



Stop AMR

Global Media Monitor

7-13 December 2019

Colistin Resistance MCR Genes Found in Ecuador, China Clusters

When it comes to genes that confer resistance to antibiotics, the mobilized colistin resistance (MCR) and the New Delhi metallo-beta-lactamase (NDM) genes are well known. The former provides resistance to the last-line of defence antibiotic colistin whilst the latter enables bacteria to resist carbapenem antibiotics.

In Ecuador, the first case of MCR-1 containing *Escherichia coli* was detected recently and, in an attempt to determine possible sources of the bacteria, a study was conducted. Domestic animals from the boy's home underwent faecal sample tests and the MCR-1 gene was found in three faecal isolates (two dogs and one chicken). The three animal and 1 human isolate had the MCR-1 gene on different sequence types indicating "a polyclonal dissemination of *mcr-1.1* in the environment surrounding the first MCR-producing *E. coli* strain reported in Ecuador." (authors)

In China, in two hospitals of Chengdu, capital of Sichuan province, five *K pneumoniae* strains were isolated from patients with all having carbapenem-resistance via NDM-1 and four having resistance to colistin through a new variant of MCR-8, called MCR-8.2 (four amino acid difference with MCR-8.1).

Source: [CIDRAP](#), 10 December 2019

Deadly 'superbugs' destroyed by molecular drills

As more and more bacteria develop resistance to antibiotics, we could soon be facing a catastrophic situation where routine infections are untreatable. As

such, research into alternatives is picking up. One such alternative is the use of molecular drills.

Rice University researchers have published a study wherein they show the potential of molecular drills to kill *K pneumoniae* bacteria or restore the efficacy of antibiotics. In regard to the latter, as bacteria have a double lipid bilayer, antibiotics that need to enter the bacteria to be effective face a significant wall. However, this wall is not as resistant to mechanical effects as opposed to chemical ones. As such, the team developed 'paddlelike' molecules that, when exposed to light, spin at 3 million rotations per second and effectively bore through the cell membrane. This can either destroy the cell directly or allow previously ineffective antibiotics to enter. The study showed that susceptibility to the meropenem drug of *K pneumoniae*-resistant bacteria was increased after the use of the drills. James Tour, head of the lab, stated "Now we can get it through the cell wall [...] This can breathe new life into ineffective antibiotics by using them in combination with the molecular drills."

The drills were tested by a Texas A&M lab under the supervision of lead scientists Jeffrey Cirillo and Richard Gunasekera. The sole use of the drills killed 17% of bacterial cells, but when used in combination with meropenem this increased to 65%. Upon optimising the balance of the two, they managed to kill 95% of the *K pneumoniae* population.

Tour stated that this technology will be useable "On the skin, in the lungs or in the GI tract, wherever we can introduce a light source, we can attack these bacteria [...] Or one could have the blood flow through a light-containing external box and then back into the body to kill blood-borne bacteria."

Source: [EurekAlert!](#) 12 December 2019

FDA Details Rising Sales of Antibiotics for Meat Production

The rise of AMR is not just caused by human medicine but rather by a combination of sectors, including veterinary medicine. Any impact on the problem will have to deal with all of its facets and decreasing antibiotic use in animal production will be key. As such, the new data released by the US Food and Drug Administration (FDA) is alarming as, after a 3-year steady decline in use, a 9% increase was observed for antibiotic sales from 2017-2018 for food animal production. However, this number does have to be taken with a pinch of salt as the 2018 values are still the lowest since recording started (2009) and are 21% down from that first mark and 38% lower than the peak selling year (2015).

It is important to notice that sales, despite being the easiest to monitor, is not the best indicator of antibiotic use on farms.

"I'm disheartened by the fact that we have an increase in antibiotic sales," said veterinary and public health consultant Gail Hansen, DVM. "I'm concerned that we're going in the wrong direction."

Concerning which livestock are concerned, 42% of the antibiotics were used in cattle, 39% in swine, 11% in turkeys, and 4% in chickens. This indicates an increase for the three of 17%, 8% and 1%, while the latter saw a decrease of 17%. This is in line with commitments made by a large number of the top US restaurant chains to develop policies to source chicken grown with less antibiotics.

"We've seen over the past several years, chicken producers have made significant progress in reducing antibiotic use, whereas the beef and pork industries have continued to lag behind [...] We know that the chicken industry is doing the right thing on antibiotics, and the beef and pork industries need to follow suit, because there's no good reason to delay preserving life-saving medicines for the future," stated the antibiotics campaign director for US Public Interest Research Group (PIRG), Matt Wellington.

Source: [CIDRAP](#), 11 December 2019

Report Details 19-Case XDR Klebsiella pneumoniae Outbreak in Germany

The outbreak of extensively drug-resistant (XDR) *Klebsiella pneumoniae* reported by the European Centre for Disease Prevention and Control (ECDC) on October 28 has seen an increase in patient number with 2 additional cases having been observed according to a study published on the 12th of December by Eurosurveillance. This brings the total number of cases to 19.

The XDR K pneumoniae strain has shown to resist carbapenems through the production of NDM-1 and OXA-48 and the only antibiotics that worked against it were chloramphenicol, tigecycline, and ceftiderocol.

"The first case (index patient) presented no typical risk factors for *K. pneumoniae* infection such as a recent hospital stay or recent travel and is therefore unlikely to be the primary case that brought the outbreak strain into the university hospital," said the authors of the Eurosurveillance study. While the outbreak seemed control until the end of October, with the new cases discovered, the authors argue that "Clinical and laboratory staff need to increase vigilance in order to improve early detection of XDR outbreaks. Early extensive screening and a high level of isolation precautions are needed to avoid further spread of these pathogens."

Source: [CIDRAP](#), 12 December 2019

Probiotic yeast may offer an effective treatment for drug-resistant fungal infections

When people think about antimicrobial resistance the mind often jumps to resistance to antibiotics. However, fungi that develop resistance to fungicides are also concerned and can be as deadly. One such example is the multi-drug resistant *Candida auris*. As is the case in antibiotic resistance, a lot of research is being done on finding alternatives to these microbials or finding ways of restoring their efficacy. In the case of fungicides, finding alternatives is even more important as they also attack tissue cells of the host that are similar to fungi cells. One such project, done by researchers from the US and India, showcased the ability of probiotic yeast to significantly



reduce the virulence of these fungi and even prevent infection.

The focus of the study was on *Candida* which is particularly dangerous for patients with weak immune systems and healthy ones with implanted medical devices. One of its characteristics that make it hard to treat and allow it to develop resistance to antimicrobials is its capacity to form biofilms. "A biofilm is a complex ecosystem that can become a physical barrier against drugs," Rao said. "Biofilms can form on medical devices, catheters and IV lines, and even contact lenses. They can also penetrate epithelial tissue in the body, leading to a variety of infections, including the deadly bloodstream infections we can see with *Candida auris*." Non-albican species of *Candida* were focused as increased occurrence of multiple resistance has been observed in these strains.

The group chose to focus on "food-derived probiotic yeast, which could present a safe and cost-effective method to keep *Candida* in check." Two yeast were examined: *Saccharomyces cerevisiae* and *Issatchenkia occidentalis*. Both naturally grow on fruit and the team checked their ability to counteract the adhesion and biofilm formation mechanisms in non-albican species of *Candida*. The application of these yeasts led to a 53% and 70% reduction was observed in adherence and in biofilm formation respectively. In human epithelial cells, the adherence of fungi cells was significantly impaired as well when using the yeasts, especially when they were present prior to the fungal infection. In a living animal model organism, the *Caenorhabditis elegans*, there was an increased lifespan if treated with the yeasts and the fungi were less active.

"As the rate of deadly infections by *Candida auris* and other non-albican fungi species increases, there is a pressing need for more effective and safer medications to both prevent and treat these intractable illnesses," Rao said. "This study has shown that probiotic yeast may be the alternative we have been looking for, and certainly warrants further investigation."

Source: [EurekAlert!](#) 10 December 2019

Pharmacy assessment of penicillin allergies finds safe, less-expensive options

One of the most common drug allergies is to penicillin, a commonly used antibiotic. Up to 10% of the population is reported to be affected. This also leads prescriptions to avoid other antibiotics from the same class and to resort to more costly alternatives. The latter are more expensive and two of the most commonly prescribed non-beta-lactam antibiotics, aztreonam and levofloxacin, are broad-spectrum and should therefore be saved for critical cases. However, a pharmacy-driven assessment has found that 50% of the reportedly penicillin-allergic patients were in fact able to take these same-class antibiotics with no side effects. One hospital that applied these findings, made the switch for 43 patients and was able to save nearly \$21,500 over 3 months.

This study was done by reviewing patient drug prescription histories and they found that 68% of the patients that had reported a penicillin allergy had also been prescribed other beta-lactam antibiotics.

"By improving penicillin allergy documentation and encouraging both pharmacists and prescribers to thoroughly evaluate allergies and prior cephalosporin use, the use of non-beta-lactam alternatives can be reduced significantly," said Rita Chamoun, Pharm.D., Clinical Staff Pharmacist at Baptist Hospital of Miami and lead author of the study.

Source: [EurekAlert!](#) 10 December 2019

Researchers identify 'Achilles' heel' of drug-resistant superbug

Vancomycin-resistant enterococci (VRE) is a potentially deadly pathogen that can resist common antibiotic treatments making it difficult to treat. Researchers from the university of Texas Health Science Center have discovered the key protein involved in its resistance mechanism. The latter enables it to detect the presence of antibiotics in the environment and trigger a change in the bacterial structure for protection. "We know that bacteria have innate stress response systems, but we do not understand fully how these responses are triggered to cause antibiotic resistance," said Ayesha Khan, the lead author of the study.

Now, they have discovered a protein called LiaX which the bacteria releases in the environment to sense the antibiotics. It is part of the stress response system of Enterococci and other bacteria, called LiaFSR. "We have uncovered the 'Achilles' heel' of an important hospital-associated and multidrug-resistant pathogen," said senior author Cesar Arias, MD, PhD, a professor at McGovern Medical School at UTHealth and Herbert L. and Margaret W. DuPont Chair in Infectious Diseases. "By identifying the main mediator of the response against antibiotics and the first line of defense of our immune system, this will open major therapeutic and diagnostic research avenues against these organisms which are associated with disease in critically ill patients."

"We call LiaX the master modulator of resistance, and it basically tells the bacteria to remodel their protective cell envelope, causing daptomycin to bind away from the septum and allowing the cell to survive," Khan said.

Source: [EurekAlert!](#) 10 December 2019