Antibiotic resistance: A global threat to public health

Antibiotic resistance is a growing concern that threatens the effective treatment of infectious diseases.[1] A recent report published by the World Health Organization on the global surveillance of antimicrobial resistance demonstrates the severity of this issue and calls for concerted action among all government sectors and society to mitigate antimicrobial resistance.[1] The report is available at www.who.int/mediacentre/news/releases/2014/amr-report/en.

To evaluate the scope of the issue, resistance data of selected bacteria from 114 countries were obtained and the findings were alarming (see Table). Of note, antimicrobial resistance associated with common infections (e.g., urinary tract infections, pneumonia, and bloodstream infections) has reached a level where standard treatment most readily available in many parts of the world has been rendered ineffective. In addition, antibiotic usage in nonhumans adds further complexity to this process due to spread of resistance genes across species, and it should be carefully monitored.[1] Resistance to last-line therapy, such as carbapenems, and a lack of new therapeutics adds to the urgency of the current global situation.[1] Moreover, systematic reviews show that patients infected with antibiotic resistant bacteria are not only at risk of poorer health outcomes but also consume more health resources (e.g., lengthier hospital stays, ICU admission, or use of long-term care facilities).[1]

This first report on global antimicrobial resistance noted a severe lack in coordination of efforts in global surveillance and information-sharing systems. Moreover, international standardization on methodology was recommended to increase the comparability and quality of data collected to support a more accurate reflection of the impact of resistance in order to inform policies and prioritize resource distribution.

Table. Key bacteria causing common infections and their antibacterial resistance globally. Adapted from 2014 WHO report.[1]

Bacteria	Antibiotic of resistance	Number of countries providing data	Number of WHO regions‡ with national reports of > 50%
*Escherichia coli**	Third-generation cephalosporins	86	5 of 6
	Fluoroquinolones	92	5 of 6
*Klebsiella pneumonia**	Third-generation cephalosporins	87	6 of 6
	Carbapenems	71	2 of 6
*Staphylococcus aureus**	Methicillin	85	5 of 6
Streptococcus penumoniae†	Penicillin	67	6 of 6

* Isolates causing infections in hospitals and in the community.
† Isolates causing infections in the community.
‡ WHO regions: African region, region of the Americas, Eastern Mediterranean region, European region, South-East Asia region, Western Pacific region.

The high proportion (50%) of resistance among *E. coli* (five of six WHO regions) and *K. pneumoniae* (six of six WHO regions) to third-generation cephalosporins is illustrated in the Table. While more options are available for simple cystitis, serious bloodstream infections by these isolates are driving increased use of carbapenems at costs that are prohibitive in resource-constrained settings.[1] The use of carbapenems may also accelerate the development of carbapenem resistance, a characteristic identified in up to 54% of reported *K. pneumoniae* isolates.[1]

Community-associated MRSA is now highly prevalent in both hospital and community settings, requiring second-line treatment with glycopeptides, linezolid, or daptomycin.[1,2] These agents require careful monitoring for adverse effects and have increased treatment costs. Among countries providing *S. aureus* data, 44% reported MRSA (in proportions of 20% or greater) among their isolates.[1]

S. pneumoniae is the leading cause of community-acquired pneumonia in children under 5 years of age, with an estimated 826 000 deaths.[1] A third of the countries contributing data documented penicillin resistance in over 50% of isolates.

Resistance patterns in BC reflect the international trends; however, our results are mixed.[2] According to BC Biomedical Laboratories (now part of LifeLabs Medical Laboratory Services), resistance of *E. coli* to ciprofloxacin increased between 2007 and 2010 and is reported to be at 25.3% in 2012.[2]

The proportion of *S. pneumoniae* nonsusceptible to penicillin in BC has stabilized since 2010 and was report-

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Audit tip: Locum agreements

Thinking of hiring a locum? Here's how to comply with the Medicare Protection Act and avoid problems later.

The practitioner number belonging to the physician who personally provided the insured service should be used when submitting a claim to MSP for payment. Payment for the service can then be assigned to another physician (the host physician) or corporate body who owns the practice. To assign payment to the host physician, complete an Assignment of Payment form and submit it to the Ministry of Health. The form can be obtained from the Ministry of Health website at www.health.gov.bc.ca/msp/infoprac/ffsclaim.html.

If an Assignment of Payment form is not in place, billing statistics for the physician who owns the practice are distorted. In addition, noncompliance may impact the level of benefits that both the host physician and the locum are entitled to.

Comply with the Medicare Protection Act and avoid problems later.

If you are the subject of an audit as a host physician and it is discovered that services provided by a locum were billed under your practitioner number, you could be responsible for paying back funds received in error. There are also medical-legal implications if a physician bills for services that he or she did not provide under another physician's practitioner number.

Requirements pertaining to assignment of payment are provided in the Preamble (C. 7, C. 8, and C. 9) to the *Doctors of BC Guide to Fees*, which summarizes the requirements set out in the Medicare Protection Act.

It is worth taking the time to complete the Assignment of Payment form to protect both the host physician and the locum.

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This article is the opinion of the Patterns of Practice Committee and has not been peer reviewed by the BCMJ *Editorial Board. For further information contact Juanita Grant, audit and billing advisor, Physician and External Affairs, at 604 638-2829 or jgrant@doctorsofbc.ca.*

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ed to be at 17.2% in 2012.[2] MRSA has fluctuated between 16% and 30% of *S. aureus* isolates between 2007 and 2012. However, the overall trend from all data sources shows that the proportion of MRSA has decreased slightly.[2]

Although antibiotic resistance is a natural phenomenon, the selective pressure posed by the inappropriate use of antibiotics has exacerbated the situation. Not only does the misuse of antibiotics contribute to the emergence, persistence, and spread of multiresistant bacteria, it may also result in side effects and drug interactions.[1] BC physicians are adopting better prescribing practices using aids such as the *Bugs & Drugs* guide.[3] By continuing to move toward sounder practice in antibiotic therapy, we will go a long way to preserving the benefits of antibiotic therapy for British Columbians.

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