Microbial Genomics 101

Queensland Genomics

What is microbial genomics?

Microbial genomics is reshaping disease surveillance, allowing for earlier detection and more precise investigation of outbreaks.

Microbial genomics is a scientific discipline that uses the application of genome-based knowledge to study and analyse the genome of microbes or microorganisms — such as bacteria, viruses or fungi.

DNA sequencing technology helps identify microbes more effectively and offers new insights into their ecology and transmission.

What is whole genome sequencing?

Whole genome sequencing (WGS) is a technology used in a laboratory that can give us information on the complete genetic material, or genome, of bacteria.

Genomic sequencing can now help hospital infection control teams to improve how they respond to and manage infectious diseases within hospital and health care facilities.

Infection control units can use genomic information to guide their practice, understand outbreaks when they occur, and identify more problematic strains of bacteria.

Why infection control is important for patient care

Every year, between 165,000 – 200,000 Australians contract a hospital-acquired infection as a result of their stay at an acute healthcare facility, causing significant ill health and costs to the health system.

An increasing proportion of organisms are also becoming resistant to first line antibiotics, making it difficult to stop the spread of certain bacteria.

With the threat of drug resistant bacteria escalating, surveillance and prevention of hospital-acquired infections is more important than ever.

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Key Microbial Genomics Terms

 Bioinformatics	The use of algorithms and software to analyse sequencing data.
 DNA	A chemical structure that makes up an organism's genetic material.
 Gene	The basic physical and functional unit of heredity. Genes are made up of DNA.
 Genome	The complete set of genetic information in an organism.
 Genomics	The study of genes, their function and inter-relationships.
 Genomic data	Refers to data produced from DNA sequencing of a genome.
 Genomic testing	Involves the analysis of thousands of genes from a pathogen simultaneously, using sophisticated computer-based algorithms.
 Infection Control	Preventing and identifying the spread of infections in a healthcare environment to protect patients and staff.
 Pathogen	A microorganism that can cause disease, such as bacteria, viruses, algae, or fungi.
 Whole Genome Sequencing	A laboratory process to determine the complete DNA sequence of an organism's genome