Antimicrobial Resistance Is Futile

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With seemingly reckless abandon, we are quickly headed toward an era in which the antibiotics we once used to treat infection will be rendered ineffective.

In 1918, the world was swept by a terrifying novel influenza pandemic that killed about 50 million people.1 The primary cause of death, however, was not the influenza virus itself but the secondary bacterial pneumonia that so often followed. Antibiotics wouldn't be discovered by Alexander Fleming until 1928, so physicians during the 1918 pandemic had nothing with which to treat bacterial pneumonia. Before antibiotics, people were at risk of dying from the same common bacterial infections we so often take for granted being able to treat today. When Fleming received his Nobel Prize for the discovery of penicillin, he warned that misuse of antibiotics could lead to resistant bacteria. True to that warning, bacteria, and now yeast, have developed ways to resist antimicrobial treatment. And if we don't act quickly to prevent and contain antimicrobial resistance, we may see a time in which the inability to treat common infections will once again be our reality.

The World Health Organization lists antimicrobial resistance as one of the top 10 global public health threats.2 Regarded as serious a threat as climate change, antimicrobial resistance threatens to rob us of the antibiotics we rely upon for the treatment of infectious diseases, and of many of our modern medical advances. A review about antimicrobial resistance estimated that "globally, at least 700,000 people die each year of drug resistance from illnesses such as bacterial infections, malaria, HIV/AIDS, or tuberculosis."3 This same report warns that, without quick and strategic action, "this toll will exceed 10 million each year by 2050 and cost the world over 100 trillion USD in lost output."3

Because of the role antibiotics play in the development of antimicrobial resistance, much of the conversation around containing resistance revolves around the stewardship and development of antibiotics. We need antimicrobials to treat infections and must therefore be judicious in our use of those antimicrobials. However, we have learned over time that the prevention and control of infectious diseases should never rely on 1 strategy alone. Instead, a combination of strategies enables us to most effectively prevent infections. To prevent the spread of antimicrobial resistance, we must address the horizontal transmission of antimicrobial-resistant organisms in addition to addressing antimicrobial stewardship. Antimicrobial resistance is worsening, but not solely because of the inappropriate use of antimicrobials. Resistance is spreading. **Drug-resistant organisms and resistance mechanisms are**

spreading from person to person, primarily in health care settings, through lapses in basic infection prevention and control. To prevent this horizontal spread of antimicrobial resistance, we need infection preventionists (IPs) to lead in the fight against drug-resistant organisms.

I. Back to the basics: When outbreaks hit or increases in infection are seen, we sometimes mistakenly look for a rare causative event, such as a contaminated medical device. However, more commonly, outbreaks and increases in infection are linked to lapses in basic infection prevention and control. To best prevent and decrease infection, including antimicrobial resistance, we have to get back to the basics. The US Centers for Disease Control and Prevention (CDC) notes that primary prevention measures for *Candida auris,* a drug-resistant fungal infection, include hand hygiene, environmental cleaning, and adherence to transmission-based precautions—strategies that are all too familiar to IPs.4 Although these strategies are the foundation of infection prevention and control, all too often, we find that adherence to these basic measures is lacking. As IPs, we have an incredible opportunity to significantly reduce the transmission of antimicrobial-resistant organisms by focusing on improving adherence to the most basic of infection prevention practices. Sometimes, prevention really is that simple.

II. Surveillance: The cornerstone of infection prevention and control will always be surveillance. Without effective systems in place to identify infections and outbreaks, we cannot prevent and control them. Antimicrobial resistance requires unique surveillance systems and close collaboration between clinical laboratories and infection prevention and control departments. IPs need to understand what their laboratories have the capability to identify and how they communicate when resistance is confirmed. Additionally, IPs need to have their own surveillance systems for reviewing, tracking, and trending antimicrobial resistance. The IP is usually the first to notice trends in antimicrobial-resistant organisms, leading to the identification of outbreaks and resistance.

III. Education: It is still not uncommon to find a provider who has never heard of *Candida auris* or the carbapenemase New Delhi metallo-beta-lactamase. Not only do health care workers need to be educated on novel and emerging resistance, but IPs also must have a firm understanding of these organisms and how they spread. As they say, knowledge is power, and so we must empower ourselves and our health care coworkers with the knowledge needed to win the fight against antimicrobial resistance. The Centers for Disease Control and Prevention (CDC) has developed a wealth of information for IPs, public health professionals, and health care workers on drug-resistant organisms including Candida auris and CRE.5,6

IV. Communication: Education, surveillance, and basic infection prevention are incredibly important to our efforts in containing antimicrobial resistance. But to be really effective at preventing and containing resistance, we must understand that resistance is not just an institutional problem but a regional one. And to fight a problem outside our own walls, we must establish clear lines of communication with other health care facilities in our region. Failure to document or communicate infection status or isolation needs is the No. 1 reason for antimicrobial resistance to spread across the health care spectrum. When a health care facility does not know that a patient is colonized with a drug-resistant organism, they fail to place the patient on the appropriate transmission-based precautions or put other measures in place that can aid in containing resistance. To fight resistance, we must all work together and develop ways to ensure communication during patient transfer. IPs can encourage the use of transfer forms, such as the Inter-Facility Infection Control Transfer Form from the CDC, to help ensure that isolation and infection status is always communicated as patients travel throughout the health care network.7

V. Collaboration: Finally, IPs must seek to understand and collaborate with the efforts of state health departments that provide enhanced surveillance and response efforts for novel and targeted antimicrobial-resistant organisms. In the event that novel or targeted resistance is identified, state health departments and state public health laboratories may assist with facility and regional

containment efforts. According to Jamie Rubin, infection prevention and control program administrator for the Maryland Department of Health, “When our public health lab identifies one of these novel or targeted organisms, they activate a coordinated response from the state health department team of infection preventionists, epidemiologists, and medical experts who then work with the health care facility to investigate potential contacts.” Occasionally, the identification of antimicrobial resistance will require enhanced surveillance methods to assist with prevention and containment, which state public health departments and laboratories can also assist with. “I hope IPs know that there is support available from their public health partners and that we can work together to reduce the development and spread of antimicrobial resistance,” Rubin said. IPs should seek to understand what their state’s health care-associated infections and antimicrobial resistance programs are doing to prevent and contain resistance.8 Furthermore, IPs should learn how they can partner and participate in public health containment efforts through ensuring their understanding of public health reporting requirements, participating in containment efforts, and quickly communicating resistance when it is identified.9 It is not alone but together that we will win the battle against antimicrobial resistance.

The world is quickly moving toward a postantibiotic era in which we may no longer be able to rely upon antimicrobials to treat infections. To prevent and contain antimicrobial resistance, we need to use a multilayered approach. It will take enormous effort and involve a number of disciplines.

At the front line of the battle are IPs, armed with the knowledge and tools needed to prevent and control the spread of antimicrobial resistance. And through using best practices in basic infection prevention, implementing strong surveillance systems, collaborating with public health partners, educating about the problem of resistance, and communicating clearly across the health care spectrum, IPs can help win the war against antimicrobial resistance. p

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