

Antimicrobial Resistance (AMR) Containment in Pakistan; Policy and Planning

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Burden of antibiotic resistance (AMR) among bacteria driven predominantly by consumption of antimicrobials, has progressively increased and is now considered as a major health crisis. Prior to the antibiotic use low level of AMR was observed, mainly due to the selective pressure of antibiotic exposure, not only in human but also in animals health sector [1]. Progressive rise in AMR has become public health concern across the globe. In 2014, WHO in collaboration with member states generated a global report on AMR surveillance, which provides a comprehensive picture regarding the magnitude and current surveillance status of AMR across the globe [2]. AMR has risen alarmingly throughout the globe, and Pakistan is not an exception.

AMR is one of the major health concerns in Pakistan where overall scenario is getting worse as depicted in many studies over the last two decades [3-5]. Multi and pan drug resistance reported in common bacterial infections results in limiting out the options for treatment and adverse outcomes. The contributory factors and prime challenges include an excessively large number of registered antimicrobial products [6], self-medication is more than 50%, presence of quacks in the country, and on average 2 - 3 antibiotics are prescribed per patient [7,8]. Such practices have contributed to extraordinary higher rate of AMR emergence for common bacterial isolates.

Recently a large scale outbreak of Extensively Drug Resistant (XDR) typhoid reported in Hyderabad and Karachi cities in the Sindh province. This novel clone is found to be resistant to all three first line antibiotics such as ampicillin, chloramphenicol and co-trimoxazole, and also to third generation cephalosporin and fluoroquinolones [9]. According to a WHO Tuberculosis (TB) report, Pakistan ranks fifth globally; the MDR-TB prevalence is exceptionally high around 1.3 million cases reported annually [10]. Additionally substantial burden of MDR enterobacteriaceae, extended spectrum β -lactamases (ESBL), methicillin resistant *S. aureus* (MRSA), New Delhi metallo β -lactamases (NDM), vancomycin resistant Enterococci (VRE), has been observed across the country due to myriad of factors [8,11].

In order to tackle this global crisis, World Health Assembly adopted resolution (WHA68.7, May 2015) to develop a global action plan (GAP) on AMR [12]. Accordingly, the Government of Pakistan is paying focused attention to resolve this evolving crisis based on GAP. The National Institute of Health (NIH) under the umbrella of Ministry of National Health Services Regulations and Coordination (NHSR&C) has taken many significant steps to implement this GAP and is working with all stakeholders from the veterinary sector, public health and environment sectors in all provinces to strengthen national capacity for AMR surveillance, laboratory diagnosis and community awareness to fulfill international obligations on health. In this regard, NHSR&C has designated AMR focal point at National Institute of Health, Pakistan and notified AMR multi-sectoral oversight committee involving federal and provincial health departments, animal livestock, environment sectors, international partners, professional associations and regulatory bodies. Based on the recommendations of Joint External Evaluation (JEE) of IHR-GHSA, AMR is included as key area in the National Action Plan for Health Security.

Through consultation of relevant experts and all stakeholders, a national strategic framework in line with WHA 2015 resolution and GAP, has been developed for containment of AMR in Pakistan which endorses the "One Health" concept. This National Strategic Framework for Containment of Antimicrobial has collated policy statements, objectives and key interventions [13]. The NIH has also established sentinel surveillance to determine AMR burden of country. Pakistan is included amongst countries enrolled in Global Antimicrobial Resistance Surveillance System (GLASS) since 2017. The GLASS data for the year 2017 has been uploaded on WHO repository.

Development of National Action Plan (NAP) was next logical step for fulfillment of the commitment for AMR containment in country. NAP has been completed with the collaboration of WHO and involvement of all stakeholders at federal, provincial and regional level. This plan is built upon objectives of GAP and National Strategic Framework, and through systematic all-inclusive consultative process to ensure the ownership, agreement and commitment of all stakeholders.

The following major strategic priorities [14] are included in the NAP:

- Development and implementation of a national awareness raising and behavioral change strategy on antimicrobial resistance;
- Establishment of an integrated national AMR surveillance (human, animal usage and resistance monitoring);
- Improve prevention and control of infections in health care, community, animal health, food, agriculture and environment;
- Update and enforce regulations for human and veterinary antimicrobial utilization;
- Phase out use of antimicrobials as growth promoters and provide appropriate alternatives (such as prebiotics, probiotics);
- Integration of AMR in all public health research agendas including research on vaccines;
- Estimation of health and economic burden of AMR for decision making.

Provincial action plans for AMR have also been developed through a collaborative process including relevant stakeholders, following the NAP as a reference document. Action plan mainly focusing on critical aspects like surveillance of AMR burden, effective stewardship program and prudent use of antibiotics in all sectors with special emphasis on national awareness raising. The NIH is in process of costing the NAP and subsequently the Government of Pakistan will be requested to allocate domestic funding for National AMR program. Meanwhile strong advocacy is required for resource mobilization to implement activities to be undertaken by animal health sector and environment sector as well provincial line departments.

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