

Editorial Commentary

Have we reached a full circle? Time to ponder on antimicrobial resistance!
World health day 2011: a public health perspective



April 7 is celebrated every year by WHO as World Health Day. Each year it highlights an important global health issue as its theme, this year's being "ANTIMICROBIAL RESISTANCE: NO ACTION TODAY, NO CURE TOMMOROW". WHO encourages people of all ages and all backgrounds across the globe to conduct and carry out activities to promote this theme and want the Governments, Physicians and Patients to pay close attention to antimicrobial resistance. So the focus is on preventing anti-microbial misuse.

An article published by Lancet Infectious disease on April 7 2011 "Dissemination of NDM-1 positive bacteria in the New Delhi environment and its implications for human health: an environmental point prevalence study" grabbed the attention of the World and specifically much hue and cry was raised in the medical fraternity in India as the new superbug named after New Delhi which had already been highlighted by the media last year, was found in the environmental samples collected from Delhi. In this paper, the authors reported bacteria with *bla*NDM-1 which were grown from 12 of 171 seepage samples and two of 50 water samples, and included 11 species in which NDM-1 has not previously been reported, including *Shigella boydii* and *Vibrio cholerae*. Carriage by enterobacteria, aeromonads, and *V. cholerae* was stable, generally transmissible and associated with resistance pattern typical for NDM-1. Twenty strains of bacteria were found in the samples, 12 of which carried *bla*NDM-1 on plasmids, which ranged in size from 140 to 400 kb.

With the publication of this report, the question

arises "Have we reached a full circle from pre-antibiotic era through a stage of euphoria to a seemingly frightening era of patients infected with multidrug resistant bacteria searching desperately for the elusive effective antibiotic/antimicrobial agent?"

The problem of Anti-Microbial Resistance (AMR) is not new but one which is becoming more serious and a threat to human health globally. This is more pertinent for countries like India where the maximum burden of infectious diseases prevail.

Alexander Fleming in 1929 changed the course of history by discovering the world's first antibiotic "*Penicillin*" which saved millions of lives. So early 1940s heralded the end of the Pre-antibiotic era with this "magic" discovery. Now, with the emergence of anti-microbial resistance, can we say that the **Antibiotic era** which probably lasted **6-8 decades** is waning off? And gradually we are slipping off in the post-antibiotic era? This will lead to disastrous consequences globally and our inability to achieve the Millennium development goals, post 2015? This is a wake-up call for all because we can't see our relatives, family and friends and patients dying from simple infections which were earlier curable by antibiotics.

What is Anti-Microbial Resistance(AMR)?

Anti-microbial resistance is the resistance of the micro-organism to an anti-microbial medicine to which it was earlier sensitive. AMR micro-organisms

often fail to respond to standard treatment resulting in prolonged illness and higher mortality. It hampers the control of infectious diseases by reducing the effectiveness of treatment because patients remain infectious for longer and subsequently spread the resistant micro-organisms to others. There are 440,000 MDR-TB cases annually and 150,000 deaths. Extensively drug resistant TB has been reported in 64 countries so far [1]. Widespread resistance to chloroquine, sulfa-pyrimethamine and emergence of artemisinin resistance is seen in most malaria-endemic countries. With expanded use of anti-retrovirals, resistance is a concern in HIV. Methicillin Resistant *Staphylococcus Aureus* (MRSA) causing high percentage of Hospital acquired infections is becoming more frequent. Multi-drug resistant *E. coli*, *K. pneumoniae* & *Enterobacter* species infections are on the rise whereas *Neisseria gonorrhoea* and *Shigella* spp. infections are becoming increasingly resistant to antibiotics. Inappropriate and irrational use of AMA favours conditions for resistant microorganisms to emerge, spread and persist.

What drives AMR?

Inappropriate and irrational use of antimicrobials is the main cause responsible for AMR. Also, inadequate national commitment to a comprehensive & coordinated response and ill-defined accountability also contribute to the above. Other factors which are responsible for AMR are insufficient engagement of communities, weak or absent surveillance and monitoring of anti-microbial use, inadequate systems to ensure quality & uninterrupted supply of medicines, poor infection prevention & control practices, depleted arsenals of diagnostics, medicines & vaccines, inadequate research & development on new products .

W.H.O. response to AMR

Responding to the gravity of the situation, World Health Organization has issued policy guidelines including support for surveillance and providing technical assistance to all stakeholders. It also promotes knowledge generation and partnerships through disease prevention and control programmes. It also emphasises on supply and rational use of good quality essential medicines. Stringent infection prevention and control measures need to be followed which will aid in patient safety.

On this World Health Day, WHO issued an international call for concerted action to halt the spread of antimicrobial resistance. Policy package for governments & all key stake-holders were issued. WHO recommends a “six-pronged strategy” [2] for Governments and all stakeholders to:

1. Develop & implement a comprehensive, financed national plan.
2. Strengthen surveillance & laboratory capacity.
3. Ensure uninterrupted access to essential medicines of assured quality
4. Regulate & promote rational use of medicines.
5. Enhance infection prevention & control.
6. Foster innovation & research and development for new tools

What went wrong?

Almost half of hospitalised patients receive AMA. It is not that everyone who received AMA had an indication for its use but still was given. The reasons could be varied like routinely treating trivial or viral infections with antibiotics, lack of awareness of basic principles of anti-microbial use, pressure of early sure-shot results, commercial interests of pharmaceuticals, use in animal husbandry/agriculture. Another very important reason for countries like India is poverty. The poor cannot afford the complete course of antibiotic due to prohibitive costs which in turn leads to AMR

A new antibiotic policy needs to be formulated with the basic aim to reduce AMR thereby minimising the morbidity and mortality due to anti-microbial resistant infections; and to preserve the effectiveness of antimicrobial agents in treatment and prevention of communicable diseases. Antibiotic policy should be formulated targeting the clinicians, microbiologists, pharmacists and nurses, keeping in mind the demands of clinical areas with infection surveillance data from microbiology departments. This would aid in creating awareness on antibiotic use; as misuse is counterproductive, employ more effective treatment in serious infections, reduce health care associated infections and their spilling to the society and at the same time monitoring antibiotic use across hospitals.

To implement the antibiotic policy effectively, an action plan needs to be prepared for education to all concerned clinical staff on antibiotic prescriptions. Simultaneously, monitoring & evaluation of the

success and failures of the policy needs to be performed. Infection Surveillance Data need to be generated. Microbiology facilities should be developed and strengthened.

Stringent restrictions in prescribing & availability of antibiotics should be in place. Continuing medical education to junior doctors and senior practitioners should be given on a regular basis. Finally, antibiotic policy needs to be individualised according to the institution & the particular area.

Everyone can make a contribution to combat antimicrobial resistance! Needless to say, the Governments need to take the lead and develop national policies to combat AMR. Health professionals, civil society and other groups can also make important contributions. Doctors & pharmacists can prescribe/dispense only requisite drugs, not the newest or the best-known. Many a times, patients or their relatives demand antibiotics from doctors which needs to be curbed. Health professionals can help rapidly reduce the spread of infection in health care facilities. Collaboration between human and animal health and agriculture professionals is also vital. Governments and partners need to work closely with industry to encourage greater investment in Research & Development (R & D) of new diagnostics that can help improve decision making as well as drugs to replace those that are being lost to resistance. Today, <5% products in R & D are antibiotic drugs.

The Indian Network for Surveillance of Antimicrobial Resistance (INSAR) is supported by WHO by providing a platform for representative Indian microbiology laboratories, in both the public and private sector and to share and monitor the trends of antimicrobial resistance.

What can possibly be India's role in combating Anti-microbial resistance:

1. Strong political commitment
2. Increased awareness of the antibiotic resistance problem
3. Strengthening surveillance of antibiotic resistance
4. Rational antibiotic use in people
5. Regulate antibiotic use in animals
6. Encourage new product development
7. Increase resources to curb antibiotic resistance
8. Increase funding for surveillance, research and education.

SAVE ANTIBIOTICS-SAVE OUR FUTURE GENERATION!!

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References

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