

LONGITUDE PRIZE

AMR VOICES

Stories from the frontlines of antimicrobial resistance during Covid-19



November 2020

ABOUT THIS REPORT

Between July and November 2020, the Longitude Prize reached out to contacts around the world to connect with people living with – or who have experienced – drug-resistant infections, to better understand how the Covid-19 pandemic is shaping their lives.

The team also spoke to medical professionals, doctors and pharmacists, to capture their perspectives. Combined, the stories shared in this report provide the reader with a first-hand look at how the antimicrobial resistance (AMR) and Covid-19 agendas meet and what people living with resistant infections or have overcome them think needs to be done.

LONGITUDE PRIZE

The Longitude Prize is a £10 million prize fund with an £8 million payout that will reward a competitor that can develop a point-of-care diagnostic test that will conserve antibiotics for future generations. The test must be accurate, rapid, affordable and easy to use anywhere in the world. The Longitude Prize is run by Nesta Challenges, part of Nesta, the UK's innovation foundation, with funding from Innovate UK.

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INTRODUCTION

Do we really want another 'new normal'?

**Longitude Prize Team
Global Health, Nesta Challenges**

In just a matter of months, the Covid-19 pandemic has turned the world on its head, laying bare the vulnerability of human health, the potential of global contagion, and the fragility of our public health infrastructure. We have also seen the disruption of everyday life and things we took for granted. National governments have implemented sweeping social restrictions to contain the spread of the disease, introducing radical measures to shore up jobs and markets.

For many, this was unimaginable just 12 months ago. Yet, the threat of the global spread of a highly infectious disease – 'Disease X' – had been anticipated and forewarned by the World Health Organization (WHO) for some time. Covid-19 carries all the hallmarks of the 'Disease X'.

What can we learn from this in regards to the battle against antimicrobial resistance (AMR)?

At [Nesta Challenges](#) – home to the Longitude Prize, an £8m prize to accelerate the development of a point-of-care diagnostic test that will conserve antibiotics for future generations – we've been asking ourselves this question.

Accelerated by the misuse and overuse of antibiotics, drug-resistant bacteria – or 'superbugs' – are multiplying rapidly. Common bacteria, like *Escherichia coli* and *Enterobacter* which cause urinary tract infections (UTIs), are developing resistance to drugs and are deemed critical on the WHO's priority pathogens list. Today, too few new antibacterial treatments are in development, rapid diagnostics are still not funded at an effective scale and pace, and antibiotic stewardship is faltering as a result.

Superbugs claim the lives of 700,000 people worldwide every year. As more drugs stop working, more lives will be put in danger. By 2050, an anticipated 10 million lives will be lost as a result of a resistant infection if we do not act now. That's greater than the current population of New York City, London or Paris.

The Covid-19 experience has taught us that the general public responds well to accurate data about serious health threats. Numbers matter – but so does the first-person experience. For many of us, Covid-19 became real when journalists started reporting and sharing footage from the hospital wards where patients were being treated. Action on AMR doesn't need to be a polarised 'either or' discussion of what evidence matters, numbers vs stories – it needs both.

AMR Voices gives a platform for people living with drug-resistant infections, those that have survived them and to the clinicians contending with them, and captures their views on the pandemic. The stories included in this report shine a light on the deep interconnections between AMR and Covid-19.

With stories from around the world, delivered first-hand or as narrated interviews, we aim to create a space where patient and medical professionals' hopes and concerns for the future treatment of superbugs can be heard.

In the UK, Dr. Ranj Singh, an Emergency Paediatrician in the National Health Service (NHS) and TV presenter, shares his fears for the future. He imagines the day when he will have to tell the parents of an extremely sick child with an AMR infection that they've run out of options, and why Covid-19 must be a lesson for us all on the value of public health. Ronda Windsor, who lives with a drug-resistant UTI, speaks candidly about the toll the pandemic has taken on her mental health and limited her access to her doctor and essential medicines – an experience that will resonate with anyone living with a chronic illness.

In India, AMR campaigner, Dr. Abdul Ghafur tells us of his turn of fate, hospitalised as a Covid-19 patient, and of his fears of being ventilated because of the increased exposure to a hospital-acquired infection. Meanwhile, patient-turned-entrepreneur Pranav Johri's experience of travelling abroad to get treatment for his resistant infection is a stark reminder that national lockdowns threaten people with other diseases than Covid-19.

Mary Millard in the US and Vanessa Carter in South Africa both call for better public education and awareness as a result of the pandemic and lament that their respective governments have not treated AMR as the public health emergency that it is. Mary highlights that sepsis already kills 99,000 people per year in the US and that, at the time of writing, more than 240,000 Americans have died as a result of the Covid-19 pandemic.

As the accounts in this report will attest, all levers of change need to be pulled in order to inspire and to mobilise communities to act on AMR. There is no silver bullet solution. It requires a concerted effort on multiple fronts, including better strategies for developing new antibiotics, new and innovative treatment techniques, continued improvement in hospital hygiene and investment in new rapid diagnostics. Better testing will be key to the sustainable stewardship of the drugs we have and those that, we hope, will come.

There's still much to learn from the Covid-19 pandemic, but it is clear that the experience has focused minds on the devastating impact of infectious diseases that are hard to manage and trace, and the challenges of developing vaccines and cures. It has equally elevated global awareness of the value of rapid diagnostics and testing as part of community responses.

Without action and new antibiotics, a simple wound or cut could be fatal and routine operations like hip replacement surgery and life-saving treatments like chemotherapy may become impossible. Just as patients have had to think twice about visiting a hospital this year to avoid the risk of contracting Covid-19, the same calculations are already having to be made in some cities in India to avoid drug-resistant infections.

AMR is a universal issue and has the potential to affect the full spectrum of the population, whereas Covid-19 hits the elderly and those with pre-existing conditions hardest. Without action on AMR, it is a calculation that many more of us may be forced to make.

Antibiotic and antimicrobial resistance cannot be allowed to become the next 'new normal'.

Our heartfelt thanks to all the people who have kindly contributed their experiences to this report, especially to those battling and recovering from Covid-19. Our thanks to all the committed charities, foundations and agencies that have helped us along the way. Special mention to: Antibiotic Research UK, Superheroes Against Superbugs, as well as to those doing great work in the field, including BSAC, ReAct, Wellcome Trust, CARB-X, GARDP and BIRAC, who kindly provided their consultative support.

FOREWORDS

When the drugs don't work

Dr Ranj Singh

National Health Service (NHS) Emergency Paediatrician
and TV Presenter, UK



"I'm sorry, but the treatment's not working."

These are the words that nobody wants to hear. Especially if you are the parent of a sick child. Yet increasingly, there is a real concern that we might have to start using them. In fact, some of us already have.

I work in Emergency Paediatrics. Infections are probably the commonest thing we see. There's a naive sense of security in all of us that, no matter what, we will always be able to treat whatever infection it is. Meningitis, cellulitis, pneumonia, urine infections, even sepsis. We think we will always have something to use.

Parents and carers think the same. There's no way that they've considered that their child might have a resistant infection. They either believe their child needs antibiotics (sometimes they expect them!), or they trust that whatever the cause we will have a treatment. Fortunately we've all made some progress in dealing with the former. Various education campaigns have taught people that most infections don't need antibiotics at all. This isn't just a success for the public. Healthcare staff are changing their practice too and not resorting to the 'have some just in case' approach, which many of us have been guilty of.

However, the message about the latter still hasn't completely sunk in. When I started medicine 20 years ago, there was always a stronger antibiotic we could use if something didn't work. We prescribed them like smarties. Now, I think twice before even starting them because I don't want to contribute to the growing issue of antibiotic resistance.

I don't ever want to tell a parent that we've run out of options. And I don't want to live in a world where we have to routinely accept that there may be infections we just can't treat. Luckily we don't see a huge amount of problematic antibiotic resistance in children in the UK. Often it's picked up

"I don't ever want to tell a parent that we've run out of options. And I don't want to live in a world where we have to routinely accept that there may be infections we just can't treat."

incidentally (for example, we routinely screen patients on admission or if they are in intensive care units). If picked up, we have systems to isolate, reduce risk and mitigate. But this may not always be the case, and we have to constantly remind ourselves to be vigilant in treating significant infections, yet at the same time, be mindful of over-treating and adding to the problem.

Unfortunately, deciding when antibiotics are required has never been easy – especially in children. The signs are harder to interpret, we can't do lots of invasive and unpleasant tests because that's not fair, plus we don't want to take chances. It's even more tricky during a pandemic. We've seen patients come in really sick with Covid-19, but equally, it could be sepsis due to a bacterial agent. Or, rarely, it could even be both.

The situation is further made complicated by children's physiology. Interestingly, most children who get Covid-19 won't get extremely unwell (which differs from older adults). So if they are really poorly, it's probably not Covid-19 at all.

So we've tried to adapt by reinforcing guidelines (NICE have great guidelines on the management of fever in kids and when to think about antibiotics), routinely calling parents to check on progress at home after discharge and then reassessing if needed (rather than giving that 'just in case' script), as well as improving our own diagnostic systems. Our department invested in point-of-care testing to get rapid blood results to help us differentiate the benign viral illness from the potentially serious bacterial infection. Our hospital laboratories also upped their testing capacity and capability. I like to think we've done a reasonably good job, but that's because I work in a Trust that has the means and resources to do so. Sadly this isn't the case across all of the NHS.

At the same time, I've continued to use whatever platform I have to spread awareness amongst the general public. I worked on a campaign around AMR with Public Health England a few years back. The same messages still apply and I continue to dish out that advice: not everything needs them, don't use them unless advised or essential, and let's preserve them for as long as we can.

Sadly these messages seem to have gotten lost during the pandemic. The focus worldwide on Covid-19 means that other infectious agents don't get as much press or headspace right now. So we either run the risk of missing important infections, or treating inappropriately. Let's be honest, more children will likely die from other infections than Covid-19 in 2020 (yes, that's a bit of a simplified look, but the figures are true). But they're still there and we need to be mindful we don't forget them, whilst not slipping into bad habits again.

Maybe it's time for a renewed focus on non-Covid-19 infections. Perhaps it's time for more public health campaigns to remind us. However, these have to be balanced with guidance for everyone on when antibiotics are the right choice. In a Covid-19-dominated world, if a virus is responsible for us all making better antibiotic choices, then at least something good might just come out of all of this.

“ Sadly these messages seem to have gotten lost during the pandemic. The focus worldwide on Covid-19 means that other infectious agents don't get as much press or headspace right now. ”

Amplifying the patient voice

Arlene Brailey

Patient Support Officer, Antibiotic Research UK



Suffering with a resistant bacterial infection is a topic which is not often discussed in the public domain, nor particularly widely in healthcare settings. And yet, for those afflicted by these under-recognised and misunderstood illnesses, it immediately conjures up fear. Fear of what happens if an infection flares up again, fear of being hospitalised with little warning, fear about not getting to the hospital quickly enough.

Then there is the ultimate, almost unspeakable terror – that there will eventually be no antibiotics left that can treat their infection. This is the deep-seated fear that invariably surfaces in every conversation when patients open up and talk about living with infections caused by resistant bacteria, and their devastating, life changing effects.

The Patient Support team at Antibiotic Research UK was set up to offer much needed support for these patients. The charity recognised that people living with resistant and recurrent infections lacked someone to speak to, and importantly someone that would listen to them, with expertise and, importantly, time – a luxury which few health professionals have.

My background is as a pharmacist, and alongside my colleague Jodie Christie, a nurse, we have established a confidential email and one-to-one telephone line for patients (and their families) to discuss anything related to resistant or recurring infection.

While we do not offer personal medical advice, we support and guide the people who contact us to valuable sources of help and information. We help distil the pertinent questions a patient really needs to ask their doctor or health professional. We have also prepared extensive website resources about different types of resistant bacteria.

“ The people we speak with and support every day desperately want their voice to be heard. They worry about the lack of new antibiotics – not only the threat it poses to their lives, but the implications this has for their children and grandchildren. ”

The most effective means of supporting patients has been through the sharing of individual experiences. This often proves cathartic for patients, being able to share that experience with others, and broadening understanding of how it feels to live and deal with these infections, and the day to day limitations it places on lives. Sharing brings patients together, creates a common bond and most important of all, reduces that extreme isolation that so many of those that I speak to feel.

AMR cannot be fully understood without involving the unique stories of the people who are living with it. They put the issue into human context and demonstrate the urgency and reality of what many describe as the 'next pandemic', something that still seems to elude general public understanding – even as we're living through Covid-19.

The people we speak with and support every day desperately want their voice to be heard. They worry about the lack of new antibiotics – not only the threat it poses to their lives, but the implications this has for their children and grandchildren. From routine operations, to a grazed knee, the risk of contracting a life altering resistant infection is increasing. AMR is one of the greatest threats to modern medicine. With limited government and medical industry support hindering the progress of developing accurate and rapid testing of bacterial infections, the problem of resistance is only exacerbated.

Patients want their voice and this message to be heard loudly and clearly.

Antibiotic Research UK

Antibiotic Research UK is the world's first charity created to address antibiotic-resistant bacterial infections through research, education and patient support. You can support them by becoming an Antibiotic Research UK member, making a donation or helping them to fundraise. It's not just about what you can give though. Antibiotic Research UK is also there to support people who are struggling to cope with an antibiotic-resistant infection. If you think you, or someone you know, might be affected then visit their Patient Support page where you can get trusted information or speak to someone about what you're going through. www.antibioticresearch.org.uk

The Longitude Prize would like to thank Arlene and her colleagues at Antibiotic Research UK for the ongoing support they have shown the Longitude Prize.

AMR VOICES

Mary Millard's Voice

**AMR survivor and advocate,
international patient speaker**

United States of America



“More patients or surviving partners need to be vocal and speak out... I cannot help but feel if patients speak louder, we can get public attention”. Mary Millard is a campaigner, public speaker and sepsis survivor. She travels the United States and internationally to educate people – from church groups, school classes and conferences to the United States Congress – raising awareness of antimicrobial resistance (AMR), its risks, its impact, and its prevalence.

In 2014, Mary was admitted to hospital for an aneurysm near her heart and a partially collapsed aortic valve. The day before her scheduled surgery, she experienced cardiac arrest as a result of a backwash clot. The doctors placed her on extracorporeal membrane oxygenation (ECMO) life support to keep her blood oxygenated and circulating around her body. After two weeks, she underwent open heart surgery to repair the damage, however within five days of the surgery she went into acute septic shock with very little chance of survival.

It was 61 days before Mary was able to leave the hospital, when she learnt the cause of the sepsis was a *Pseudomonas aeruginosa* infection acquired via a cannula in her groin during her time on life support. The bacteria, it turned out, is resistant to most antibiotics, and had created a biofilm growing on the surfaces of all the artificial implants installed during her surgery, as well as on her valve replacement.

Six months later, Mary went into septic shock once more.

To this day, Mary still lives with the resistant infection, taking a combination of Tobramycin, Zosyn (Piperacillin with Tazobactam), Cefapime, and Ciprofloxacin to restrict the infection to the biofilm and keep it out of her bloodstream. For Mary, the campaign to raise awareness of AMR and its causes is personal.

“ They have no idea that over-prescribed antibiotics lead to these pathogens getting stronger. They think antibiotics cure anything and do not know that the pipeline for new drugs is drying up. ”

“When I speak to smaller public groups in churches or in schools, people are shocked that one in every 25 people in hospital acquire these infections, and that the general public outside of hospital can acquire them too. They have no idea that over-prescribed antibiotics lead to these pathogens getting stronger. They think antibiotics cure anything and do not know that the pipeline for new drugs is drying up.”

Mary would like to see the issue of AMR taken as equally seriously as breast cancer and other high profile diseases, but worries the risk of acknowledging the prevalence of infections is hindering the chances of tackling it.

“It seems always to be hidden. I believe healthcare facilities like to deny it happens, as here in the US, they are fined for infections.”

The US has been one of the hardest hit countries during the Covid-19 crisis, with more than nine million people contracting the virus and over 240,000 deaths since the beginning of the pandemic.

Luckily, Mary has not had the virus, and tested negative ahead of a recent surgery. For her, she is not worried that Covid-19 would result in her Pseudomonas infection flaring up since she is on a permanent regimen of antibiotics to keep it suppressed.

Having lived with a resistant bacterial infection, Mary’s awareness of how pathogens spread has certainly increased. Since her original diagnosis, she has taken courses in epidemiology and superbugs. When Covid-19 arrived in America, Mary felt ready.

“I took steps to stay out of public when it started, as we were told to stay home. My husband was sent to work from home incredibly early on. I did use grocery delivery instead of going to the store and started having my prescriptions mailed so I would not have to pick them up. I am very keen on hand washing and sanitising surfaces.”

Reports that Covid-19 patients have been prescribed antibiotics as a prophylactic measure do worry Mary, particularly if it undermines antibiotic stewardship. She would like to see cultures or rapid tests for pathogens before antibiotics are prescribed.

When asked whether she is worried that the response to Covid-19 may turn attention away from developing solutions for drug-resistant infections, Mary is emphatic,

“Oh absolutely! I had just returned from a trip to Congress in Washington D.C. to lobby for more funding in the fight against AMR. Two weeks later the Covid-19 crisis broke, and all was forgotten – funding went to fight the new pandemic. All talk on social media went from AMR and antibiotics to Covid-19. It was devastating. I then saw some talk from France that some Covid-19 patients had died from sepsis, rather than Covid-19, and finally conversations about secondary bacterial infections began. I became a ‘social media warrior’ starting to keep AMR in people’s minds. It has been hard.”

For many raising awareness about AMR, particularly among lawmakers and the media, the dominance of Covid-19 has pushed the problem of resistant bacterial infections too far down the agenda. *“It is baffling to me why such little attention should be paid to such a problem”,* sharing her concern that not enough people are being made aware of the scale of the AMR problem in the media.

“ All talk on social media went from AMR and antibiotics to Covid-19. It was devastating. ”

When it comes to government, she is even less reassured,

"I am confounded that the government does not see that AMR is as great a threat as Covid-19. Here in the States 240,000 have died from Covid-19, but they do not seem to be aware that 99,000 a year are dying from sepsis and AMR too, and that number will only grow. It seems to not be as alarming. Maybe this is because most people get over infections or, at the other extreme, they die from them. We survivors, who have to live with them every day, keep crying out about it – it is hard to get more people involved."

Mary wishes the medical sector and government would mobilise against AMR in the same way it has in pursuing a Covid-19 vaccine. She would like to see new antibiotics and novel therapies, however she is gloomy about the prospect,

"On the whole, companies have stopped work on developing new antibiotics, because they do not make money from them."

There may be some hope however, with wider awareness about public health and the impact of infections following the Covid-19 pandemic, Mary believes there may be greater appetite to understand AMR, particularly as more people become aware of the role sepsis has played in making many Covid-19 patients worse, as well as the similarities in some of the after effects of both Covid-19 and resistant infections,

"Much like Covid-19, AMR has aftereffects too. ICU delirium is not specific to Covid-19 yet the media think it's unique. The same goes for those in government. The problem is AMR does not shut governments down, but it can stop those experiencing an infection from working, from living a normal life. AMR is not new, and I think that is a big issue too."

In America, where television advertising for medicines and medical treatments is permitted, Mary sees an opportunity. She would like to see similar commercials raising awareness of drug-resistant infections, though she is realistic about the prospect, since most foundations involved in tackling AMR do not have the funds for media. For now, Mary continues to advocate for patients' voices to be heard.

"What is missing to me is the patient view... I know it can be difficult for many to share the intimate details of what has happened to them, but we need that to show how devastating this is at an individual level. I see some rare stories describing what superbugs are from time to time on the news, maybe including an interview with a doctor, but it seems to stop there".

For Mary, the more survivors of AMR – or the partners of those who have lost loved ones to AMR – who tell their stories, the better chance there will be of raising public consciousness. Honest conversations about the human cost of the ongoing rise of resistant infections, with lawmakers, with doctors, with the American hospital lobby and with the public are essential. Change is possible, but only through greater awareness of the enormous toll that AMR is taking.

" I am confounded that the government does not see that AMR is as great a threat as Covid-19. Here in the States 240,000 have died from Covid-19, but they do not seem to be aware that 99,000 a year are dying from sepsis and AMR too, and that number will only grow. "

Pranav Johri's Voice

AMR survivor and Founder, Vitalis Phage Therapy

India



The Covid-19 virus has impacted every aspect of life; social distancing measures have become the norm, entire cities, regions and nations have experienced government lockdowns with little warning, and international travel has ceased overnight.

At such a time, the suggestion that viruses could be a source of hope for the future of AMR may at first seem contentious, but Pranav Johri's story of recovery thanks to phage therapy is remarkable. In the face of four separate drug-resistant bacterial infections, his treatment was only possible thanks to open skies and unrestricted travel. What seemed a given in free society months ago is now a logistical ordeal.

In 2016, Pranav developed chronic bacterial prostatitis, an inflammation of the prostate gland typically caused by a bacterial infection. Diagnostic testing revealed a multi-bacterial infection, including methicillin resistant *Staphylococcus aureus* (MRSA), *Staphylococcus haemolyticus*, *Enterococcus faecalis* and *Streptococcus mitis*.

These four strains that caused the prostate infection were all resistant to the classes of antibiotics that are available to treat prostate infection – macrolides, tetracyclines and fluoroquinolones.

"I think the general public does not realise the threat that AMR poses, and its potential to cause morbidity and mortality. Not just the general public, even some medical practitioners seem reluctant to accept the problem of AMR, with some wanting to deny the scale of the problem and others being defensive about it. AMR is a problem that goes beyond any specific doctor or hospital or city or even country, it is a problem at a global scale like Covid-19 and requires a multi-pronged response similar to Covid-19."

Fortunately, Pranav was able to overcome his resistant infection with three courses of pioneering bacteriophage therapy, a method that uses viruses to attack specific bacteria. His third and last round of phage therapy finished in May 2018, and since then he has been free of infection and symptoms. However the Covid-19 pandemic has focused his thoughts on how different his situation may have been had he contracted the infection this year.

Facing the prospect of a resistant infection, with his doctors unable to provide adequate pharmacological solutions, Pranav was forced to take things into his own hands and research alternatives. He discovered the work of the Eliava Institute in the Republic of Georgia. He travelled from his home in New Delhi to Tbilisi for phage therapy treatments, sometimes for weeks at a time. It has been a long and difficult road to recovery.

“ Infections caused by antibiotic resistant bacteria pose a similar threat to our lives as Covid-19. The impact of the virus on every aspect of our life should be the alarm-bell alerting everyone to the terrible impact lethal microorganisms can have. ”

It is no secret that the Covid-19 pandemic has seen a shut-down in global travel, with many countries banning entry from abroad, requiring strict quarantines from travellers, and of course the collapse of many airlines. For many people, international travel for healthcare treatment has been essential in their recovery, something that the pandemic has rendered near-impossible.

Having experienced a drug-resistant infection and gone to great lengths to seek specialised experimental treatment, Pranav is wary of Covid-19, knowing the adverse impact it would have on his immunity, which would increase the possibility of a secondary bacterial infection occurring. He has taken many precautions to protect himself – avoiding crowded spaces, maintaining social distancing, and always wearing a mask.

With the present Covid-19 pandemic creating a greater public awareness of infectious disease and the need to prevent its spread, Pranav hopes it will create public pressure for governments to take greater action, particularly against antimicrobial resistant infections.

“The most important step would be to start accepting the scale of the problem and putting it into the public domain. When people start realising that the problem of drug-resistant infections will soon claim more lives every year than Covid-19 may end up claiming in 2020, then they will begin to see the scale and danger that it poses.”

He would like to see increased regulation of access to antibiotics. In India, an influencing factor in the increase of resistant infections is the ability to buy antibiotics over the counter without the need for a prescription. This has resulted in self-medication with inappropriate drugs that have contributed to the rise of resistant infections in the country.

As Pranav’s experience highlights, for some infections, the antibiotics we have available in the fight against some resistant strains are already ineffective. The challenge of antimicrobial resistance will only be overcome if it is fought on many fronts and innovation continues apace;

“The next step I would like to see is faster adoption of alternative treatments for AMR infections, like phage therapy. Medical regulators need to recognise the fact that antibiotics are not a treatment option in an increasing number of cases of infection due to the rise of AMR, and alternative treatment options like phage therapy need to be fast-tracked.”

Pranav is helping to spearhead the need for greater innovation. Thanks to his experience and treatment in Georgia, he and his wife established Vitalis Phage Therapy in India to bring phage therapy treatment to people facing the grim prospect of infections that antibiotics cannot treat.

“Infections caused by antibiotic resistant bacteria pose a similar threat to our lives as Covid-19. The impact of the virus on every aspect of our life should be the alarm-bell alerting everyone to the terrible impact lethal microorganisms can have. Media has played a vital role in creating awareness on Covid-19 among people and should be encouraged to play the same role with spreading awareness of AMR and the steps we can take to slow down its impact. I hope that governments, medical regulators, doctors and the medical community overall will now look at AMR with a renewed sense of urgency.”

What is phage therapy?

Bacteria are found everywhere in our biosphere, but nature has a way of preventing bacterial overgrowth and keeping them under control. It does so with the help of 'bacteriophages'. Bacteriophages, or simply 'phages', are naturally occurring viruses that infect and feed on bacteria. They do not harm any organisms other than bacteria. They are found everywhere – in the air, in water, soil, food, even inside our bodies, and any other environment that allows bacteria to grow in it. Phage therapy is the use of phages to cure bacterial infections in human hosts.

Source: www.vitalisphagetherapy.com/what-is-phage-therapy

Ronda Windsor's Voice

AMR survivor and patient speaker

United Kingdom



In November 2018, Ronda underwent laparoscopic surgery to diagnose and treat endometriosis. Within 48 hours of the procedure, she began to experience the symptoms of a catheter associated urinary tract infection (UTI). Very quickly this infection developed into urosepsis, pushing Ronda hours away from death. Though the hospital was able to save Ronda's life, it did not adequately treat the underlying UTI, and though she was discharged from hospital, she was not cured.

The UTI was caused by bacteria able to resist the antibiotics that Ronda had been prescribed. The inadequate treatment of the infection at the acute stage has seen the infection become a multi drug-resistant chronic infection also known as an obligate intracellular bacterial infection. It has had a devastating impact on Ronda's life, causing unbearable pain, incontinence, harm to her mental health, fear and embarrassment, and straining relationships with friends and loved ones.

For Ronda, the lack of public awareness of the threat of drug-resistant infections is shocking, *"It's a global serial killer. At present, a person will only be aware of the issue if they happen to suffer from a superbug, know someone who suffers from one personally, or stumbled across a rare article hidden deep in a newspaper."*

Ronda's resistant infection took hold because she was not treated fully in the first instance until she was symptom free, and the follow up treatments have been ineffective in curing the infection too.

"Most people in my position have been prescribed many short, rescue courses of tablet or intravenous antibiotics, ranging from three to 14 days. Too often the urinalysis tests come back negative, despite symptoms persisting. Even though it's known the usual dipstick test is wrong a third of the time,¹ the so-called rapid tests available to doctors haven't progressed in nearly six decades. When you experience a chronic infection, it is all too common for doctors to dismiss the pain and attribute it to one's mental health instead."

For Ronda, her first-hand experience has highlighted the necessity of tests that accurately identify infections and determine treatments that eradicate infections first time.

"It's a global serial killer. At present, a person will only be aware of the issue if they happen to suffer from a superbug."

1. The Longitude Prize. May 21, 2020. [The Long Read: We must do better for UTI patients](#). Ruth Neale

"I am very worried that the NHS's gold standard for testing urine for infections is 50 years old – infections are too often being missed. AMR is an urgent issue, a global threat to life and to modern medicine. It must be taken seriously by the government. It requires long-term planning and strategy to tackle the issue and will require significant amounts of money and resources to develop new antimicrobial treatments and accurate diagnostic tests, to ensure we preserve the effectiveness of those treatments."

2020 has been a difficult year for Ronda, with Covid-19 infections in the UK ballooning in number in March. She has faced many challenges as a result of her multi drug-resistant infection, impacting not only her physical health, but her mental wellbeing too.

Having previously experienced the near-death reality of sepsis, and living with the threat of its return, the danger of a potentially deadly virus sweeping through the country was hard to bear. The failure of medical supply chains were well documented at the start of the outbreak in the fight against Covid-19, but the knock-on impacts were felt much wider.

"Around the start of lockdown, in early April, I ran into a spot of medical bother which sent a huge surge of panic and fear through my mind, not least because of my battered immune system. My specialist prescribed a new antibiotic treatment to me, which was unavailable. Most worryingly, there was no alternative to take its place at the time."

As a sepsis survivor, Ronda erupted with fear and had to contend with the turmoil and anguish that has plagued her since she contracted her resistant infection.

"I found myself in an extremely precarious position and feared that if my infection remained untreated and my immune system floundered, I would have been a prime candidate for contracting a deadly dose of the virus that was spreading like wildfire. If I had contracted Covid-19, it was probable that I would have had to face the demon of sepsis again."

Ronda was not able to get the treatment she needed for many weeks and took extra steps to shield herself. She followed the government guidance to stay at home. All of her hospital appointments and therapy sessions took place over Zoom or on the phone, she only ventured outside for a fortnightly trip to the pharmacy and to pick up groceries. People with chronic drug-resistant infections were not included on the UK government's list of people asked to shield, despite their compromised immune systems and susceptibility to new infections, so were not able to secure priority slots for online supermarket deliveries.

" I am very worried that the NHS's gold standard for testing urine for infections is 50 years old – infections are too often being missed. "

" Around the start of lockdown, in early April, I ran into a spot of medical bother which sent a huge surge of panic and fear through my mind, not least because of my battered immune system. My specialist prescribed a new antibiotic treatment to me, which was unavailable. Most worryingly, there was no alternative to take its place at the time. "

Thankfully, Ronda was able to eventually fill her prescription, but as the levels of infection in the UK subsided, and the country began to unlock at the start of August, she began to feel unwell. The symptoms of her chronic UTI had reduced in severity, she had no episodes of incontinence, but she was bed-ridden for weeks.

"I had gone from one extreme to another. I was suffering from unbearable nausea – day and night. I had extreme tiredness, sleeping 20 hours a day. I was weak, my muscles ached, I had recurring headaches, an upset stomach, and a fever. I honestly believed I had succumbed to Covid-19 and truly feared the worst. My mental health was in tatters, I cried most days and I suffered suicidal thoughts."

Ronda was able to visit a drive-through Covid-19 testing centre. The test came back negative.

"Instantly, the fear of sepsis and all-too real threat of death lifted. Naturally, I thought it was a matter of riding out the storm of whatever bug I might have until I felt well again."

With the symptoms persisting, and Ronda at the brink of a physical and mental breakdown, she consulted the information leaflet accompanying her antibiotic treatment,

"To my horror, and confirmed later by my specialist, this episode of ill-health was a side effect of the antibiotic medication. Although I felt relieved, at the same time I was utterly bewildered that an antibiotic, a tiny white tablet, made me so ill that I was convinced I had contracted Covid-19. Within days of discontinuing the medication, I felt a thousand times better."

It is an experience familiar to many people with chronic multi drug-resistant infections; for most people antibiotics have few or no side effects; for those needing treatment with antibiotics of last resort, the side effects can be dreadful. Ronda has started a different antibiotic treatment regimen and is doing much better.

Ronda hopes that Covid-19 will not distract from the ongoing fight with drug-resistant infections, in fact she hopes the viral pandemic is a moment that will focus attention on the issue of infectious disease treatment.

"It has been reported that in Wuhan, where the first cases of Covid-19 were identified, and before a lot was known about treating the disease, a number of people who had been hospitalised for Covid-19 and placed on invasive ventilators, died not from the virus, but from secondary bacterial drug-resistant infections that developed in to sepsis."²

The wider impact of drug-resistant infections on the Covid-19 mortality rate is not yet known, but will no doubt be the subject of study as the world emerges from the pandemic.

"I hope the NHS and the government will review all of the data and statistics around causes of death and ongoing infections, and prioritise the development of new solutions to combat drug resistance."

The mobilisation of government resources and the NHS in response to Covid-19 has been enormous, and while Ronda

“ AMR has been a major health issue for years and years, all before Covid-19 emerged. Governments around the world are fully aware that antibiotic resistance is a killer. It exists! It is real! ”

2. The Lancet. March 11, 2020 Clinical course and risk factors for mortality of adult inpatients with Covid-19 in Wuhan, China: a retrospective cohort study. Fei Zhou, Ting Yu, Ronghui Du, et al. P1054-1062: [https://doi.org/10.1016/S0140-6736\(20\)30566-3](https://doi.org/10.1016/S0140-6736(20)30566-3)

hopes that this might produce a change in attitude in the prioritisation of treatments and diagnostics for drug-resistant bacterial infections, she is not confident,

“AMR has been a major health issue for years and years, all before Covid-19 emerged. Governments around the world are fully aware that antibiotic resistance is a killer. It exists! It is real! As the pandemic continues to spread, we are in a second wave in the UK and Europe. This could further delay responses to AMR and slow the development of solutions.”

For Ronda, a silver lining from the pandemic may be a greater awareness and appreciation among the wider British public of the terrible impact that infectious diseases can wreak on society. She believes the campaign needs to be spearheaded by government.

“It needs to be taken seriously by our government, for drug-resistant infections to receive a comparable degree of publicity and ministerial attention as Covid-19 has, not least because secondary bacterial infection and sepsis have been a reality for many Covid-19 patients.”

She is more hopeful that there will be longer term changes in public health thanks to the hygiene measures implemented this year. With people attending GP surgeries and hospitals wearing face masks, washing their hands and using sanitiser, Ronda believes surgeries and hospitals have never been cleaner. She would like to see them become a compulsory feature in medical facilities to reduce the spread of hospital acquired infections that are, or can become, resistant to antibiotics.

“The role AMR has played in Covid-19 deaths must be looked at in great detail as the data becomes available. Just as there were and will be avoidable deaths during the pandemic, the same is true for drug-resistant infections. We have missed too many opportunities to invest in new treatments to save lives”, explains Ronda, looking to the future.

“Covid-19 should be a wake-up call for the horrific impact of uncontrolled infectious diseases. It is having the same level of devastation that AMR is already having on global health, yet AMR is something that is only going to get worse unless there is similar major intervention. We need urgent action; it requires money and resources. I would not wish the physical pain and mental anguish of living with a drug-resistant infection that I have experienced on anyone. We should be doing absolutely everything to deal with resistant infections.”

“ Just as there were and will be avoidable deaths during the pandemic, the same is true for drug-resistant infections. ”

Early in 2020, Nesta Challenges' Longitude Prize and the Royal College of Nursing (UK) convened a one-day symposium of 162 clinicians, nurses, health experts and professional bodies working in treating and solving UTIs in the National Health Service, along with diagnostic developers competing to win the Longitude Prize. Read about the outcomes of this event here: [We Must Do Better for UTI Patients.](#)

Dr. Abdul Ghafur's Voice

Coordinator, Chennai Declaration on AMR; Apollo Adjunct Professor; Consultant in Infectious Diseases, Apollo Cancer Institute, Chennai, India



India

"They are two devils working together. Covid-19 kills patients and AMR helps Covid-19 to kill patients" – these are the words I shared in an interview shortly after I had recovered from Covid-19. I continue to stand by them.

In June 2020, I was admitted to the intensive care unit at the hospital where I work. I had contracted Covid-19. It's strange to go from frontline medical professional to vulnerable patient, and I won't ever forget the experience. At the time, I was worried about complications that come with this novel coronavirus – they range from pneumonia to cardiovascular shock and even sepsis. However, I was especially worried about the need to be ventilated if my condition deteriorated and how this increased my risk of getting a hospital-acquired drug-resistant infection.

" They are two devils working together. Covid-19 kills patients and AMR helps Covid-19 to kill patients. "

I have been working in the field of antibiotic resistance for most of my medical career. As a consultant in infectious diseases, I have been campaigning for action on AMR, advising decision-makers in India that a perfect strategy for controlling antibiotics in developing countries like ours may not exist but that there are many levers of change that we can pull to stem the tide and save lives.

In 2012, I convened a meeting of the medical societies of India and this resulted in the creation of the Chennai Declaration, a roadmap to action on drug-resistant infections across India. Again, it wasn't perfect but it was practical. It consisted of a series of recommendations aimed at the national government and state-level policymakers, including measures on the better stewardship of antibiotics and greater public awareness of the issue.

Antibiotic misuse was prevalent in India well before the pandemic was declared. Unfortunately, it continues during these troubling times too. We know that taking antibiotics when they are not needed can change bacteria so much that, ultimately, antibiotics don't work against them. This is the driver of AMR, or as they are more colloquially known, 'superbugs'.

While much is being done to better research and explore the prevalence of bacterial co-infections in Covid-19 patients (and there's still a lot more to learn), it's increasingly clear to me drug-resistant infections make the prognosis of Covid-19 cases worse. They are indeed two devils working together. The Covid-19 virus can kill patients and antimicrobial-resistant bacteria help Covid-19 to do it.

Emergent data from the pandemic indicates that patients with mild Covid-19 respiratory infections are being treated with antibiotics even though, as a viral infection, they should not be getting them. Indeed, if you look at the published data from a few countries, it seems that patients don't need antibiotics in the early stages of the infection but at the later stage.

Overall, 7 per cent of hospitalised Covid-19 patients have had a bacterial co-infection.³ Yet, when Covid-19 patients have severe pneumonia and develop complicated secondary infections, antibiotics are essential. Without them, lives can be lost.

Before the outbreak of the Covid-19 pandemic, AMR was considered one of the most important health and economic challenges that the healthcare field and the world is facing. Will the experience of this 'super virus' finally convince policymakers, politicians, business leaders, and the public to act on superbugs? The clock is ticking. Unlike so many healthcare workers across the world who succumbed to disease exposure and infection, I am one of the lucky ones to have recovered. We owe it to their memory and to our patients to act on this 'slow-moving pandemic' and to turn the tide on AMR.

Covid-19 must be a wake-up call to governments to increase their spending on healthcare, improving both the public healthcare system and the infrastructure that supports localised community care. All too often, villages and rural communities are on the sharp end of exposure to the worst of a health crisis, lacking the infrastructure in their communities to manage the spread and to care for those who are sick.

SARS, Ebola, and now Covid-19, are all messages from nature, showing us what happens when we don't listen to what she is trying to tell us. The good news is that change is possible and that action on AMR today could really transform our future. Just think about how changes in behaviour – increased handwashing, wearing masks, observing social distancing, etc. – have helped to reduce transmission of Covid-19. Equally, think about how the role of rapid testing for the virus has shown us how localised outbreaks can be identified and, in many cases, brought under control.

From improving public understanding and funding innovation to strengthening measures around antibiotic stewardship, the sentiments underpinning these Covid-19 response measures must be brought to bear on AMR. Without them, I'm afraid to say that the devils will continue to have their day.

“ Will the experience of this 'super virus' finally convince policymakers, politicians, business leaders, and the public to act on superbugs? The clock is ticking. ”

“ Think about how the role of rapid testing for the virus has shown us how localised outbreaks can be identified and, in many cases, brought under control. ”

3. Journal of Infection. August, 2020. Co-infections in people with Covid-19: a systematic review and meta-analysis. Louise Lansbury, Benjamin Lim, Vadsala Baskaran, and Wei Shen Lim. J Infect. P266–275: doi: 10.1016/j.jinf.2020.05.046

Vanessa Carter's Voice

AMR survivor and advocate

South Africa



"I won't touch an antibiotic unless I absolutely need it, I had to learn the hard way when I had no idea how important they are."

In 2004, Vanessa Carter was involved in a car accident that caused devastating injuries to her internal organs, as well as multiple facial fractures. After a facial implant prosthetic, Vanessa developed an infection which resulted in a decade of surgeries to manage. In and out of hospital, Vanessa was kept on multiple courses of antibiotics. After a year, the infection was worse. In a final emergency surgery, the plastic surgeon removed the prosthetic and sent it for testing. Confused and concerned, Vanessa called for the results and for the first time, was introduced to the term 'MRSA' (methicillin-resistant *Staphylococcus aureus*).

"I was shocked to find out I had an antibiotic resistant infection. I had been taking antibiotics continuously between different doctors, half the time quitting a course because it didn't seem to work.⁴ I did not know about antibiotic resistance. If I had, I feel I might have asked for a test and removal of my prosthetic sooner. When I explain what happened to my face and resistant infections, most people really don't understand."

Living with multiple prosthetics in her face, Vanessa is especially vigilant about infection prevention and control, *"It's quite easy for bacteria to get in through my artificial eye when I touch my face and then pass on to the other prosthetics inside"*. Covid-19 has prompted her to take additional prevention measures like wearing a mask and regular hand washing and sanitising.

Vanessa hopes that as a result of the pandemic, the mass education of the public in the best ways to prevent and control infection will complement efforts to tackle antibiotic resistance,

"I think the public education messages to tackle Covid-19 are a good foundation to build on and raise awareness of antibiotic resistance. I think there is greater public understanding of the difference between a viral infection and bacterial infection and when an antibiotic is required or not. I hope that knowledge will help people to be more questioning when they are prescribed antibiotics."

“ I think the public education messages to tackle Covid-19 are a good foundation to build on and raise awareness of antibiotic resistance ”

4. To find out more about this, read the World Health Organization's Q&A [Antimicrobial resistance: Does stopping a course of antibiotics early lead to antibiotic resistance?](#)

Vanessa would like to see the introduction of measures that help make the risks of AMR much clearer to the public,

“Much of the information patients are exposed to is highly scientific, difficult to understand and often hard to access. Number one, pharmaceutical packaging needs to carry a very visible warning. Second, more patient-friendly information needs to be made available online. In South Africa, it needs to be available in different languages, as well as graphics for those who may struggle to read.”

2020 has seen unprecedented co-operation between governments and the medical sector to respond to the Covid-19 pandemic. Vanessa sees a potential silver lining for antimicrobial resistance. The sharing of data that has helped deliver rapid advances in tests and vaccines sets a precedent that could see AMR datasets shared wider. She recognises that some countries are more conservative about sharing this type of data, but believes governments and the wider public recognise the importance of holistic data in tackling infections.

“I also think it’s a good opportunity to teach people how different microbes move from animals to people and can travel around the world quickly. We need to leverage the situation to educate people about infection prevention and control and reinforce the differences between bacterial infections and viruses. I think much more can be done to advertise the message.”

Vanessa is not convinced the government of South Africa takes AMR as seriously as Covid-19,

“There is also a major funding deficiency in terms of public awareness and AMR compared to Covid-19. Many non-profit organisations got involved in spreading the Covid-19 message as funding priorities shifted. There’s never really been an AMR funding drive to encourage charities and other civil society organisations to get involved.”

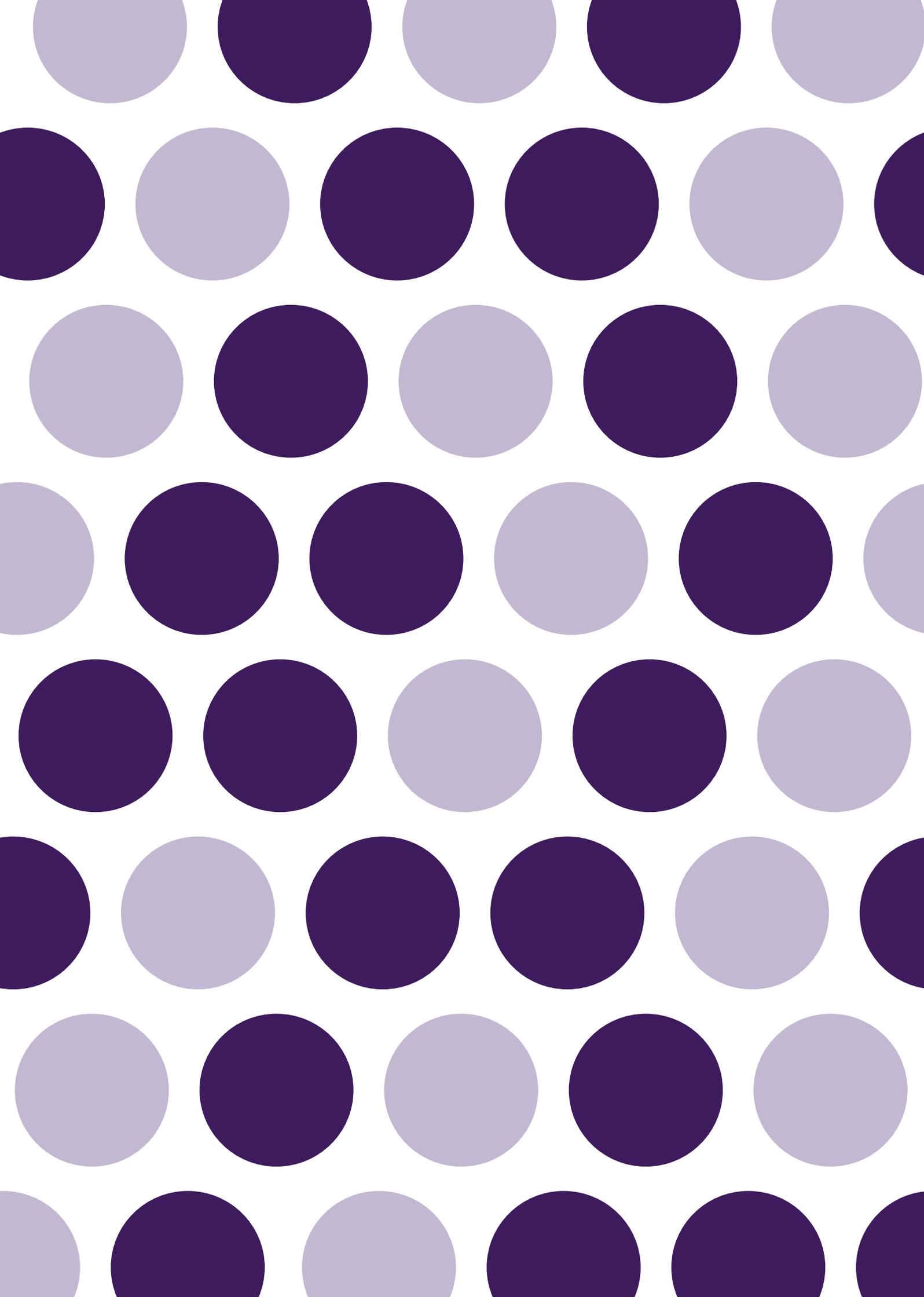
Education has been crucial in helping people understand the spread of Covid-19 and the preventative messages they are able to take. In the context of antimicrobial resistance, Vanessa believes the public deserves to be given more credit,

“I think for some people it seems like it’s too difficult for the public to understand, but just as no-one understood Covid-19 a year ago, with a bit of effort, education and empowerment is achievable. Teach the public about AMR in the same way that they have been educated about Covid-19 and change can happen in a matter of months.”

On Vanessa’s part, as an activist and campaigner, she will continue to raise the issue of AMR, educate decision makers and promote better antibiotic stewardship to ensure a future where antibiotics are able to cure infections and are prescribed only when essential.

“ There is also a major funding deficiency in terms of public awareness and AMR compared to Covid-19. There’s never really been an AMR funding drive to encourage charities and other civil society organisations to get involved. ”

“ Teach the public about AMR in the same way that they have been educated about Covid-19 and change can happen in a matter of months. ”



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