Chapter 1
Resistance Phenotypes and Surveillance

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ABSTRACT

The emergence of drug resistance complicates surveillance and treatment of antimicrobial phenotypes. For example, the rise of Methicillin-resistant Staphylococcus aureus and carbapenem-resistant Enterobacteriaceae influence delivery of care. Moreover, a lack of surveillance programs in most of the developing world exacerbates the problem of MDR. Existing studies in humans are mostly retrospective single-center surveillance-based studies that look at the molecular makeup and prevalence of phenotypic resistance for several pathogens. Very few studies examined infection prevention measures or antimicrobial stewardship activities, and of those that did, none of them were multicenter. The aim of this chapter is to explore prevalent phenotypes in clinical settings and antimicrobial resistance (AMR) surveillance programs throughout the world.

INTRODUCTION

Antimicrobial resistance (AMR) threatens to upend decades of progress on managing infections. Antimicrobial drugs have saved life on earth from once-fatal diseases and risky procedures like surgeries and transplants, but their systematic misuse and overuse have transformed the bacterial population and limited the effectiveness

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of these miracle drugs. Moreover, the interconnectedness of biomes has made the exchange of bacteria in the environment, animals and humans much easier. The challenge of AMR has led many experts to reconsider the effectiveness of current antibiotic therapies over the next 100 years with a dwindling pipeline of new drug research and development (R&D). Antibiotic usage outside of human medicine, like in agriculture for growth promotion creates another entry for antibiotics to enter our biome through our environment (Diallo, 2020). The broad scope of drug resistance requires effective collaboration among disciplines and countries to build robust surveillance program health outcomes. Similar plans to educate stakeholders and surveil infections to prevent antimicrobial resistance through hygienic infection control practices would sustainably optimize use of antimicrobial medicines in humans and animals. monitor antimicrobial resistant phenotypes to inform interventions. A "one health" approach, like the one proposed by the World Health Assembly in 2015, outlines an action plan that encourages collaboration among actors in human and veterinary medicine, finance, agriculture, environment and consumers. By creating programs, policies and research through multiple sector collaboration, a "one health" approach can achieve better public well being (GLASS WHO Report, 2017).

Figure 1. The One Health triad

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