



Future strategies to control antimicrobial resistance in Asia

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I. Introduction

Infectious diseases are posing growing global problem due to widespread emergence of antimicrobial resistance in major pathogens, which makes antimicrobials ineffective, resulting in treatment failure, prolonged illness, disability, greater risk of death and economic loss¹. Furthermore, due to slowed development of new antimicrobials, very few antimicrobials are left to treat infections caused by multidrug-resistant pathogens². Given the enormous clinical and economic impact of antimicrobial resistance, World Health Organization (WHO) has identified antimicrobial resistance as one of the greatest threats to human health and the theme of World Health Day 2011 by WHO was antimicrobial resistance with a slogan entitled “Antimicrobial resistance: no action today, no cure tomorrow”³.

Antimicrobial resistance is not a local problem but a global issue because antimicrobial resistance can spread between different countries or continents. The massive increases in trade and human mobility brought about by globalization have enabled the rapid spread of infectious agents, including those that are resistant to antimicrobials⁴. Recent outbreak and international spread of New Delhi metallo-beta-lactamase-1 (NDM-1) producing *Escherichia coli* from India to many countries could be one of the best examples of transmission of antimicrobial resistance between countries, showing critical impact of antimicrobial resistance on economy and trade in addition to impact on public health⁵.

While richer countries, to a large extent, are still able to rely on the latest antimicrobials to treat resistant infections, access to these life-saving drugs is often limited or totally impossible in many parts of the world, particularly developing countries in Asia. Although situation of antimicrobial resistance may vary by region or country, it is evident that Asia is certainly a part

of the world in which there are increasing concerns regarding antimicrobial resistance because of a high prevalence of antimicrobial resistance in major bacterial pathogens and relatively poor and weak healthcare infrastructures in many countries^{6,7}.

II. Asian initiatives to control and prevent antimicrobial resistance

Given the critical impact of antimicrobial resistance, the US and European countries have prepared strategic action plan to combat antimicrobial resistance. The European strategic action plan on antibiotic resistance has been adopted by 53 countries in the region in 2011 and has 7 strategic objectives : to Strengthen intersectoral coordination, to Strengthen surveillance of antibiotic resistance, to Promote rational use and strengthen surveillance of antibiotic consumption, to Strengthen infection control and surveillance in health care settings, to Prevent emerging resistance in the veterinary and food sectors, to Promote innovation and research on new drugs, and to Improve awareness, patient safety, and partnership⁸. In the US, the Public Health Action Plan to Combat Antimicrobial Resistance was developed by an interagency Task Force on Antimicrobial Resistance in 2001 and has been revised in 2011⁹. The Action Plan consists of four focus areas, Surveillance, Prevention and control, Research, and Product development and each focus area has specific goals, consisting of 11 specific goals in total.

Despite many serious events of antimicrobial resistance, however, many countries in the Asian region do not have adequate national infrastructure and system to control and prevent the problems. Also, there have been few practical efforts to improve the preparedness for control of antimicrobial resistance based on international collaboration in the Asian region. It is quite obvious that the lack of awareness of critical situation of antimicrobial resistance prevents Asian countries from preparing comprehensive international strategies for antimicrobial resistance and leads to ineffective responses to antimicrobial resistance in the region. Therefore, future strategies should be prepared with multifaceted collaboration among all relevant stakeholders in the Asian region based on strong national initiatives. Also, the comprehensive strategies for control and prevention of antimicrobial resistance are urgently required in the region.

Given these situations in the Asian region, an international project entitled “International initiatives to control antimicrobial resistance in the Asia-Pacific region” was proposed to Asia-Pacific Economic Cooperation (APEC) by Asia Pacific Foundation for Infectious Diseases (APFID) in collaboration with Asian Network for Surveillance of Resistant Pathogens (ANSORP) with support from Korea Centers for Disease Control and Prevention (CDC) to prepare future strategic action plan to control and prevent antimicrobial resistance in the Asian region. Given its devastating impact on human lives and economy, the project was approved by APEC in 2010 (APEC HWG 05/2010A) and the first strategic action plan to control antimicrobial resistance in Asia has been prepared¹⁰.

III. Strategic action plan to control antimicrobial resistance in Asia

The strategic action plan to control and prevent antimicrobial resistance in the Asian region consists of five major components. First, surveillance of antimicrobial resistance is the first and basic step to detect and identify the problems of resistance in the region. Second, appropriate use of effective antimicrobials is of utmost importance because antimicrobial abuse or misuse is the most critical driving force for the emergence of antimicrobial resistance. Third, hospital infection control is also important since it can prevent the spread of resistant clones in the hospitals and in the community. Fourth, vaccination can prevent the emergence of infectious diseases as well as can reduce the prevalence of antimicrobial resistance in certain bacterial pathogens, such as *Streptococcus pneumoniae*. Finally, adequate and relevant policies and regulation by governmental system for control of antimicrobial uses, prevention of counterfeit drugs, and surveillance of antimicrobial resistance are very crucial for successful control of antimicrobial resistance. Since current problems and issues of resistance and antibiotic uses vary by country, actual implementation of the plan should be based on local situation.

1. Surveillance of antimicrobial resistance and antibiotic use

- The national surveillance system of antimicrobial resistance should be urgently established in every country in the Asian region that can identify the national status of antimicrobial resistance.
- The national surveillance systems for antimicrobial consumption both in patients and in

animal husbandry should be established in each country using the standardized methods.

- The microbiology laboratory procedures, data collection, and data reporting should be qualified and standardized.
- The international surveillance system(s) in the Asian region collecting the data about antimicrobial resistance in Asian countries should be established.

2. Appropriate use of effective antibiotics

- Appropriate use of effective antibiotics is a key factor to prevent the further emergence of antimicrobial resistance in major pathogens, which includes the appropriate use of current antibiotics as well as the development of novel agents.
- Appropriate use of current antibiotics can be encouraged by campaigns and educational activities for general public, which could be implemented at various levels - hospital, local, regional, or national level.
- “I Care” (Initiatives to Control Antimicrobial REsistance) campaign prepared by the APFID can be utilized as a campaign program in the Asian region.
- Education of healthcare professionals should be continuously implemented. All countries are encouraged to implement antimicrobial stewardship program in the healthcare setting.
- Antimicrobial use in food animals should be monitored and controlled by the regulations and guidelines.
- Healthcare policies and regulations for control of antibiotic use should be urgently established in some countries.
- Development of novel antibiotics is critically required to overcome the problems of antimicrobial resistance. International collaboration is essential for the discovery of new antibiotics.

3. Hospital infection control

- Hospital infection control is a basic procedure to prevent the spread of resistant clones in the hospital as well as in the community.
- Stringent and rigorous infection control procedures should be implemented in all hospitals.

- The microbiology laboratory should provide adequate diagnostic testing to identify nosocomial infections and accurate antimicrobial susceptibility testing.

4. Vaccination

- Effective vaccination can reduce the prevalence of antimicrobial resistance in major bacterial pathogens.
- National and international efforts should be exerted to increase the awareness of the importance of vaccination both in general public and in healthcare professionals.

5. Policy and regulation

- Control and prevention of antimicrobial resistance should be one of the top priorities among national policies and agenda.
- Appropriate and relevant governmental regulations, commitment and support are essential for successful control of antimicrobial resistance.
- Relevant policies and regulations to control antibiotic abuse are urgently required in many Asian countries.
- Any kind of antibiotics should be purchased based on doctor's prescription and it should be regulated by law in all countries.
- Monitoring and regulation to prevent the production and circulation of counterfeit drugs should be implemented in all countries.
- Antibiotic uses in animal husbandry should be monitored and regulated by appropriate regulations.

V. Conclusion

Antimicrobial resistance is a serious healthcare threat worldwide. Comprehensive strategies should be implemented to control and prevent the emergence and the spread of antimicrobial resistance. Given the enormous clinical and economic impact of antimicrobial resistance, particularly in the Asian region, the Strategic Action Plan has been developed and it consists of five major components that are aimed to achieve effective control and prevention of antimicrobial resistance in the Asian region; surveillance of antimicrobial resistance and

antibiotic use, appropriate use of effective antibiotics, hospital infection control, vaccination, and policy and regulation. This Strategic Action Plan can provide Asian countries with the general concept and the frame of the strategies to address the growing threat of antimicrobial resistance in the region for the first time.

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