modify or discontinue specific antibiotic use[9].

The appropriate evidence-based treatment options should be chosen in consultations with inputs from clinical microbiologist on local resistance patterns (hospital antibiograms), using fewest formulary drugs, with minimum side effects, optimum dose and duration. The presence of infectious disease (ID) physicians, clinical pharmacist and infection control nurse is crucial for a functional AMSP programme.

AMSP is seen as resource intensive intervention which needs to be supported administratively by allocating sufficient human and financial resources and information technology structures. Hence, countries who implemented evidence-based AMSP in their hospitals found it to be financially self-sustaining[9].

AMSP-Indian initiative

AMSP capacities in Indian healthcare institutions (HCIs) are rudimentary or rather non-existent and this has been well documented in one of the surveys carried out by ICMR in 2013 among 20 tertiary HCIs about AMSP components, implementation and outcome[15]. It showed that only 40 per cent of HCIs had AMSP written documents, 75 per cent of HCIs had HIC guidelines and 65 per cent had AMAs prescription guidelines. Moreover, only 30 per cent of HCIs had AMSP implementation strategies. Private HCIs showed better performance compared to government HCIs in AMSP that was attributed to the accreditation process. The survey reported the absence of IDs physicians and clinical pharmacists in institutions. This shows a lacuna for AMSP in India and the dire need to implement AMSP as priority[15].

In March 2017, the National Health Policy 2017 of Ministry of Health and Family Welfare (MoHFW), Government of India, prioritized AMR in India. In response to the call by 71st UN General Assembly for AMR threat in the meeting of global leaders (September 2016), the Government of India launched the National Action Plan on AMR (2017-2021) in April 2017 with support from WHO India office coordinated by MoHFW. The document notified the governance mechanisms by three groups - an intersectoral coordination committee, a technical advisory group and a core working group on AMR[16].

Recognizing the need to create AMSP structures in HCIs in the country, the ICMR carried out four workshops on AMSP capacity building across the country in the second quarter of 2017 (*http://iamrsn. icmr.org.in/index.php/events/amsp*). More than 30 hospitals across the country participated in the workshop. Several deliverables were identified which could be initiated at the earliest (Box).

Recommendations

The following recommendations for Indian hospital settings, based on the AMSP guideline published by Indian Council of Medical Research (ICMR) (*http://*

Box. Specific deliverables identified for antimicrobial stewardship practices
Hospital antibiogram
Customized antibiotic policy for each hospital including surgical prophylaxis based on antibiograms
Culture of cultures: Point prevalence study
Measurement of antibiotic consumption rate (DDD/DOT)
Consider introducing audit and formulary restrictions
Staff education: CME for hospital staff and for hospitals in surrounding areas
DDD, defined daily dose; DOT, days of therapy; CME, continuing medical education

iamrsn.icmr.org.in/images/pdf/AMSP_Guidelines_final.pdf), the CDC document on core elements of hospital stewardship programs[14] and other successful AMSP programs[9].

Structure: The antibiotic stewardship team should be formed in hospitals which must include, but not limited to ID physician or physician or surgeon trained in ID, a pharmacist, a clinical microbiologist, and infection control personnel. This team will be responsible for implementing and monitoring AMS programmes. The team will coordinate the activities in connection with the hospital and pharmacy, governance, infection control and drug committees. The committee should ensure that separate funds are allocated for this activity in the hospital.

Capacity for stewardship programmes such as monitoring, reporting and audit, computer technology, information systems to monitor and track progress and develop innovative strategies should be built up. Defined goals and outcomes are to be laid out.

Antibiograms and antibiotic policy: Antibiograms should be generated periodically, and guidelines for antibiotic use in hospitals based on hospital antibiograms should be drafted. The policy should be based on site of infection (*e.g.,* skin or soft-tissue infection, intra-abdominal, urosepsis, pneumonia, head and neck, bone and joints), and mention alternate regimens for treatment.

Formularies and guidelines: Approvals for prescribing and dispensing specific drugs and for sale of certain non-prescription drugs should be made mandatory and guidelines for antimicrobial treatment and prophylaxis need to be available in all healthcare systems.

Training: Periodical training and certification of hospital staff on AMSP is mandatory, and prescribers should be given stringent training on "Therapeutic guidelines for antimicrobial use".

Monitoring and reporting antibiotic use: Background information on current antibiotic use and prescription rates should be collected. Use of electronic patient records to track prescription and antibiotic usage trends should be devsied. Expenditure on antibiotics over time must be monitored systematically.

Goals and measurable outcomes: The process measures include compliance with surgical prophylaxis prescribing, and 'care bundles' [three-day antibiotic review bundle, ventilator-associated pneumonia (VAP) bundle].

The outcome measures include antimicrobial usage rates, bacterial culture rate, resistance rates, and other measures such as *Clostridium difficile* rates, and length of hospital stay.

The balancing measures are mortality rates, treatment-related toxicity, rates of complications and surgical site infections, admissions in ICU and readmission within 30 days of discharge.

Audit and feedback: These are two important processes to monitor the implementation which includes review of prescriptions, laboratory results, clinical notes *etc*. and most importantly audit of carbapenem and polymyxin use in ICU.

Interventions: Therapy based on standard guidelines and patients' clinical status should be ensured to control use of restricted antimicrobials for empirical treatment. Other important interventions include directed therapy based on early microscopy tests, immunological and rapid molecular tests, antibiotic "time outs", de-escalation of therapy, dose optimization, change of broad spectrum antibiotics after culture results are available and shortening treatment duration in prophylactic use[14].

Education and awareness: Medical education curriculum should include AMSP as part of the main course for physicians, microbiologists, pharmacologists, nurses and pharmacists. It is also important to create awareness among patients, healthcare workers, administrators and governing authorities through advertising, media and messages.

Research on AMSP: AMS research focused on novel strategies of stewardship, implementation and impact

of AMS programmes, point prevalent studies, effective interventions, surveillance and management of antimicrobial usage data, needs be devised for Indian settings.

Discussion

There has been an alarming increase in AMR in India due to unwarranted use of antibiotics. High rate of antibiotic usage in hospitals also affects economy due to heavy expenditure on antibiotics procured. Implementation of AMSP on priority will help rationalize antimicrobial usage in our country. The ultimate goal of antimicrobial stewardship is to reduce the adverse consequences of antibiotics and increase in emergence of resistant organisms[6]. Strategies such as intravenous-to-oral conversions, de-escalation and therapeutic substitution and formulary restriction also referred to as low hanging fruit can be initiated with lesser resources and cost in many healthcare settings[8,9,12]. These initiatives will lead to significant financial savings and a positive impact on patient care[17]. HCIs to create structure and processes for implementation of AMSP by providing adequate funds and human resources for this activity. Availability of physicians, pharmacists trained in IDs and documentation such as antibiograms and treatment guidelines is crucial for implementation of an AMSP.

AMSP efforts would also need to be supported with improved diagnostic facilities and infection prevention control programmes. Improved diagnostic facilities will ensure that antimicrobial prescription are specific while implementation of infection control programmes will ensure that there are less number of situations that warrant antimicrobial prescriptions. Development of easy to use, rapid, accurate, point-of-care diagnostic tests are essential in preventing unnecessary antibacterial therapy. There is a need to customize solutions for AMSP relevant to our needs based on healthcare system in the country. This would require funding research to devise and implement ideal AMSP practices addressing the local needs. Most countries that implemented AMSP have benefitted from allocating resources to implement AMSP. It is the need of the hour that all hospitals in India initiate AMS strategies and start implementing to benefit patients and also for spill over benefits to community by reducing AMR.

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For correspondence: Dr Kamini Walia, Division of Epidemiology & Communicable Diseases, Indian Council of Medical Research,
                                 Ansari Nagar, New Delhi 110 029, India
                                 e-mail: waliakamini@yahoo.co.in