Editorial

World Antibiotic Awareness Week

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World Antibiotic Awareness Week falls on 13 to 19 November this year, the fifth since its inception in 2013.[1] This World Health Organization (WHO) annual campaign had its genesis in 2 separate events that both began in 2008 – the European Antibiotic Awareness Day and the United States' Centers for Disease Control and Prevention's (CDC's) Get Smart About Antibiotics Week. It aims to increase public awareness of antibiotic resistance as well as antibiotics as a precious and finite resource.[1]

Alexander Fleming's serendipitous discovery of penicillin in 1928 helped to usher in a golden age of antibiotic discovery, which lasted until the late-1980s.[2] What is less well known is that he was also the first to warn the world about antibiotic resistance. In his Nobel Award lecture, Fleming described the ease with which he could make microbes resistant to penicillin in his laboratory,[3] and in a subsequent interview in the New York Times in 1945, sounded the alarm that "the thoughtless person playing with penicillin treatment is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism". However, this warning went unheeded in the years of antibiotic plenty, and antibiotics have become almost a fundamental necessity in human society.

Antibiotics convey upon humanity the ability to prevent and treat most bacterial infections. They have been the bedrock without which many other modern medical interventions such as joint replacement surgery, cancer chemotherapy and organ transplantation will extract such a high toll in terms of death and disability that they will rightfully be attempted only for the most extreme of cases. They are also an important contributor towards the availability of cheap animal protein, upon which we are increasingly reliant.[4,5] When used in small quantities in animal feed, antibiotics act as growth promoters that increase daily growth rates by up to 10%, with meat containing less fat and increased protein.[4] Globally, more antibiotics are used in animals than in humans, and this difference is set to widen if current trends are not reversed.[6]

Over the past decades, the rates at which bacteria have become resistant to antibiotics have accelerated even as the antibiotic pipeline has slowed. In Singapore, our hospitals have seen rising rates of carbapenem-resistant Enterobacteriaceae since 2010,[7] as well as sporadic human cases of polymyxin-resistant *Escherichia coli* harbouring the *mcr*-1 gene first discovered in food animals in China.[8] A medical student community health project completed last year showed community carriage rates of extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae that exceeded 25% (personal communication: A/Prof Alex Cook)—a marked jump from the 12.4% reported in an older study in 2006.[9]

A term first used in social policy planning, a "wicked problem" is an issue that is not easy to understand or resolve because of contradictory, variable and incomplete factors that may not be fully recognised. In this aspect, antimicrobial resistance is a classical "wicked problem"; there is no single solution to this crisis, and no perfect solution that comes without cost.[10] It is important to understand that antimicrobial resistance is an evolutionary response that cannot wholly be stopped or reversed, only slowed at best. The Global Antibiotic Research & Development Partnership (GARDP) was established last year by the WHO and the Drugs for Neglected Diseases Initiative (DNDi) to develop new antibiotic treatments,[11] but it will be at least a decade before these new antibiotics reach the market. Other measures include investments in new vaccines (one of the strategic initiatives of the Bill and Melinda Gates Foundation) and increasing their uptake, improving infection prevention practices and improving the appropriate prescription of antibiotics via antibiotic stewardship or healthcare worker education. In addition, there are now efforts to develop rapid diagnostics to differentiate between viral and bacterial infections within an hour, hence reducing the unnecessary use of antibiotics. Outside of the medical field, there are also measures to improve agricultural practices to reduce dependence on antibiotics, and incorporating concepts of antibiotics and antimicrobial resistance into the school education curriculum.

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Multiple studies have shown that 30% or more of antibiotic prescriptions are either unnecessary or the antibiotics were wrongly selected.[12] The optimal duration of treatment for most infections is also unknown, although the majority of newer studies suggest that the duration of treatment for many bacterial infections can be safely shortened.[12] The difficulty of crafting public messages or even those for healthcare workers based on such nuanced understanding has recently again been highlighted by the backlash to Dr Martin Llewelyn and co-workers' article in the British Medical Journal, provocatively titled, "The antibiotic course has had its day".[12] The deep divide even among healthcare workers and experts is most readily seen in the readers' responses to the article, which are helpfully available online.[12]

On a positive note, however, such debate is healthy and elevates the issue of antibiotic prescription and resistance temporarily into the public domain and consciousness. A path towards clearer messaging and education can hopefully be found in the future when better evidence is available and more minds are focused on the issue.

In summary, antibiotics remain a finite resource that underpins much of medical progress and capability, as well as cheap animal protein. The advent and increasing pressure of antimicrobial resistance has eroded some of the gains brought about by the easy availability of antibiotics, and threatens greater future human suffering and financial costs. Although no simple or clear solutions are available in the short term or perhaps even distant future, greater public awareness has resulted in more resources being directed to this global public health issue. This is a cause for optimism for the future.

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