



Stop AMR

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Coronavirus: lessons to be learned (opinion)

With more than 9,800 confirmed cases and at least 213 deaths¹, China is facing a serious public health threat and international scrutiny for their handling of the novel coronavirus termed 2019-nCoV. In a few short weeks the world's attention has rapidly shifted to Wuhan, China and the source of the viral outbreak. The outbreak began with a few cases sparking concern in the Hubei province and now has seemingly exploded overnight into at least 23 countries². Experts suggest that China may be downplaying the official numbers with some estimating the true number of cases at 44,000³ while more extreme approximations put it as high as 100,000⁴. All at once top epidemiologists (and the international press) have turned their focus to coronavirus, but where was this concerted effort while scientists have been predicting a new outbreak for years? Even Bill Gates warned back in 2017 that a global pandemic was one of the three greatest threats to humanity right alongside nuclear war and climate change⁵.

¹ <https://www.theguardian.com/world/live/2020/jan/31/coronavirus-live-updates-china-wuhan-death-toll-who-global-health-emergency-latest-news>

² <https://www.theguardian.com/world/live/2020/jan/31/coronavirus-live-updates-china-wuhan-death-toll-who-global-health-emergency-latest-news>

³ [Experts: nCoV spread in China's cities could trigger global epidemic](https://www.theguardian.com/world/live/2020/jan/31/coronavirus-live-updates-china-wuhan-death-toll-who-global-health-emergency-latest-news)

⁴ <https://thehill.com/changing-america/well-being/longevity/480089-coronavirus-sparks-panic-as-flu-poses-greater-threat-to>

⁵ <https://www.businessinsider.com.au/gates-foundation-10-million-to-fight-wuhan-coronavirus-2020-1>

⁶ <https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories/china-travel-advisory.html>

Following the World Health Organization's (WHO) decision on January 30 that Coronavirus is a Public Health Emergency of International Concern⁶, the US has now upgraded its travel advisory for China to the highest level (level 4)⁷ and urges citizens not to travel to China at all. Domestically the Democratic Senator from Massachusetts, Edward Markey, has called on President Donald Trump to reinstate the National Security Council Global Health Chief that was established by President Obama during the 2014-2016 Ebola outbreak and eliminated by Trump in 2018⁸. Along the same line, many international airlines including Lufthansa, American Airlines, British Airways, United, Air Canada, Air Seoul, and Air India have stopped direct flights to China until further notice⁹.

Coronavirus has already outpaced MERS-CoV in terms of infections; the latter saw nearly 2,500 cases since 2012 while 2019-nCoV hit 7,711¹⁰ confirmed cases as of January 30. Of those confirmed cases 170 have died with 95% of the deaths occurring in the Hubei province where Wuhan is located¹¹. To aid in the emergency medical response the Bill and Melinda Gates Foundation has allocated 10 million USD for frontline responders with

⁷ <https://www.theguardian.com/world/live/2020/jan/31/coronavirus-live-updates-china-wuhan-death-toll-who-global-health-emergency-latest-news>

⁸ <http://www.cidrap.umn.edu/news-perspective/2020/01/cdc-110-suspected-ncov-cases-26-states-being-probed>

⁹ <https://www.reuters.com/article/us-china-health-airlines-routes-factbox/factbox-airlines-suspend-some-flights-to-china-over-coronavirus-idUSKBN1ZS18F>

¹⁰ <https://www.theguardian.com/world/2020/jan/30/coronavirus-us-deaths-leap-in-china-as-countries-struggle-to-evacuate-citizens>

¹¹ <https://www.theguardian.com/world/2020/jan/30/coronavirus-us-deaths-leap-in-china-as-countries-struggle-to-evacuate-citizens>

half of that going to China to bolster their response team while the other half was sent to the Africa Centres for Disease Control and Prevention to help with screening and crisis preparedness¹². This is reflective of Bill Gates' statement in 2017 that the world's "sense of urgency is lacking." When it comes to preparing for biological threats¹³.

After just the first few weeks of the outbreak the Hang Seng fell 3% on January 29¹⁴. Within China price gouging has led to severe fines from the Chinese government with one drugstore in Beijing receiving a 434,530 USD fine for increasing the price of face masks to 6 times its normal value¹⁵. China is already assuredly feeling the economic impact of the outbreak whether they acknowledge it or not. Extending the length of the Lunar New Year holiday reduces economic output on top of the reduced workforce that will return once the holiday ends. Those who are quarantined will be unable to work while many more will opt to stay home for fear of the virus. If the outbreak lasts sufficiently long, China may also see a decrease in foreign direct investment (FDI) and companies become wary of sinking their capital into a potentially risky market.

The death and infection totals for coronavirus rise in China each day while the media runs live updates throughout the night, but why is there no such response to threats of antimicrobial resistance? Antimicrobial Resistance (AMR) in China has been building for years, reducing the nation's ability to treat routine infections and leading to diseases that are difficult or even impossible to cure. In Europe alone an estimated 33,000 people die each year due to AMR¹⁶ – likely an inaccurate approximation given that there is no unified monitoring system and, in most countries, no requirement to report. In the US the CDC reports that 2.8 million people are

diagnosed with resistant infections each year, 35,000 of those are fatal¹⁷.

Coronavirus is a new threat certainly, the unknown can be terrifying especially when it concerns human health, but what is more unknown than AMR? Bacteria develop new resistance genes with alarming speed, in some parts of the world going to the hospital with a common infection comes with the risk of developing an untreatable infection. Outbreaks of resistant diseases are a reality in many parts of the world; just as Coronavirus has rapidly spread, bringing with it quarantines for travellers and evacuations of foreign citizens in Wuhan, resistant infections deserve the same precautions.

Aside from AMR it is also interesting to compare the global response to Coronavirus to public perceptions of the yearly flu. In the ongoing 2019-2020 season the flu has already killed 8,200 people in the US alone, 54 of those being children¹⁸. The CDC estimates that there are at least 15 million infected with the flu in the US and there are 140,000 hospitalizations. Furthermore, the World Health Organization (WHO) reports there are 5 million serious flu related illnesses globally which kill around 650,000 each year¹⁹. Apart from yearly vaccination campaigns the flu is taken as a fact of life, some news outlets will report on it when their local regions are hit particularly hard, but governments are certainly not issuing travel advisories or quarantining travellers. Regarding this duality Dr. William Schaffner, professor of preventive medicine and health policy at Vanderbilt University Medical Center writes that "Coronavirus will be a blip on the horizon in comparison. The risk is trivial."²⁰

Since 2012 MERS has killed more than 840 people²¹; SARS, which is considered more lethal but less virulent than Coronavirus, has infected 8,000 and killed 774²²

¹² <https://www.businessinsider.com.au/gates-foundation-10-million-to-fight-wuhan-coronavirus-2020-1>

¹³ <https://www.businessinsider.com.au/gates-foundation-10-million-to-fight-wuhan-coronavirus-2020-1>

¹⁴ <https://www.ft.com/content/fe7c566e-422d-11ea-bdb5-169ba7be433d>

¹⁵ <https://www.ft.com/content/fe7c566e-422d-11ea-bdb5-169ba7be433d>

¹⁶ https://ec.europa.eu/health/amr/antimicrobial-resistance_en

¹⁷ <https://www.sciencedaily.com/releases/2020/01/200129131428.htm>

¹⁸ <https://thehill.com/changing-america/well-being/longevity/480089-coronavirus-sparks-panic-as-flu-poses-greater-threat-to>

¹⁹ <https://thehill.com/changing-america/well-being/longevity/480089-coronavirus-sparks-panic-as-flu-poses-greater-threat-to>

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²¹ <https://www.businessinsider.com.au/scientist-simulated-coronavirus-pandemic-deaths-2020-1>

²² <https://www.businessinsider.com.au/scientist-simulated-coronavirus-pandemic-deaths-2020-1>



since it caused a global panic in 2003. Going all the way back to 1918, the Spanish Flu, widely considered to be one of the most devastating pandemics in human history, killed 50 million²³. A simulation conducted by the Gates Foundation in partnership with the World Economic Forum found that a worst-case outbreak could kill 65 million people within 18 months²⁴. The world is woefully unprepared for an outbreak of multiple drug-resistant bacteria even with warning after warning. The number of bacteria resistant to our first-line antibiotics and even last-resort antibiotics like colistin is growing by the day, but much like the world's response to coronavirus we seem incapable to plan ahead.

The total number of cases in each country as of writing are as follows: China: 9,692, Thailand: 19, Japan: 14, Singapore: 13, Taiwan: 9, Malaysia: 8, Australia: 7, South Korea: 11, France: 6, Vietnam: 5, United States: 6, Germany: 6, Canada: 3, United Arab Emirates: 4, Italy: 2, United Kingdom: 2, Russia: 2, India: 1, Philippines: 1, Finland: 1, Nepal: 1, Cambodia: 1 and Sri Lanka: 1²⁵.

'Lethal' mutation made tuberculosis bacteria resistant to important antibiotic

The normal treatment for tuberculosis (TB) uses four different antibiotics over the course of several months, however if even one of the antibiotics does not work the treatment is much more likely to fail. With antibiotic-resistant TB now commonplace, it is necessary to test which antibiotics the TB bacteria is resistant to which now takes only a few days thanks to rapid DNA sequencing.

Researchers at Uppsala University found 'frameshift mutations' in clinical TB bacteria that was present in a gene responsible for making the protein RpoB and the target of the antibiotic rifampicin. This mutation should have killed the bacteria so researchers wanted to isolate this mutation in *E. coli* to study how it could survive. They found that "slippage" occurred when the bacteria's ribosome made new proteins using this mutated genetic code. The slippage caused a high frequency of mistakes which limited the effect of the frameshift mutation and

²³ <https://www.businessinsider.com.au/scientist-simulated-coronavirus-pandemic-deaths-2020-1>

²⁴ <https://www.businessinsider.com.au/gates-foundation-10-million-to-fight-wuhan-coronavirus-2020-1>

allowed the bacteria to survive and become highly resistant to rifampicin.

Source: [EurekAlert!](#) 27 January 2020

100 years after development, TB vaccines vary in ability to stimulate immune components

A study published in the journal *Vaccine* shows BCG vaccines vary significantly in their ability to activate cytokines. TB infections in babies can lead to serious complications and death which is why newborns typically receive the vaccine in areas where it is common. The BCG vaccine has been shown to boost overall immunity in addition to protecting against TB. In terms of cytokine responses, the BCG-India vaccine induced significantly less interferon gamma than the other strains. The findings of the study raise questions on whether all BCG vaccines are interchangeable and whether the quality also varies because of the variation in viability and cytokines.

Source: [EurekAlert!](#) 28 January 2020

Color-changing bandages sense and treat bacterial infections

New research published in *ACS Central Science* unveils color-changing bandages that can sense drug resistant and drug sensitive bacteria in wounds. Xiaogang Qu and colleagues developed a material that changes from green to yellow when it detects a bacterial infection; once sensed, the material can then release an antibiotic to kill drug sensitive bacteria. If the material turns red that means it has contacted an enzyme produced by drug resistant bacteria. To fight the resistant bacteria, the researchers can shine a light on the bandage which causes it to release reactive oxygen species that kill the bacteria or make them more susceptible to the antibiotic.

Source: [EurekAlert!](#) 29 January 2020

²⁵ <https://www.theguardian.com/world/live/2020/jan/31/coronavirus-live-updates-china-wuhan-death-toll-who-global-health-emergency-latest-news>

Prenatal antibiotics linked to childhood asthma in Tennessee study

A large retrospective cohort study published in *Clinical Infectious Diseases* links an increased risk in childhood asthma to broad-spectrum prenatal antibiotic exposure, increasing number of antibiotics courses, and early timing. This study involved 84,212 mother-child pairs enrolled in Tennessee's Medicaid program between 1995 and 2003. The researchers from Vanderbilt University and Louisiana State University studied the relationship between prenatal antibiotic exposure and the development of asthma in children prior to age 6. 64% of the children (54,141 in total) were exposed to antibiotics prenatally; compared to the unexposed children, this group was 23% more likely to develop childhood asthma after adjusting for covariates.

They found that the children of women who received one antibiotic course were no more likely to develop asthma than unexposed children regardless of when the course was administered. However, among women who received more than a single course, early exposure was associated with a higher risk of childhood asthma in their children. Between narrow and broad-spectrum antibiotics, only broad-spectrum were associated with an increased risk of asthma.

Source: [CIDRAP](#) 29 January 2020

Report: Some UK supermarkets still allowing routine antibiotics on farms

The UK-based Alliance to Save Our Antibiotics found that some British supermarket chains are allowing suppliers to routinely use antibiotics in food animal production. Of 10 leading supermarkets that have publicly available antibiotics policies Aldi, Asda, and Iceland have no restrictions on routine antibiotics use in meat, dairy, and eggs other than the legal minimum requirements. The report found that Iceland was the only supermarket that did not have a publicly available antibiotic reduction plan and the only chain that does not collect data on suppliers' antibiotic use. Of the 10 chains in the report, 6 did release some data on suppliers' use, but none were considered "good data" on antibiotic use in the farming system. Only Waitrose and M7S ban suppliers from using the last resort colistin. The supermarkets included in the report are Aldi,

Asda, Co-op, Iceland, Lidl, M&S, Morrisons, Sainsbury's, Tesco, and Waitrose.

Source: [CIDRAP](#) 29 January 2020

A host's genes likely influence the spread of antibiotic resistance

In a study published in *mSphere* Microbiologist Melha Mellata, Ph.D., at Iowa State university and her colleagues analysed how antibiotic resistance associated plasmids transferred from one microbe to another in two genetically different groups of mice. Both groups of mice began the study with the same population of gut microbes, were kept in the same environment, and were fed the same diet. The researchers found the plasmids successfully spread in some of the mice but failed to in others, meaning resistance did not spread the same way in both groups. Further analysis of their results led to the conclusion that genetic factors in the mice could explain the variations in transfer.

Mellata's team then studies how the plasmids spread to *E. coli* inside the mice. They are now following up on this study to identify specific genetic factors that facilitate plasmid transfer.

Source: [Science Daily](#) 29 January 2020