Antimicrobial resistance, a silent public health emergency

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The golden age of antibiotic discovery began with the advent of penicillin by Sir Alexander Fleming in 1928 and its introduction during World War II. This new antibiotic era translated to rapid decline in mortality and morbidity from infectious diseases, especially those caused by bacteria.

However, this golden age of antibiotics has long been over, with no new major class of antibiotics being discovered in the last three decades. Even more alarming, antimicrobial resistance, when bacteria mutate to become relatively impervious to an antibiotic, is becoming a serious public health threat. Antimicrobial resistance threatens to undo many of the health gains over the last seventy years with the current situation looking particularly worrisome.

There are several poignant international threats worth noting. According to the World Health Organization (WHO), methicillin-resistant Staphylococcus aureus (MRSA) has become common and entails a 64% increased risk of mortality. Carbapenem resistance in Klebsiella pneumonia is a major cause of hospital- acquired infections reported from all parts of the world. E.coli resistance to fluoroquinolones is now widespread. Treatment failure with third generation cephalosporins in Niesseria gonorrhoea has been confirmed in at least 10 countries. Resistance to colistin (a last resort treatment for Enterobacteriaceae) has also been found in many countries. A particularly worrisome global threat is the emergence of multidrug-resistant tuberculosis (MDR-TB) and extensively drug-resistant tuberculosis (XDR-TB). These forms of TB have made treatment extremely difficult and costly with poor outcomes. WHO estimates that among people treated for TB, 20% will develop MDR-TB and among people with MDR-TB, 9.7% will have XDR-TB.

Beyond bacterial infections, resistance to anti-malarial agents also threatens to erode gains in health for much of the world. In 2016, P. falciparum malaria resistance to artemisinin-based combination therapies (ACTs) was confirmed in countries of the Greater Mekong sub region. P. falciparum resistance to almost all available antimalarial medicines has also been reported along the Cambodia-Thailand border.

Resistance has also emerged to the few anti-viral drugs at our disposal. Resistance to antiretroviral drugs for HIV has been well documented. Reports in 2010 reveal up to 40% resistance among people re-starting antiretroviral treatment and over 15% resistance in those newly initiating treatment. Influenza A viruses have also been found to be resistant to the M2 inhibitors, amantadine and rimantadine. Resistance to the neuraminidase inhibitor oseltamivir is estimated to be 1-2%.

Antimicrobial resistance is a natural process that follows the Darwinian theory of natural selection on a rapid scale. However, our actions have accelerated this process. Fueling the proliferation of antimicrobial resistance are the unwarranted and sometimes irrational use of antibiotics in humans and animals, the use of antibiotics as growth promoters in animals and crops, the sale of low quality medicines, poor infection control in healthcare facilities, poor adherence and over-the-counter sale of antimicrobials.

Research and development of new antibiotics struggle to keep pace with the emergence of resistance. The issue was put on the agenda for the September 2016 session of the United Nations General Assembly (UNGA) in New York. “Heads of States, for the first time, committed to taking a broad, coordinated approach to addressing the root causes of antimicrobial resistance across multiple sectors, especially human health, animal health, and agriculture”. The declaration made antimicrobial resistance the fourth health issue to be taken up by the UNGA, after HIV, non-communicable diseases, and Ebola. Antimicrobial resistance was seen as a threat to the achievement of the Sustainable Development Goals. Countries reaffirmed their commitment to develop national programs based on the “Global Action Plan on Antimicrobial Resistance”. The UNGA directed WHO, World Organization for Animal Health (OIE), and Food and Agriculture Organization of the UN (FAO) to work together and with other stakeholders to combat antimicrobial resistance.

The WHO, in collaboration with the FAO and OIE, has already developed the “Global Action Plan on Antimicrobial Resistance”. In addition, the WHO has also developed the “Global priority list of antibiotic-resistant bacteria to guide research, discovery, and development of new antibiotics” with the major objective of “guiding the prioritization of incentives and funding, help align research and development priorities with public health needs and support global coordination in the fight against antibiotic-resistant bacteria”.

In this environment of unprecedented global focus on antimicrobial resistance, each country needs to play its part. Effective strategies and action plans need to be adapted and adopted. Awareness of

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proper antibiotic use needs to be promoted in health care settings and in the whole of society. Primary prevention and control of infection in human and animal health care facilities through better hygiene and sanitation, improved food and water safety and introduction of vaccines will reduce reliance on antibiotics. Increased diligence is needed to ensure rational use of antibiotics in humans and animals, monitor antimicrobial use in agriculture and detect the emergence of resistance in coordinated surveillance programs. Meanwhile, research and development of new antimicrobials are an immediate need requiring pharmaceutical firms and government investment as a social responsibility.

Antimicrobial resistance requires concerted and rapid action if we are to achieve our aspirations for health and socio-economic development.