Stop AMR Global Media Monitor

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Drug resistance threatens Canada's health, economy, report says

A report from the Council of Canadian Academies (CCA), “When Antibiotics Fail”, highlights that of all reported bacterial infections in Canada in 2018, 26% were found to be resistant to first-line treatment. Furthermore, it states that just in 2018, out of the 14,000 deaths caused by bacterial infections, 5,400 were directly attributable to antibiotic resistance. This brings the number to 15 Canadians dying a day due antibiotic resistant bacteria. The estimated cost for the Healthcare system is $1 billion, with another $2 billion loss to the nation’s economy due to the resulting labour loss.

The report focused on 10 “important clinical syndromes” that they perceive to be a good representation of resistant infections in Canada: “bacterial gastrointestinal infections, bloodstream infections, Clostridiodes difficile infections, intra-abdominal infections, musculoskeletal infections, pneumonia, sexually transmitted infections, skin and other soft-tissue infections, tuberculosis, and urinary tract infections.”

For the panel, if infection treatment does not change, the proportion of resistant infections could reach 40% by 2050, and that this could be an underestimation.

They concluded that "AMR is a looming public health threat and potential economic disaster in Canada”, “The economy will shrink, the healthcare system will be less sustainable, and social inequality will further increase” and that “it is clear that AMR needs not only to be seen as a scientific and healthcare issue, but also as an economic and security threat. It is an insidious problem that increasingly permeates all aspects of our society.”

Source: CIDRAP, 12 November, 2019

CDC spotlights 'deadly threat' of antibiotic resistance

New data has come in from the Centers for Disease Control and Prevention (CDC) putting the number of infections due to antibiotic-resistant bacteria and antimicrobial-resistant fungi at 2.8 million, including 35,000 deaths a year in the United States. In addition, you have 223,900 infections caused by Clostridoides difficile infections including 12,800 deaths. These new values garnered through electronic health data from more than 700 US hospitals highlights that the AMR threat is significantly greater than previous estimates (CDC’s 2013 report estimated 2 million infections and 23,000 deaths caused by AMR).

“Today's report shows us that antibiotic resistance is a larger threat in the United States than previously estimated, and the report further underlines that this deadly threat is not going away," CDC Director Robert Redfield, MD, said in a press conference. "A death from antibiotic-resistant infections occurs about every 15 minutes, and a resistant infection occurs every 11 seconds. Antibiotic resistance threatens both our nation's health, and our global security."

It is important to keep in mind that this does not necessarily indicate an overall increase in AMR as the new data gathering method was much more extensive.

Another interesting and more positive finding is that the occurrence of carbapenem-resistant Enterobacteriaceae (CRE) has remained fairly stable. This is a bacteria dubbed “nightmare bacteria” thanks to its ability to cause severely invasive infections and its multiple resistance to antibiotics. Overall the number of infections went from 11,800 cases in the 2000s to 13,100 in 2018 along with 1,100 deaths versus 1,000. "This is a significant accomplishment, given just how quickly it spread in the early 2000s, and how deadly it can be," Craig said.

Source: CIDRAP, 13 November, 2019

Vaccine reduces likelihood of severe pneumonia

At the World Congress of the World Society for Paediatric Infectious Diseases in Manilla, The Philippines, the partnership of the Murdoch Children's Research Institute (MCRI) and the University of Melbourne showed that there could be a 35% decrease in severe pneumonia occurrence amongst children with the use of vaccines against the pneumonia-causing bacteria.

Source: EurekAlert!, 11 November, 2019

CRISPR: More than just for gene editing?

Researchers from Case Western University have developed a methodology to detect troublesome viruses such as the human papillomavirus (HPV) or parvovirus (parvo) using CRISPR technology. This was done by having CRISPR produce an electrochemical signal upon binding with the target DNA of the virus. The method was termed E-CRISPR.

E-CRISPR works as a virus detecting method by producing different levels of electrochemical current of methylene blue based on the presence or absence of the target virus. For the method to work, the Cas12a compound is introduced along with nonspecific ss DNA reporter with methylene blue tag immobilized on a gold electrode that have the potential to produce an electrochemical current. In the presence of the virus, the target DNA will be cleaved by Cas12a and this will then allow it to cleave the non-specific DNA reporter, resulting in a low electrochemical current. If the target DNA is not present, in the case of no virus, Cas12a will not be able to cut the non-specific DNA reporter, resulting in a high current.

"This could someday become a simple, accurate and cost-effective point-of-care device for identifying different nucleic acid viruses, such as HPV or parvo from a single droplet of a blood sample," said Yifan Dai, a PhD candidate in the chemistry department and lead author. Furthermore, whilst existing test for these viruses currently take 3-5 days to provide an accurate result, E-CRISPR could potentially do this under an hour.

Source: EurekAlert!, 11 November, 2019

Study Finds Antibiotic Prescriptions Have Fallen by Nearly a Third in Finland

The pharmaceutical company Pfizer commissioned a study using health insurance data from the Finnish government agency in charge of social benefits, Kela, and observed that over the last decade, a drop of 29% in antibiotic prescription has been observed in Finland (1 million fewer antibiotic prescriptions in 2008 compared to 2018). One key change has been in antibiotic prescription for children aged 0-4 where a a 60% decline was observed. Perkka Hongannen, Emeritus Professor of General Medicine at the University of Oulu, attributes this drastic drop to the introduction of a pneumococcal vaccine in the country's national vaccination program.

Source: CIDRAP, 14 November, 2019

Latest Scottish Report Shows Drop in Antibiotic Use, Stable Resistance Levels

In Health Protection Scotland's annual report for 2018, total antibiotic use in humans reportedly dropped by 6.2% since 2014, and resistance stayed stable overall.

Concerning human medicine in particular, the levels of antibiotic prescription in primary care have seen a significant decline (10.2%) whilst an increase of 16.0% was observed in acute care hospitals. When it comes to veterinary antibiotic prescription, it found that one in five consultations in small veterinary practices resulted in prescription.

The report also delved into the status of AMR and found that despite an overall stability in occurrence, there was a significant increase of carbapenase-producing bacteria between 2017-18, a 43.2% increase in infections resistance to vancomycin and, in 2018, resistance to azithromycin was observed in nearly 10% of gonorrhoea infections. On the other hand, E. coli bacteria have not become more resistant over the last 5 years and this is the

same for Salmonella, with two thirds of the infection it causes being treatable with the antibiotics tested.

Source: CIDRAP, 13 November, 2019

Boosting host immune defenses to treat tuberculosis

Mycobacterium tuberculosis (Mtb) treatments are often long, complex, and hard for people to endure. Furthermore, during the course of treatment, the bacteria often evolve resistance. This makes it a significant cause of death worldwide with 1.5 million deaths in 2018.

A team led by Anne Goldfeld, MD of the Boston Children's Hospital Program in Cellular and Molecular Medicine has discovered a new treatment avenue with a very high potential. This would be to improve our own cells ability at dealing with the bacteria. The use of RNA sensing by our immune cells is a signficiant part of our first-line of defense but has long been thought to be geared towards viruses and not bacteria. However, in this study, it was observed that Mtb activates several major RNA sensors (RIG-I, MDA5, PKR, and MAVS), which then play a role in inhibiting bacterial growth.

With this newfound insight, the team looked into repurposing the antiparasitic drug nitazonaxide for tuberculosis. The drug is an Ebola inhibiting drug approved by the FDA and it works by amplifying RNA sensing. Goldfeld said that they "showed that NTZ amplifies the activities of RNA sensors once they have been triggered by Mtb RNA" and that "unexpectedly, we found that NTZ also amplifies MTB's stimulation of RNA sensor activity."

"NTZ is low in cost and available as an oral drug, including a syrup formulation for children, making it an easily accessible treatment," she says. "We think NTZ or a derivative drug could complement traditional tuberculosis regimens by boosting host defenses to kill Mtb. The power of this approach is that targeting host factors will not precipitate or increase antibiotic resistance in bacteria." (Goldfeld)

Source: EurekAlert!, 12 November, 2019

Review: FDA guidance often touts indirect end points for antimicrobial trials

A systematic review today of 27 US Food and Drug Administration (FDA) guidance documents on developing new anti-infective agents has determined that the documents frequently recommend as study end points indirect measures of patient benefit—rather than direct measures, such as symptom resolution or survival—raising questions about whether the FDA is following its own standards when it comes to new antimicrobial drugs such as antibiotics.

The investigators found that 21 of 27 indications recommended surrogate—or indirect—outcomes as either the sole primary end point or as one or more components. What's more, none of the recommendations for the use of surrogate end points matched the regulatory and scientific conditions favouring indirect outcomes in place of clinical outcomes. The authors conclude, "Existing guidance documents should be updated and revised to recommend appropriate clinical outcomes consistent with general scientific and regulatory parameters."

Source: CIDRAP, 12 November, 2019

Antibiotics: New substances break bacterial resistance

"Researchers at the Martin Luther University Halle-Wittenberg (MLU) have developed a new, promising class of active ingredients against resistant bacteria." The active ingredients in question targets an enzyme that has previously not been targeted by antibiotics and bacteria have therefore not acquired resistance. The target in question is the pyruvate kinase, which "plays an important role in metabolic processes". By rendering it inactive, you effectively disrupt the bacteria's metabolic pathways and render in harmless.

As of now, experiments on the larvae of the greater wax moth (model organism) have confirmed the efficacy of their new substance, with their best compounds achieving results at least as good as conventional antibiotics.

A patent application has been filed, however, there is still a large amount of testing to be done and the new substances could potentially see the market in more than 10 years.

Source: EurekAlert!, 11 November, 2019

UK antibiotic development group to work on metallo-beta-lactamase inhibitor

A preclinical candidate for the AMR Centre's (UK-based antibiotic and diagnostic development group) program to address the antibiotic resistance caused by metallo-beta-lactamase (MBL) enzymes has been established. The focus is on a novel small molecule that has been shown to restore the efficacy of existing beta-lactam antibiotics by inhibiting a range of MBL enzyme (NDM-1, IMP, and VIM).

The goal would be to combine said molecule with carbapenems to treat infections caused by "serious, multidrug-resistant infections caused by gram-negative, MBL-harbouring bacteria".

Source: CIDRAP, 11 November, 2019