PRESS RELEASE

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Silent bug carriers drive *E. coli* spread in households, NUS Medicine researchers find

Singapore, 29 October 2025 – Researchers from the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), have discovered that some people can carry large amounts of a multidrug-resistant strain of *Escherichia coli* sequence type 131 (*E. coli* ST131) in their gut for extended periods without showing any symptoms, and can unknowingly pass it on to their household members. The study, published in *Nature Communications*, is possibly the first in Asia to trace how this antibiotic-resistant bacterium spreads within the community.

E. coli is a common type of bacteria that naturally lives in the intestines of humans and animals. Most strains of *E. coli* are harmless and even play a role in maintaining a healthy gut by aiding digestion and preventing other harmful microbes from taking hold. However, some strains can cause disease when they acquire specific genes that allow them to produce toxins or invade tissues. These pathogenic forms can lead to various illnesses. Certain strains cause gastrointestinal infections such as bloody diarrhoea, while others primarily cause infections outside the gut, such as urinary tract infections and bloodstream infections.

One particular strain, *E. coli* ST131 has become globally widespread and is antibiotic-resistant. Unlike the strains that cause gut infections, infections caused by *E. coli* ST131 most often present as urinary tract infections but can also progress to more serious conditions such as kidney infections or sepsis, particularly in older adults or individuals with weakened immune systems.

Antibiotic resistance is a growing concern not only in hospitals but also in the community, where infections are becoming harder to treat. Much of this problem is driven by specific strains of bacteria, often referred to as “superbugs”, such as *E. coli* ST131. While antibiotic use in humans and animals has long been recognised as a major driver of resistance, it has been unclear how these resistant bacteria circulate among healthy people in daily life.

To investigate this, the research team followed 34 families in Singapore—patients previously infected with *E. coli* ST131 or other *E. coli* strains, as well as their family members—for up to eight months. Stool samples were collected from 135 participants, along with environmental

swabs and samples from pets, to test for *E. coli*. Genetic sequencing was then used to identify *E. coli* ST131 and map how it spread within households.

Conducted in collaboration with researchers from the NUS Saw Swee Hock School of Public Health, National University Hospital (NUH), Environmental Health Institute, University of Oxford and Vanderbilt University, the team found that a small number of individuals carried *E. coli* ST131 persistently and in high numbers over long periods, even though they did not develop infections. These individuals were likely the source of transmission to their household members, who carried closely related bacterial strains. The findings suggest that such "silent carriers" may act as hidden reservoirs that help sustain the spread of resistant bacteria in the community.

Dr Mo Yin from the Infectious Diseases Translational Research Programme (TRP), NUS Medicine, who led the study, said, "Our study shows that antibiotic resistance is not just a hospital problem—it can spread quietly within ordinary households. By identifying people who carry high levels of resistant bacteria without symptoms, we can start thinking about targeted prevention strategies to reduce the risk of spread within the community."

The study underscores the importance of good personal hygiene practices even within the home environment, as well as the need to develop new ways to reduce long-term carriage of resistant bacteria. Potential strategies include vaccines, probiotics, prebiotics or faecal transplants, though more evidence is needed to determine their effectiveness. Targeting interventions at individuals who carry high levels of resistant bacteria could help reduce community transmission and the wider spread of antibiotic resistance.

Professor Paul Tambyah, Deputy Chair of the Infectious Diseases TRP, NUS Medicine, added, "Superbugs like *E. coli* ST131 have become part of our everyday environment, but not everyone who carries them will fall sick. Understanding how these bacteria persist and move between people helps us develop more practical, community-based solutions to contain antibiotic resistance before it leads to a difficult to treat infection."

Following this study, the research team plans to further examine the gut microbiome of participants, to understand how the balance between beneficial and harmful bacteria affects long-term carriage of resistant strains. These data will also contribute to ongoing global efforts to better understand and combat the rise of antibiotic resistance.

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Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments, and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, research centres of excellence, corporate labs and more than 30 university-level research institutes focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research, and cybersecurity.

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Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School's founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2025 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2025).

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About the National Medical Research Council (NMRC)

The NMRC was established in 1994 to oversee research funding from the Ministry of Health and support the development and advancement of biomedical research in Singapore, particularly in the public healthcare clusters and medical schools. NMRC engages in research strategy and planning, provides funding to support competitive research grants and core research enablers, and is responsible for the development of clinician scientists through awards and fellowships. The council's work is supported by the NMRC Office which is part of

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