



# Adapting waste water surveillance for SARS-CoV-2 to antimicrobial resistance (AMR) surveillance

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22 November 2022

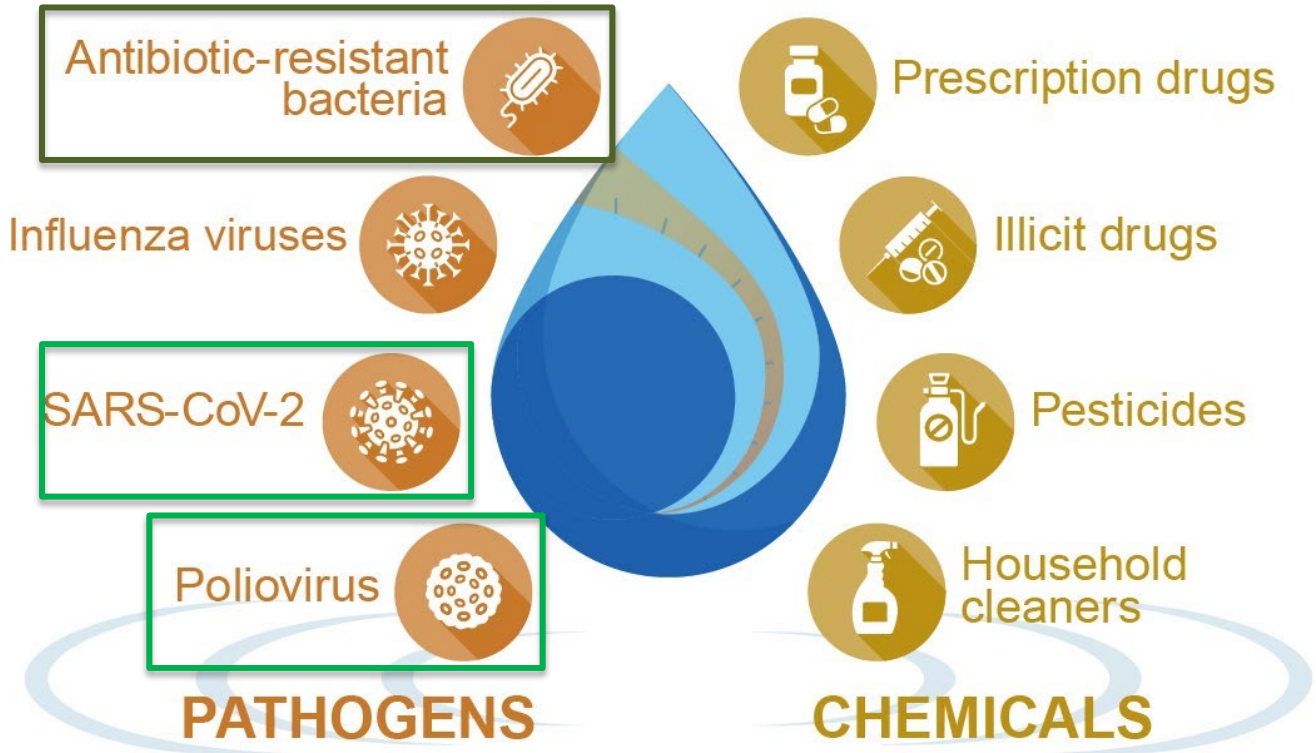
WORLD  
**ANTIMICROBIAL**  
AWARENESS WEEK  
18-24 NOVEMBER

 **NATIONAL INSTITUTE FOR  
COMMUNICABLE DISEASES**

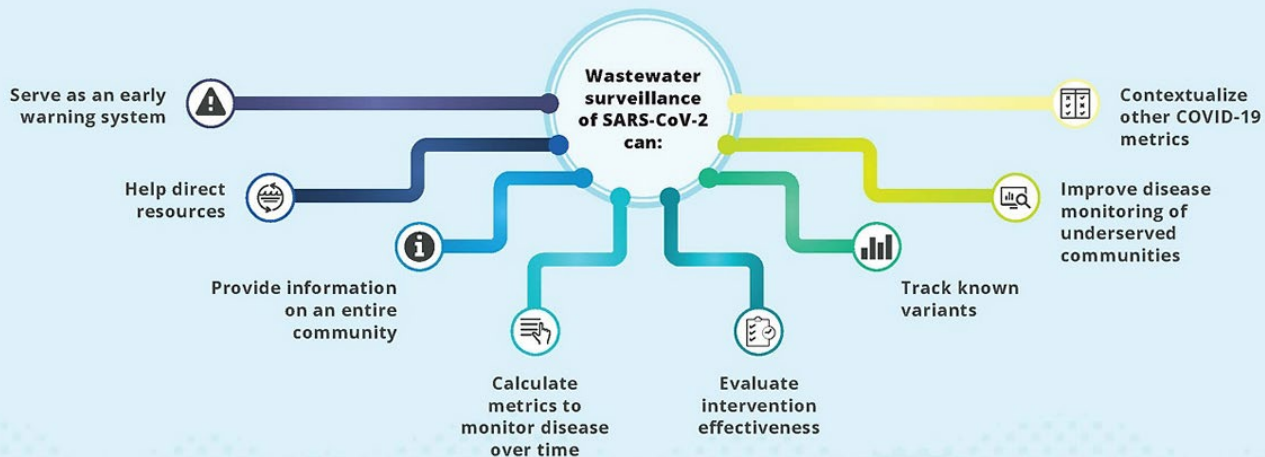
Division of the National Health Laboratory Service

Centre for Healthcare-Associated Infections, Antimicrobial Resistance & Mycoses Centre for  
Healthcare-Associated Infections, Antimicrobial Resistance & Mycoses [sabellej@nicd.ac.za](mailto:sabellej@nicd.ac.za)

# Wastewater-based Epidemiology(WBE)



## Public Health Benefits



## Advantages of SARS-CoV-2 Wastewater Surveillance

- ◆ Non-invasive
- ◆ Unbiased
- ◆ Inclusive (both asymptomatic and symptomatic individuals)
- ◆ Data for communities where individual testing is underutilized or unavailable
- ◆ Indicator of changes in community-level infection
- ◆ Complements existing COVID-19 surveillance systems
- ◆ Inexpensive
- ◆ Large data pool of individuals

## Wastewater Surveillance Programs—Key Partnerships

Partnerships are key for a successful wastewater surveillance program.



State, local, tribal, and territorial governments, particularly public health departments



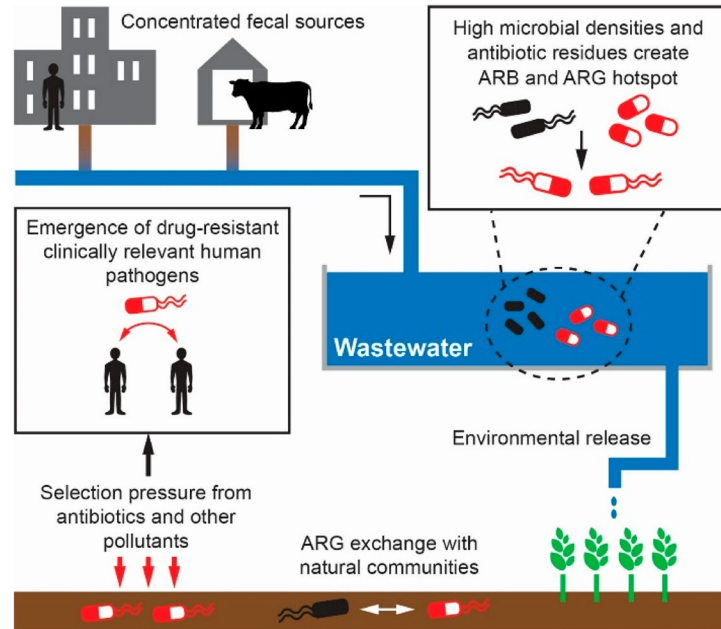
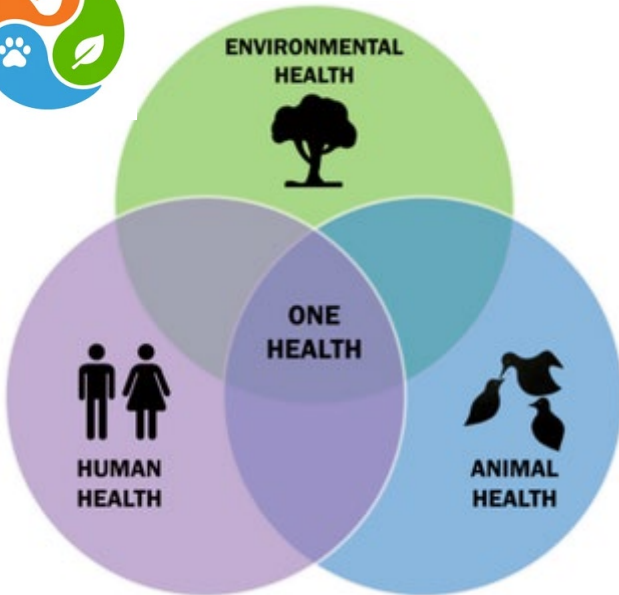
Wastewater utility companies



Laboratories: Public health, environmental, academic, and/or commercial

# Antimicrobial Resistance WBE

Wastewater: AMR resource from humans, animals and the environment



# Laboratory-based AMR surveillance : LARS

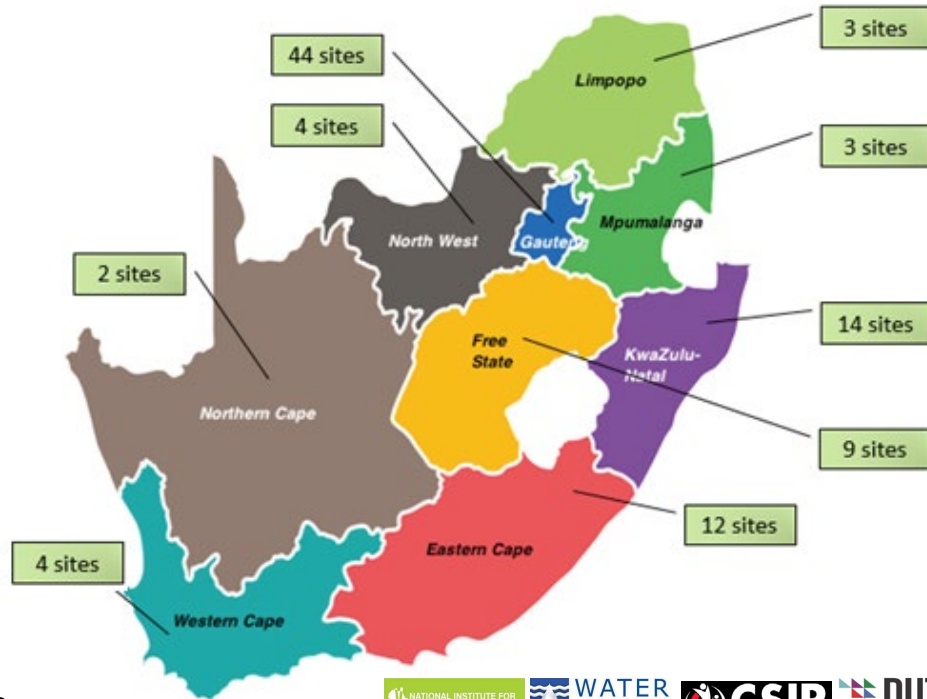
- Implemented to establish a functional, integrated AMR surveillance system for common, nosocomial bacterial pathogens
- Centre for Healthcare-Associated Infections, Antimicrobial Resistance & Mycoses (CHARM)  
→ Highly antibiotic-resistant ESKAPE organisms
- LARS & Enhanced → 2010-2021
- ESKAPE → *Enterococcus spp.*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* & *Enterobacterales spp.*



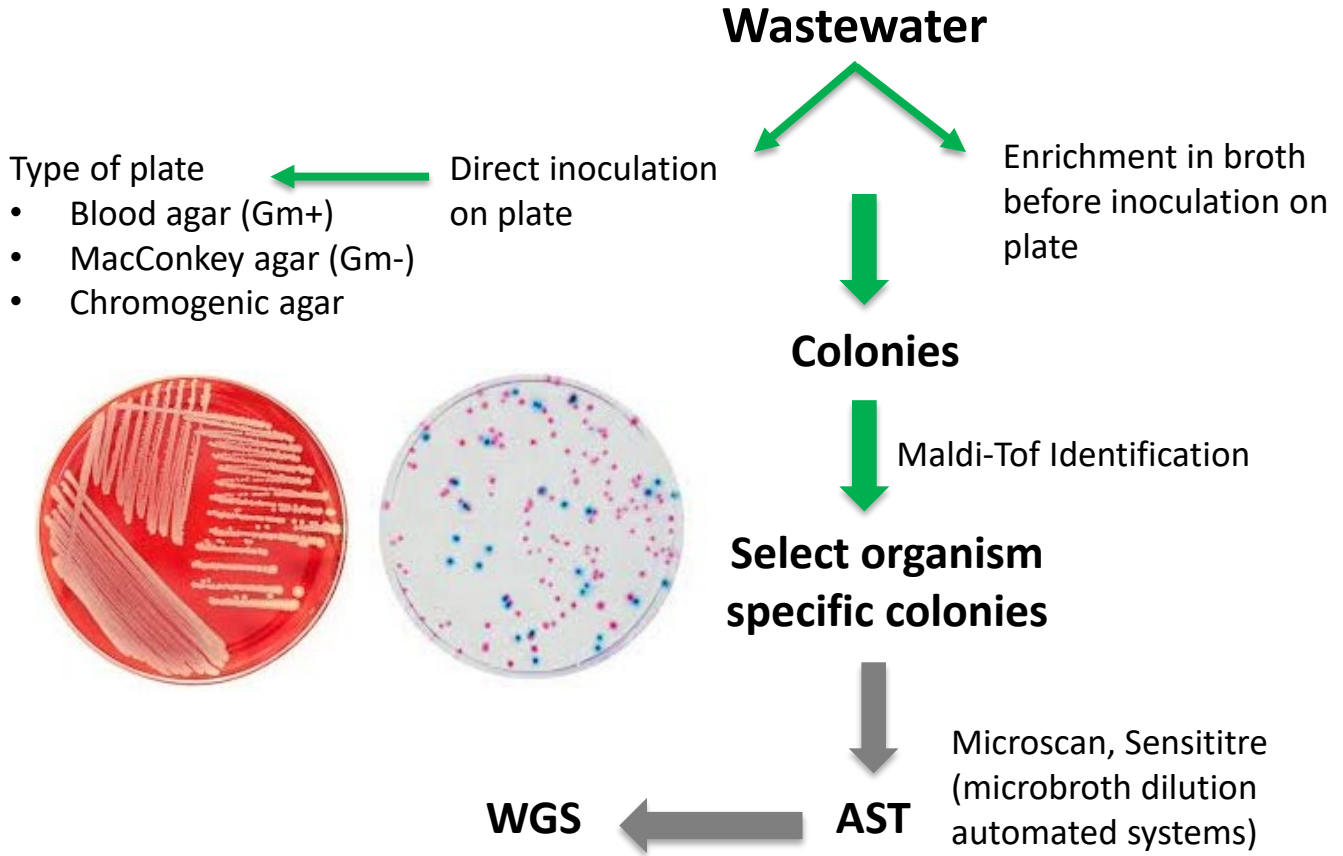
# Sars-Cov-2 WBE

## South African Collaborative COVID-19 Environmental Surveillance System

- Testing locations
  - 95 large WWTP across S. African urban metros
- 7 testing laboratories
  - Different concentration, RNA extraction & quantification methods
  - Inter-laboratory comparison and QA co-ordinated by NICD
- Network activities
  - SARS-CoV-2 levels in influent wastewater
  - Sequencing of SARS-CoV-2

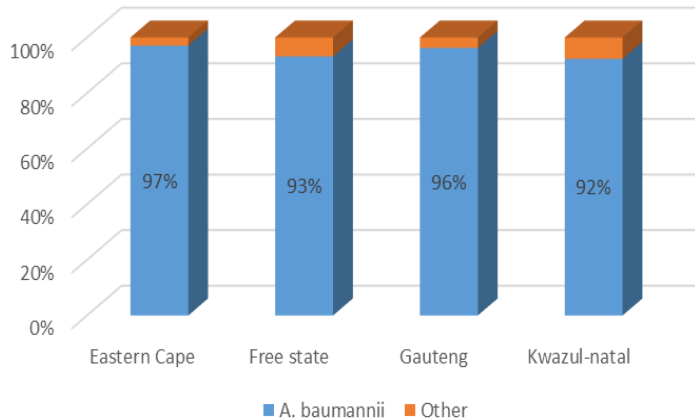


# Setting up AMR surveillance from wastewater



# Acinetobacter baumannii complex

A. baumannii species per province



A. baumannii isolates by province



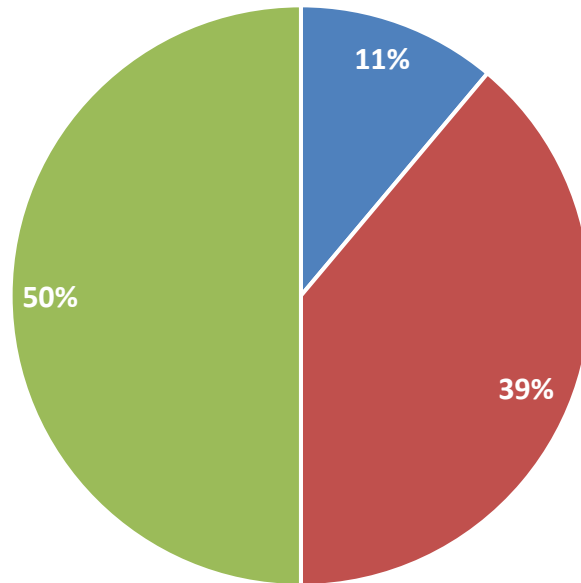
*A. pittii*, *A. balyii*, *A. Dijkshoorniae*, *A. nosocomialis*, and *A.tandoii*

no sites	Province	Districts
6	Eastern Cape	Buffalo city
5	Free state	Mangaung
11	Gauteng	Ekurhuleni, Johannesburg, Tshwane
3	Kwazul-natal	Ethekwini



# Enterococcus

*Enterococcus* species at three sites in Gauteng



■ E. faecium   ■ E. faecalis   ■ E. hirae



# *Next steps*

- AST and WGS
- Optimise isolation methodology for other ESKAPE pathogens
- Establish wastewater surveillance for ESKAPE pathogens (1-2 years from all 9 provinces)

# ACKNOWLEDGEMENTS



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**Kerrigan McCarthy** : Sars-Cov-2 WBE

