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Staying ahead of the bugs

BERTIE C FIELDING



Bertie C Fielding and his team at University of the Western Cape

In a recent interview on his *The Daily Show*, Jon Stewart asked astrophysicist Neil deGrasse Tyson why the universe is trying to kill us, this in reference to the near-miss meteor event a few months ago.

The universe – meaning meteors – has always kind of been trying to kill us, responded the always-game Tyson; we just haven't noticed it so much before. It's only now, as humans have spread further and wider across the planet and with deep-space satellites keeping a lookout, that we've noticed the meteors raining down around us. And that kind of applies to the newly

identified coronavirus, now officially dubbed the Middle East Respiratory Syndrome Coronavirus (MERS-CoV).

In a manner of speaking, viruses have always been trying to kill us. It's not that they've gone all Bond villain on us, hell-bent on wiping us out. It's just that in their insatiable drive to replicate, these viruses have sometimes – self-defeatingly, yes – killed their hosts, humans among them.

And it's only now, with our state-of-the-art lab electron microscopes and cutting-edge molecular biology tools, alongside stringent new medical protocols in place across the world, courtesy of the likes of the

World Health Organisation, that we've put names, DNA profiles and genetic sequences to these viruses. We're now better equipped than ever before to spot them and, to some degree, understand them. This is the case with coronaviruses, so named because of the distinctive crown-like spikes that form around the main virus 'body'. Coronaviruses are in the news again as reports appear on this new human coronavirus (hCoV), MERS-CoV. (The coronavirus was originally called novel coronavirus 2012 (nCoV) or HCoV-Erasmus Medical Centre (HCoV-EMC), the latter in reference to the Dutch facility

INSIGHT: INTERNATIONAL

thousand from SA, are set to head for Saudi Arabia later this year for the Hajj, the annual pilgrimage to Mecca. The World Health Organisation (WHO) and CDC have, for now, issued no travel advisories, and the CDC does not recommend any change in travel plans. They advise only that those who visit the Arabian Peninsula monitor their health and “see a doctor right away if they develop fever and symptoms of lower respiratory illness, such as cough or shortness of breath”.

WHAT OUR STUDIES HAVE SHOWN...

Coronaviruses were of limited interest to researchers, until SARS. They are typically not the first, second or even third pathogen that laboratories search for when looking for possible causes of what’s known as severe acute respiratory-tract infections.

As a result, no one knows quite how common human coronavirus infections are. In our research on the human coronavirus, known as NL63, the virus shows up, globally, in anything between 1% and 10% of samples. In SA, prevalence was just over 8%. But we suspect that if we do start screening for hCoV (not necessarily, in SA, for MERS-COV), we would find a higher incidence.

As with MERS-COV, NL63 was commonly found with other respiratory viruses. So, for example, it coincided with the human metapneumovirus (hMPV), an important cause of lower respiratory tract infections among children, and/or the respiratory syncytial virus, or RSV, which also produces cold-like symptoms.

In fact, studies conclude that doctors would most often credit hMPV or RSV as the causes of infections. Very rarely would hCoV be considered. Consequently, we do not think we have a full picture of hCoV prevalence as yet. As indicated already, human coronaviruses are typically not on the list of agents labs screen for when working with samples. We’ve also found that analysis has to be conducted with the right samples; a phlegm sample produced better results than a swab sample taken from the nose and throat. And coronavirus screenings require spe-

cialised (i.e. expensive) equipment in WHO-accredited labs. There is still so much to be learnt about human coronaviruses, we do not know, for example, if hCoV is an opportunistic virus that pounces when others have already weakened the immune system, or whether it does the weakening and opens the door for other infections. But we do know that when hCoV is found alongside hMPV or RSV, symptoms are typically more severe.

There are other issues, notably that samples are only obtained from those who actually go to hospitals, i.e. in the most severe cases. Many others may be infected, but do not need to go to hospital as their symptoms are milder and pass on their own. Although they could, even with such mild symptoms, infect others.

IS THERE A COST TO THIS?

There are, of course, some very real economic considerations. In the US, for example, the common cold leads to between 75m and 100m visits to doctors annually, at a conservative cost estimate of \$7.7bn per year. It has also been reported that Americans spend roughly \$2.9bn on over-the-counter medication and another \$400m on prescription medicines to rid themselves of the symptoms. In addition, an estimated 22m to 189m school days are missed annually due to the common cold. As a result, parents missed 126m work- days to stay home to care

for their children. When added to the 150m workdays missed by employees suffering from a cold, the total economic impact of cold-related work loss exceeds \$20bn per year. So it is estimated that the common cold costs the US economy around \$40bn per year and the British economy £42bn. While we do not have reliable numbers for SA, it would not be far-fetched to imagine that infections here would carry equally worrying costs.

WHAT NEXT?

The WHO and the CDC are right; there is no need for panic. As already indicated, no travel restrictions have been put in place. The organisations do not even propose that countries start screening for MERS-CoV, although they do advise that countries be on the alert for “any unusual patterns” of severe acute respiratory infections. The CDC also suggested that screening for MERS-CoV be considered for those who, within 14 days of travelling to the Arabian Peninsula or neighbouring countries, develop severe acute lower respiratory illness and do not respond to appropriate therapy. And for those who develop these symptoms after being in contact with such a traveller. For those who are being tested, the CDC also recommends expanding the specimens to improve the chances of detection.

There is a growing need for greater research into the virus. Fears remain that SARS will make a comeback, or that we will find a new coronavirus – other than MERS-CoV – that spreads easily and becomes a worldwide problem. Our globalised, jet-hopping world is a boon to any virus with world domination on its mind.

SARS, fortunately, was stopped in its tracks through quick action from the WHO and other such organisations. But, say scientists, we need to learn what we can from SARS, MERS-CoV or even animal coronaviruses. That knowledge could stand us in good stead further down the line. So even if most meteors go swooshing past us, it’s best to be prepared when one comes a little too close for comfort. ■

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Prof. Bertie C Fielding