





# Congress Review

## Review of the 32<sup>nd</sup> European Congress of Clinical Microbiology and Infectious Diseases (ECCMID) 2022

Location: Lisbon, Portugal

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A PIONEERING hybrid format was adopted by the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) for the 32<sup>nd</sup> European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), allowing delegates to meet onsite in Lisbon, Portugal, and also online. During the Opening Ceremony, Maurizio Sanguinetti, ESCMID President, commented: “It’s singular that this congress opens in Lisbon because this gives me the opportunity to draw a parallel between the Lisbon story and the ECCMID story.” The Great Lisbon earthquake of 1755 was an unprecedented catastrophe, which almost razed the capital to the ground. “We can, therefore, say that the history of Lisbon includes two major periods: one before the earthquake and the other one after the reconstruction. Similarly, we could divide the ECCMID story in two stages: before and after COVID-19,” said Sanguinetti.

Combining both an in-person and virtual event experience proved to be hugely

popular, as evidenced by statistics shared during the Opening Ceremony. Jacob Moran-Gilad, ECCMID Programme Director, revealed that ECCMID 2022 had already attracted 13,327 participants. “I’m sure that in the coming days, the numbers will increase,” added Moran-Gilad. “We have a record number of countries,” stated the ECCMID Programme Director. A total of 156 countries were represented, “so most countries in the world, which is amazing.” Clearly, ECCMID continues to remain one of the world’s leading clinical microbiology and infectious diseases congress.

According to Moran-Gilad, the 2022 scientific programme was notable for featuring “an amazing panel of keynote speakers.” Lectures covered a broad range of topics, such as the impact of climatic change on neglected tropic diseases in lower middle-income countries, future threats from coronaviruses, clinical research in infectious endocarditis, and advances in clinical antibacterial resistance research.



Symposia also spanned across the disciplines, providing updates on HIV treatment and prevention, artificial intelligence in disease management and control, the management of bloodstream infections in immunocompromised patients, and the prediction and prognosis of *Staphylococcus aureus* pneumonia. Of particular relevance was the session entitled 'Past, Present and Future of Pandemics: Preparedness and First Defense'. This forms the basis of our compelling in-house congress feature, which considers the

global spread of human pathogens and measures to contain them.

An overview of standout ESCMID press releases can be found within this issue of *EMJ Microbiology and Infectious Diseases*, including the impact of a longer interval between COVID-19 vaccine doses on antibody levels, whether a 4-week occupational therapy programme can relieve long COVID fatigue, and the identification of existing medicines that could be repurposed for gonorrhoea treatment. Each news story



featured in our independent congress review was based on research presented during ECCMID 2022.

Several major awards were presented as part of ECCMID 2022. Michele Bartoletti, IRCCS Sant'Orsola and University of Bologna, Italy, and Timothy Rawson, Imperial College London, UK, both received the ESCMID Young Investigator Award for Research in Clinical Microbiology and Infectious Diseases. Bartoletti's research focused on the epidemiology and clinical management of infections in patients with liver cirrhosis. Rawson investigated whether artificial intelligence and real-time monitoring could support optimised antimicrobial usage. Furthermore, this year's recipient of the prestigious ESCMID Award of Excellence was Bart Haagmans, Erasmus Medical Center, Rotterdam, the Netherlands. Haagmans's research focuses on the pathogenesis of viral infections, especially viruses that emerge through zoonotic transmission, such as severe acute

respiratory syndrome coronavirus 2, as a basis for future interventions.

"I'll finish off with a forward look," concluded Moran-Gilad during the Opening Ceremony. Moran-Gilad believes that the future is hybrid: "No doubt, hybrid congresses are here to stay and we should work to constantly improve the format." He emphasised that, "at some point, we hope the pandemic will subside, but pandemic preparedness, health security, and public health and public policy should, and shall, remain an important topic in the programme."

Whatever the future holds, conferences such as ECCMID are crucial for the generation and exchange of scientific knowledge. With this in mind, we look forward to being part of the international clinical microbiology and infectious diseases community again, at next year's congress in Copenhagen, Denmark. Until then, read on for our key scientific insights from ECCMID 2022. ■

*"Clearly, ECCMID continues to remain one of the world's leading clinical microbiology and infectious diseases congress."*



ECCMID 2022 REVIEWED →

# Virtual Exercise Classes Help Improve COVID-19 Symptoms

COVID-19 symptoms that persist following recovery from the initial acute infection can be improved by virtual exercise classes, a new study suggests. These symptoms, which include fatigue, breathlessness, joint pain, and chest pain, are often debilitating to patients even years following COVID-19 infection, severely impacting their quality of life and ability to carry out normal day-to-day activities. An Irish study presented at ECCMID 2022, 23<sup>rd</sup>–26<sup>th</sup> April 2022, in Lisbon, Portugal, shared the results of a virtual 6-week exercise-based recovery programme, which was designed to aid COVID-19 patients by reliving these enduring symptoms.

The programme consisted of two 50-minute virtual classes a week, for a 6-week period, involving a wide range of exercises such as squats, lunges, stretches, and other aerobic and strength-based exercises, the intensity of which gradually increased over the sessions. The study was comprised of 60 patients (42% male, average age 45 years), whose physical fitness

and breathlessness, fatigue, and health-related quality of life were assessed at the start of the investigation by the 6-Minute Walk Test (6MWT), Chalder Fatigue Score (CFQ), and Short-Form-36 (SF-36) scores, respectively.

The results collected after 6 weeks showed that, out of 40 patients who completed the programme, 34% were able to walk further than at the start of the study, and 70% experienced a significant improvement in fatigue levels. Improvements were also seen in other everyday activities, such as climbing stairs and carrying groceries.

Physiotherapist and lead researcher of this study Kate O'Brien, St James's Hospital, Dublin, Ireland, commented on the importance of these results: "These preliminary findings suggest a physiotherapist-delivered virtual post-COVID-19 recovery programme can improve exercise capacity, breathlessness and quality of life without exacerbating fatigue." ■

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## Four Week Occupational Therapy Helps Fatigue in Long COVID

**F**ATIGUE is defined as chronic tiredness and is one of the many long-term symptom's patients with long COVID are burdened by. Long COVID affects at least 10% of individuals in Ireland who have previously had a COVID-19 infection, preventing people returning to their normal lives (i.e., work). An Irish study that was shared at this year's ECCMID in Lisbon, Portugal, aimed to share results from a 4-week therapy programme.

*"Seventy-two percent of patients also reported to have severe breathing difficulties and issues with memory and concentration."*

The therapy took place at St James's Hospital, Dublin, Ireland, and involved a total of 53 patients, predominately female (73%), who had reported moderate-to-severe fatigue as a symptom of long COVID that was affecting their daily life. Seventy-two percent of patients also reported to have severe breathing difficulties and issues with memory and concentration. As a result of these symptoms, 74% of individuals were unable to

return to work at full capacity and 58% struggled to complete day to day activities, including meal preparation, walking, and driving.

In order to help patients manage their symptoms of long COVID, particularly fatigue, the cohort were assigned three online group interventions lasting 1.5 hours over the course of 4 weeks. The purpose of these virtual interventions was to provide resources and techniques to individuals to help them manage their fatigue and 'brain fog' better.

Patients were given questionnaires to complete regarding fatigue and energy levels, quality of life, and well-being before and after the programme to assess whether the group interventions have been beneficial in helping patients deal with their fatigue.

Results from this pilot study were very promising as the preliminary analysis showed patients had significant improvement in fatigue, quality of life, and well-being. This indicates that providing patients with a variety of practical techniques could be very beneficial in improving these persistent symptoms of long COVID. Due to these positive outcomes, the study has been extended and the researchers are continuing to collect data in this area. ■

# Hospitalisation and ICU Admission Among Females Who Are Pregnant with COVID-19

**A**CCORDING to research presented at ECCMID 2022, females who are pregnant with COVID-19 are at a higher risk of hospitalisation and severe disease than females of childbearing age who are not pregnant. Results were obtained from a time-matched cohort study conducted by Kiera Murison and colleagues from the University of Toronto, Canada.

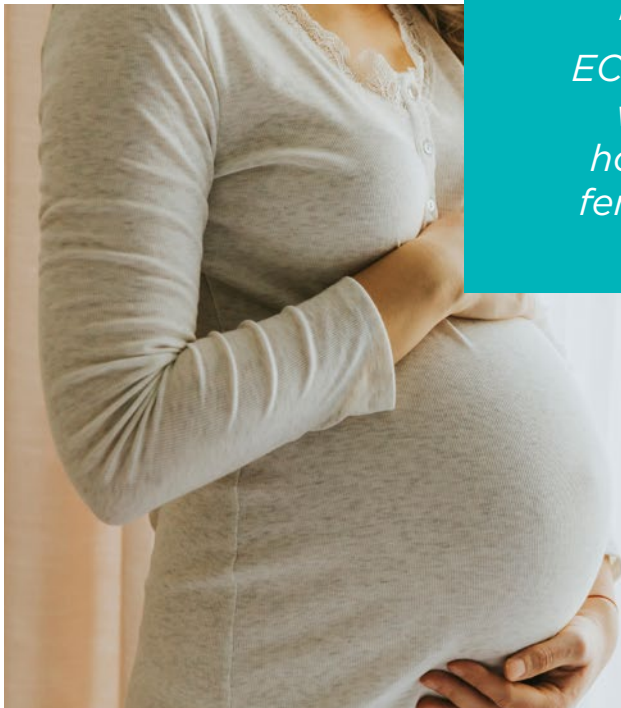
The researchers found that females who are pregnant are only half as likely to have a severe acute respiratory syndrome coronavirus 2 infection compared with the base population. However, they are approximately five-times as likely to be admitted to hospital with COVID-19 relative to females who are not pregnant of reproductive age. In addition, females who are pregnant were more than six-times as likely to require treatment in the intensive care unit.

Subsequent analyses compared females with similar comorbidities. Overall, healthy females who are pregnant are over five-times as likely to be hospitalised compared with their healthy non-pregnant peers. Interestingly, females who are pregnant with underlying illnesses were only twice as likely to be hospitalised relative to females who are not pregnant with comorbidities.

Murison summarised the research results: “These findings suggest that in otherwise healthy women, pregnancy itself seems to be a factor that increases illness severity, while among women with comorbidities it becomes one of several factors that augment risk.”

In summary, this study indicates that although females who are pregnant might be at a decreased risk of severe acute respiratory syndrome coronavirus 2 infection compared with the general population, their risk of severe illness is substantially increased following infection. Therefore, COVID-19 vaccination during pregnancy is recommended. “Our findings underscore the need for clear accurate information to reassure pregnant women and tackle concerns about COVID-19 vaccine safety,” said Murison.

It is important to note that there were several limitations. This was an observational study, meaning causality could not be established. In addition, the researchers could not eliminate the possibility that unmeasured factors, such as underlying medical conditions, may have impacted the results. ■



*“According to research presented at ECCMID 2022, females who are pregnant with COVID-19 are at a higher risk of hospitalisation and severe disease than females of childbearing age who are not pregnant.”*

# Cytokine Signature in Patients with COVID-19 with Worst Prognosis

*"This allowed the researchers to build a decision tree to predict those patients at risk of a negative outcome."*

**A** DYSREGULATED cytokine storm during severe acute respiratory coronavirus 2 infection can cause an aggressive inflammatory response, leading to organ failure and death in patients with COVID-19. Research presented at ECCMID 2022 aimed to identify the most relevant cytokines driving this process, which, when assayed on admission, would allow individuals with the worst prognosis to be identified.

Emanuela Sozio, Infectious Disease Clinic, Azienda Sanitaria Universitaria Friuli Centrale, Udine, Italy, and colleagues performed a retrospective study of 415 patients hospitalised with COVID-19 between May 2020 and March 2021. Patients were classified as having mild/moderate disease or severe/critical disease. In total, 15.7% of patients died in hospital and 23.6% had a negative outcome, such as orotracheal intubation or death.

On admission, serum levels of a large panel of cytokines were measured and compared against outcomes, in combination with other

blood-based biomarkers. This allowed the researchers to build a decision tree to predict those patients at risk of a negative outcome.

Individuals were initially split into two groups according to their IL-6 levels. Next, levels of IL-10, mid-regional pro-adrenomedullin, soluble IL-2 receptor  $\alpha$ , interferon- $\gamma$ -inducing protein 10, and C-reactive protein were utilised to determine whether patients were at risk of a negative outcome.

Sozio commented on the wider implications of the research findings: "It is not always possible to determine which patients with COVID-19 have the worst prognosis, especially early on. It is becoming increasingly clear, however, that the earlier we treat excessive inflammation, the more likely we are to turn it off quickly and definitively and so avoid irreversible organ damage." Sozio added: "Our work may help select patients with worse prognoses who need to be admitted to high dependency units, as well as potentially help personalise their treatment." ■





# Longer Gap Between COVID-19 Vaccines Results in Nine-Times More Antibodies

VACCINES have proven to be an efficient way of controlling the COVID-19 outbreak and reducing the risk of hospitalisation. However, could the length of time between getting each dose be important regarding the efficacy of the vaccine? New research delivered at ECCMID 2022 investigated whether a longer interval could affect antibody production.

Ashley Otter, Technical Lead for SIREN serology, UK Health Security Agency, and the team measured antibody levels from blood samples from approximately 6,000 healthcare workers following Pfizer (New York City, New York, USA)/BioNTech (Mainz, Germany) COVID-19 vaccination. From this sample, 3,989 patients had their first dose 21 days earlier and 1,882 had their second dose 14 days earlier. Individuals were grouped based on previous COVID-19 infection, naïve, or no history of infection.

Findings from this analysis showed that participants with previous COVID-19 infection had 10-times higher antibody levels compared with naïve participants. Additionally, examining the intervals between vaccination doses showed that having a longer dosing interval was linked with nine-times higher antibody levels in naïve individuals.

Participants with a previous infection had no difference in antibody levels due to varying dosing intervals. Moreover, patients who had their first dose of COVID-19 vaccine after 8 months of a COVID-19 infection had seven-times higher antibody levels compared with individuals vaccinated 3 months after a COVID-19 infection. Fascinatingly, the results also revealed that female and ethnic individuals were more likely to have higher concentration of antibodies.

Otter summarised the key findings of the study: "This study shows that an interval of 10-12 weeks between vaccine dose 1 and dose 2 results in higher antibody responses compared to a 2-4-week period in participants with no previous infections. The current COVID-19 vaccination programme advises a 12-week interval between vaccinations and this study further supports this timeframe."

Finally, she added her hopes for the future: "Further research is needed to determine whether these higher antibody levels provide greater protection against COVID-19 disease and how this longer dosing interval may affect booster responses." ■



*"Individuals were grouped based on previous COVID-19 infection, naïve, or no history of infection."*



## Are Partially Vaccinated Individuals at Lower Risk of COVID-19 Than Unvaccinated Patients?

COVID-19 has resulted in the fastest vaccination production in human history. Previously, creating and approving a vaccine could take up to 10 years; however, due to the collaborative approach taken by global pharmaceutical companies and universities, the first COVID-19 vaccine was approved for use in just 10 months. A study shared during ECCMID 2022 compared intensive care unit (ICU) admission and death between individuals partially vaccinated and individuals who were unvaccinated.

The scientists aimed to examine the risks of ICU admission and death in unvaccinated and vaccinated patients by analysing data from a Canadian database. The data was taken between January 2021 and January 2022 and included 20,064 individuals. Sixty-nine percent of this cohort were aged 50 years and over. Additionally, out of this sample, 3,353 were vaccinated and 16,711 were unvaccinated.

Methods of comparison included matching each vaccinated patient with up to five unvaccinated patients. This was done because the response to COVID-19 was constantly changing, as was the dominant variant. The team used modelling techniques and unmatched analyses to determine the risk of ICU admission and death and discover the differences in vaccine effects.

*"Interestingly, the team discovered there was no significant differences in risk due to the different variants."*

Results were favourable for vaccinated individuals as the findings showed that individuals who were vaccinated with one, two, or three doses had significantly less risk of being admitted to the ICU and death. Interestingly, the team discovered there was no significant differences in risk due to the different variants.

Alicia Grima, Epidemiology Student, University of Toronto, Ontario, Canada, and co-author of this study, shared her opinion on the research results: "Even with the diminished efficacy of vaccines against infection with novel variants of concerns, our findings indicate that vaccines remain a vital tool for reducing ICU admission and death from COVID-19."

Although this study highlighted the importance of COVID-19 vaccination and the reduced risk of ICU admission and death, the session added that it is still important to note that factors that were not measured (e.g., previous infection) could have affected the results in the unvaccinated group of individuals. ■



# COVID-19 Death Rates Three-Times Higher Than Seasonal Influenza

A SPANISH STUDY conducted during the first wave of the COVID-19 pandemic has found that adults in hospital due to the disease were three-times as likely to die within 30 and 90 days, respectively, than those patients hospitalised for bouts of seasonal influenza. Results were shared during ECCMID 2022.

The retrospective cohort study, carried out at the Hospital del Mar, Barcelona, Spain, discovered that adults over the age of 18 years, who are hospitalised with COVID-19, have a higher risk of complications and death than patients with influenza. This is despite their younger age, and less chronic illnesses.

Also linked in the study is the association of COVID-19 with lengthier stays in hospital and intensive care than influenza. Researchers also found COVID-19 costs almost twice as much to treat than influenza, at over 21,000 EUR per patient.

In their study, researchers examined the medical records of 187 patients (average age: 76 years; 55% male), all admitted to hospital with seasonal influenza between 2017 and 2019. They compared these records to 187 patients hospitalised with COVID-19 between March and May 2020 (average age: 67 years; 49% male). All of the COVID-19 patients required O<sub>2</sub> therapy upon admission.

In both cohorts, researchers chose to enrol patients continuously until the required sample size was met. The study went on to compare clinical characteristics between patients; healthcare resource use outcomes, including duration of stay and intensive care admission; hospital costs; and rates of death.

The study discovered that patients hospitalised with influenza had more existing chronic illnesses, and challenges with daily living, than the cohort of patients with COVID-19, but were less likely to be overweight.

It also found that COVID-19 was associated with a raised infection severity risk, and higher admission to intensive care. Patients with COVID-19 were also at more risk of developing complications such as blood clots, moderate-to-severe acute respiratory distress syndrome, and acute kidney injury. Patients with influenza were more likely to experience bacterial pneumonia. After taking into account age, sex, disease severity, comorbidities, the presence of pneumonia, and corticosteroid treatment, the research team concluded that COVID-19 is a much deadlier disease than influenza. Lead study author Inmaculada Lopez explained: "Our findings suggest COVID-19 is far more lethal than influenza." She added: "COVID-19 patients had consistently worse health outcomes." ■

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# Antibiotic Prescriptions Fall Significantly During COVID-19 Pandemic

A STUDY presented at ECCMID 2022 has found that the number of outpatient antibiotic prescriptions in Australia fell by up to 38% during the COVID-19 pandemic. In winter 2020, 38% fewer prescriptions were issued than during the same period in 2018 and 2019 (1.432 million on average per month versus 2.313 million). Twenty-three percent fewer prescriptions were issued during the summer of 2021 in comparison to the summers of 2018 and 2019 (1.347 million on average per month versus 1.817 million). Similar falls in prescription numbers were noted across the country, in states with and without lockdowns.

In this study, researchers examined rates of outpatient antibiotic prescriptions throughout Australia before and during the pandemic. A representative sample of 10% of these prescriptions issued between January 2014 and April 2021 demonstrated that before the pandemic, a clear seasonal variation existed. Before 2020, in Australia, prescriptions of antibiotics were 29% higher during the winter months (June–August). The study found that this usual seasonal variation was not replicated during the pandemic. Numbers dropped sharply in March 2020, coinciding with strict national

restrictions, and remained lower than usual during the remainder of the period studied. Decreases were noted across all age groups, and the largest of these was observed in the 0–17 year cohort.

These findings mirror other studies carried out globally, which have shown similar reductions in antibiotic prescriptions to outpatients during the pandemic. Reasons for this are somewhat unclear, but multifactorial. They could include the inability or fear of seeing a clinician in person; strict lockdown measures; or other public health measures, including targeted mask wearing and culture shifts with regard to hygiene. Reductions may also be partially explained due to social distancing measures, which also reduced the spread of respiratory infections like influenza.

Lead study author Jack Skeggs, Monash Infectious Diseases, Monash Health, Clayton, Australia, commented: “Antibiotic resistance threatens many of the gains of modern medicine in increasing life expectancy and decreasing infant mortality and hugely increases peri-operative risk.” He went on to stress that “reducing unnecessary use of antibiotics is the first and least costly step in preventing the development of antibiotic resistance.” ■

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# Disparities in Antibiotic Prescriptions in the USA

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outpatient visits from 2009 to 2016, and covers all 50 USA states. The prescription of antibiotics was defined by the researchers as an antibiotic prescription per 1,000 visits, which allowed them to confirm if the antibiotic prescription was appropriate, somewhat appropriate, or inappropriate. They further evaluated the acquired data of prescriptions by race/ethnicity, age group, and gender to identify any disparities.

The findings showed that patients who were Black (122 per 1,000 visits) and Hispanic (139 per 1,000 visits) have the highest rates of prescriptions. Additionally, children had 114 prescriptions per 1,000 visits in total, while female patients had 170 antibiotic prescriptions per 1,000 visits. The researchers investigated the data to determine appropriateness and discovered that roughly two-thirds and over one-half of prescriptions to patients who are Black and Hispanic, respectively, were inappropriate. Three-quarters (74%) of antibiotic prescriptions written to patients over the age of 65 years and over half to males (58%) were considered inappropriate. The researchers stated that one of the reasons for overprescribing in minority populations is due to physicians worrying that the patients would not return for another appointment despite the possibility of an infection. However, antibiotic prescribing is a big issue in the USA compared with other countries, and most of this overprescribing happens in outpatient settings. ■

**D**ISPARITIES in inappropriate antibiotic prescribing for older, Black, and other ethnic minorities has been observed over the past 7 years in hospital clinics and emergency departments, according to a study presented at ECCMID 2022. Approximately three-quarters and two-thirds of antibiotics prescribed to older patients over the age of 60 years and Black people, respectively, were considered improper. Furthermore, the study showed that out of the presented hospital and emergency visits, approximately 11% (around 8 billion) concluded with an antibiotic prescription.

The researchers, from the University of Texas Health Science Center, San Antonio, USA, carried out an observational study using the prescribing data collated from the Centers for Disease Control and Prevention (CDC) National Ambulatory Medical Care Survey (NAMCS), which covers over 5.7 billion adults (>18 years) and about 1.3 billion children (<18 years). The data is based on





## Priority Pathogen Could Be Thwarted by Repurposed Drugs

*"Better treatments for gonorrhoea are urgently needed and finding new uses for old drugs could provide a rapid and relatively inexpensive solution."*

**G**ONORRHOEA is the second most common bacterial sexually transmitted infection in the UK, with 70,936 cases being reported in the UK in 2019. Presenting their findings at the ECCMID 2022 congress in Lisbon, Lilana Rodrigues, Institute of Hygiene and Tropical Medicine (IHMT), NOVA University of Lisbon, Portugal, and colleagues believe that existing drugs can be repurposed to help treat this infection.

The World Health Organization (WHO) has labelled gonorrhoea as a "priority pathogen" due to its growing resistance to antibiotics, with some strains now resistant to treatment. Gonorrhoea can lead to serious complications, including infertility in males and females as well as complications during pregnancy such as miscarriages. Rodrigues stated: "Better treatments for gonorrhoea are urgently needed and finding new uses for old drugs could provide a rapid and relatively inexpensive solution."

The researchers identified and tested 57 potential existing drugs to see which ones effectively

inhibit drug efflux, a process where bacteria pump drugs out of cells. Inhibiting this process would increase the antibiotic concentration, thereby making the bacteria more susceptible to treatment. Using computer modelling, the researchers were able to identify 30 potential 'weak spots' that these drugs could exploit.

This study saw six drugs that were promising: amlodipine, which is used to treat blood pressure; doxorubicin, a drug used in chemotherapy; and atovaquone, which can be found in some anti-malarial tablets. Other drugs that showed promise were acetazolamide, dequalinium, and clomipramine. The researchers found that some antibiotics for gonorrhoea treatment were four-times more effective when used with doxorubicin, atovaquone, and acetazolamide than alone.

Repurposing existing drugs is an attractive prospect as there is already research and clinical trials around their use. It also reduces the risk of drug development and costs. Rodrigues stated that this research could lead to further research into new treatments for gonorrhoea. ■