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Australia invents smart surveillance and biosecurity tool to stop infectious diseases

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Australia's Murdoch University researchers are spotting drug-resistant superbugs prior to a breakout, to install biosecurity at a regional level and to stop the spread of infectious diseases.

Scientists at Murdoch University are contributing research to strengthen understanding of infectious diseases and how to stop them by exploring technology and antimicrobial resistance surveillance.

Overcoming antimicrobial resistance

Overcoming the antimicrobial resistance challenge requires a One Health approach – which recognizes that the health of humans, animals and ecosystems are interconnected. At Murdoch University's state-of-the-art Antimicrobial Resistance and Infectious Diseases (AMRID) Laboratory, Associate Professor in Microbiology Sam Abraham leads the One Health Infectious Diseases research team.

Globally limited therapeutic options are available to treat bacterial infection in humans from livestock and the rapid transmission of genes responsible for antimicrobial resistance into human pathogens. The research team is exploring how Australian animals may acquire bacteria resistant to last-line antimicrobials.

Antimicrobial resistant bacteria that emerge and spread in livestock and other animals is one of the contributors to the global burden of antimicrobial resistance," says *Associate Professor Sam Abraham*

Dr Abraham's team are using innovative robotics, genomics and microbiology to study antimicrobial resistance in key zoonotic bacteria emerging in Australian animals. Use of high-throughput robotics and genomics with rapid turn-around time for analysing large data sets to identify emerging problems quickly and respond to those problems rapidly. The facility has used its platforms in several national antimicrobial surveillance programs in livestock.

Their research has demonstrated the emergence of last-line drug resistant bacteria – at low frequency – in livestock, companion animals and wildlife as a result of human derived bacteria entering the animals directly or in-directly through birds.

Optimizing surveillance and biosecurity

Understanding disease surveillance systems and how biosecurity systems operate is essential to study infectious diseases.

Led by Professor of Biosecurity Simon McKirdy, Pro-Vice-Chancellor of the Harry Butler Institute, this research is looking at the development of biosecurity systems to ensure that they operate cost-effectively and in an efficient manner that provides protection for people, agriculture and the environment. Having robust and appropriate risk analysis to understand the threats can be mitigation measures.

The team is developing robust surveillance systems that can deliver results that decision-makers can utilize – both as an early warning tool and also for real-time decision-making during a response to a disease outbreak. An effective surveillance system that is linked to diagnostics and provides a high level of confidence in detecting threats and collecting the right number of samples gives statistical strength to say this is the current presence or level of disease within the community, explains the team.