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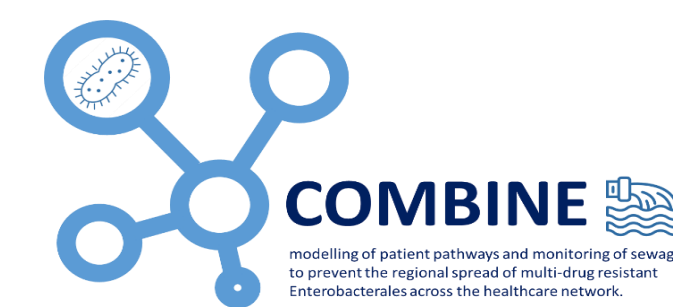
Evaluating sampling methods for the detection of multidrug-resistant Enterobacterales in Nursing Home Wastewater

Maxence Mougou¹, Nicolas Helsens^{1,2}, Pauline Sorlin³, Cécile Ferriot^{1,2}, Clément Legeay⁴, Didier Hocquet⁵, Julien Léaustic⁶, Élodie Claire⁶, Stéphane Corvec^{6,7}, Gabriel Birgand^{1,2,8}.

¹Cibles et médicaments des infections et de l'immunité, IICiMed, Nantes Université, Nantes, France. ²CPIAS des Pays de la Loire, Centre Hospitalier Universitaire (CHU), Nantes, France. ³Hospital Hygiene and Infection Control Team, Hospital Center Laval, 53000 Laval, France. ⁴Infection Control and Prevention, University Hospital of Angers, Angers, France. ⁵Université Marie et Louis Pasteur, CHU Besançon, CNRS Chrono-environnement (UMR6249), Besançon, France. ⁶Institut de Biologie des Hôpitaux de Nantes, Service de Bactériologie et des Contrôles Microbiologiques, CHU de Nantes, France. ⁷INSERM, Immunology and New Concepts in ImmunoTherapy, INCIT, UMR 1302, Nantes Université, Nantes, France. ⁸NIHR Health Protection Research Unit in Healthcare Associated Infection and Antimicrobial Resistance at Imperial College London, Hammersmith Campus, Du Cane Road, London, UK.



E-mail: gabriel.birgand@chu-nantes.fr



Introduction

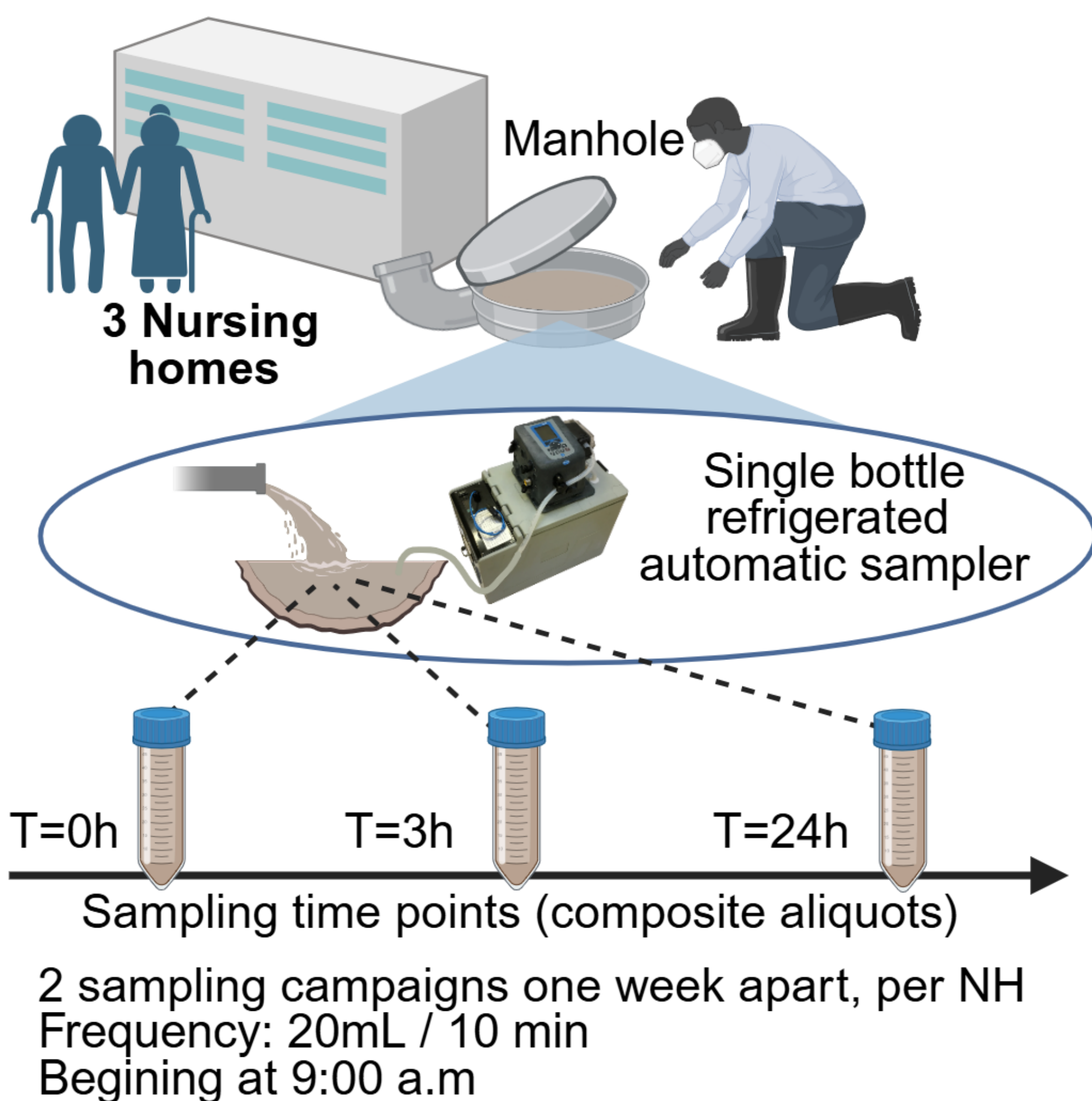
Multidrug-resistant Enterobacterales (MRE), including extended-spectrum beta-lactamase-producing Enterobacterales (ESBL-E) and carbapenemase-producing Enterobacterales (CPE), are major public health threats. Nursing homes (NH) represent important reservoirs of antimicrobial resistance and wastewater-based surveillance could provide a non-invasive population-level monitoring tool, but optimal sampling strategies duration remain unclear.

Objectives

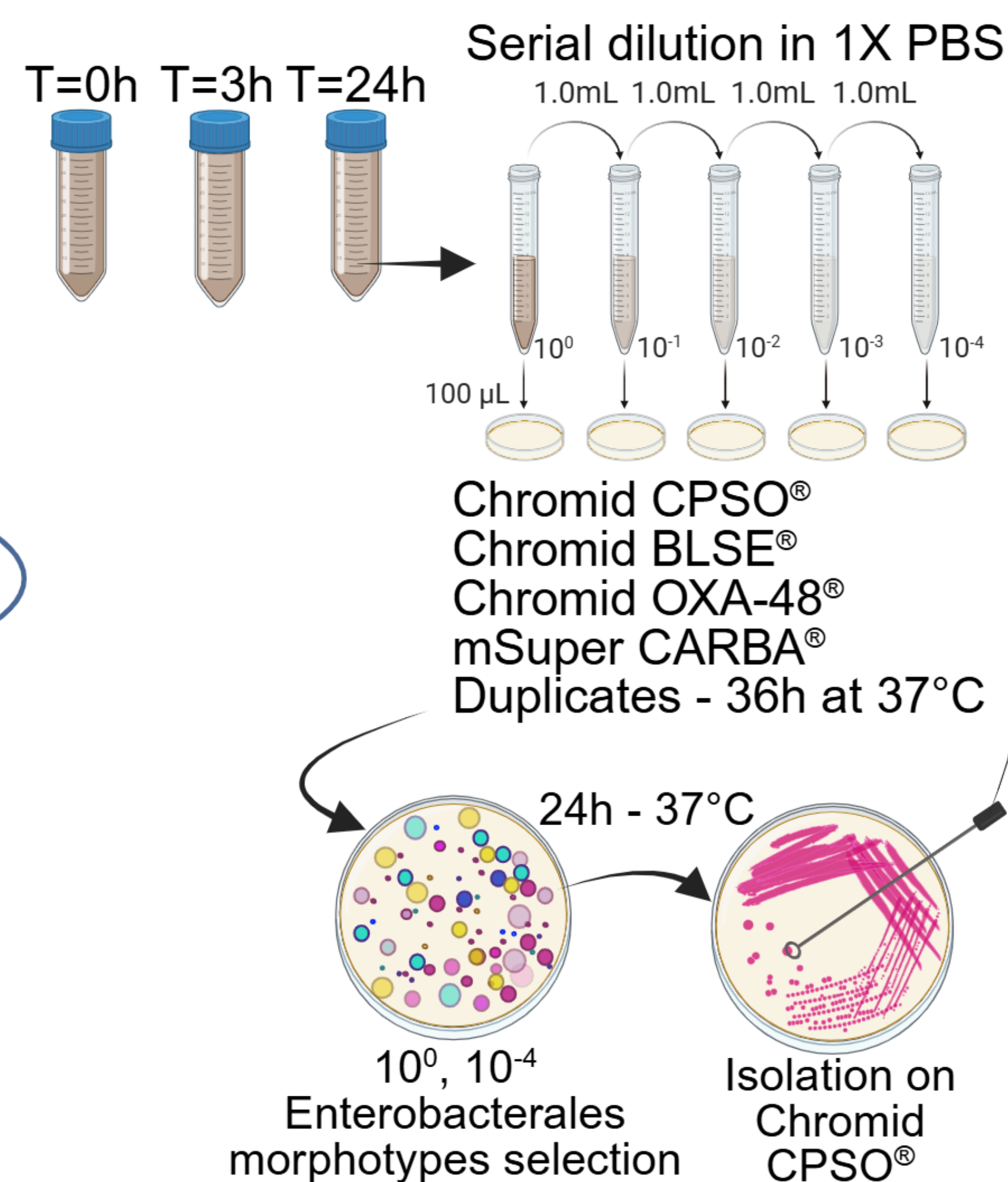
- To develop a practical wastewater-based surveillance protocol to detect MRE in nursing homes.
- To compare sampling duration effect on detection and quantification of MRE.

Materials and Methods

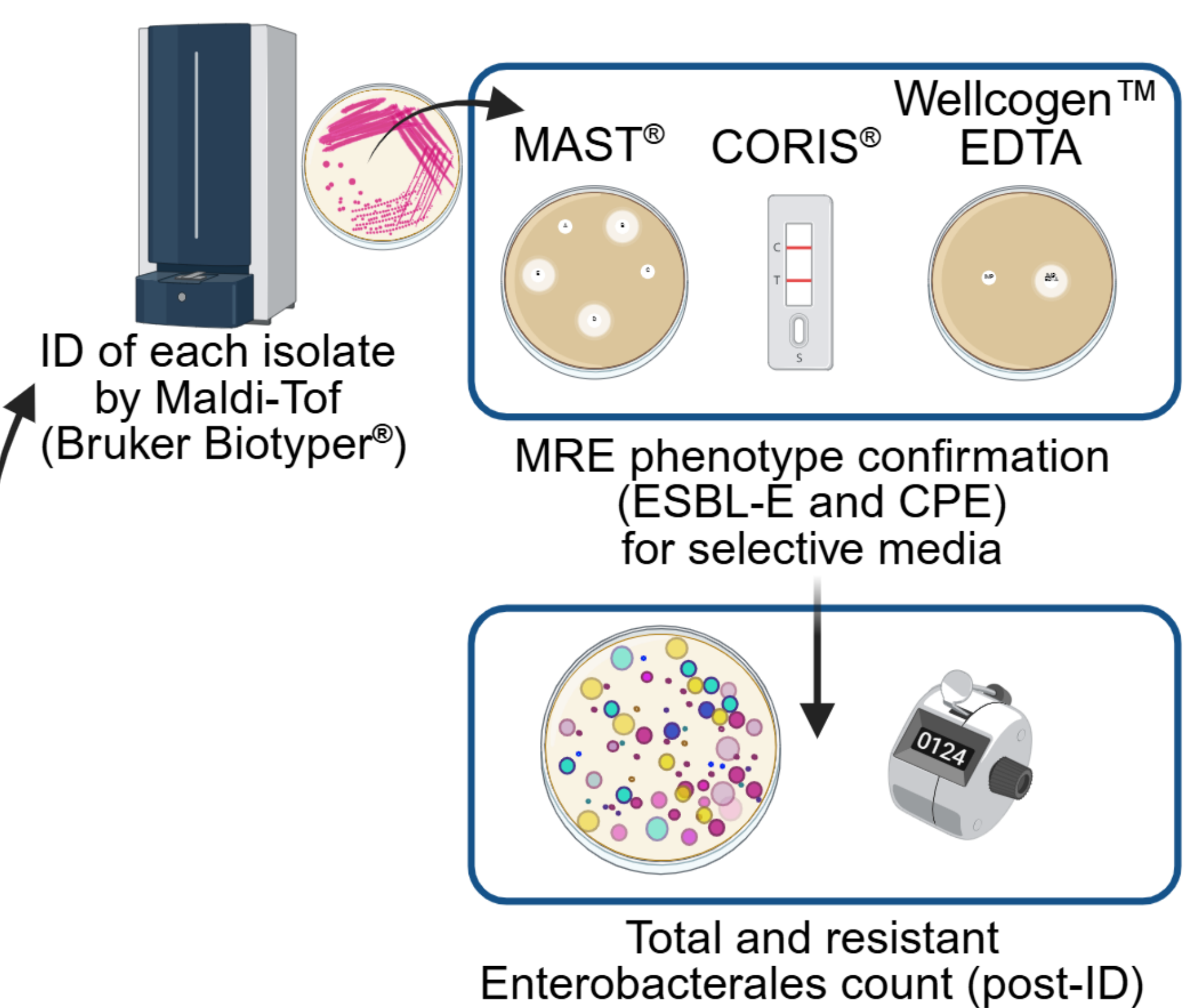
Wastewater sampling



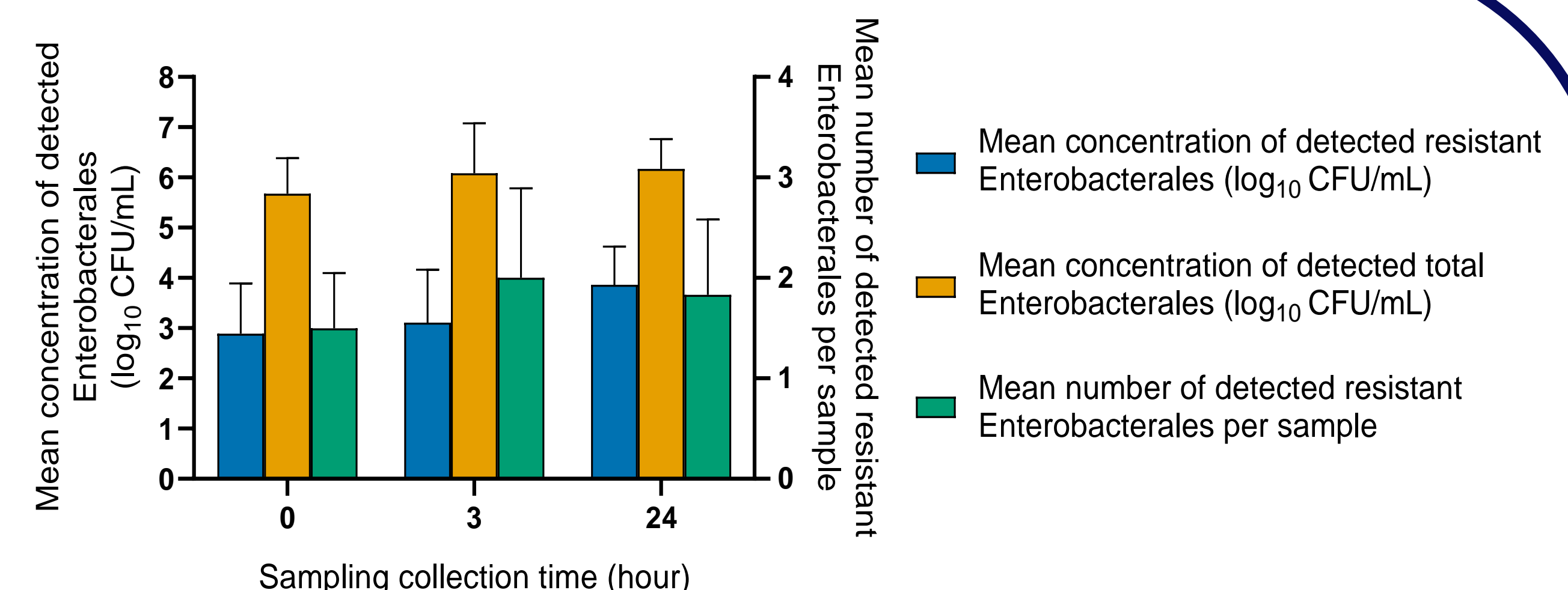
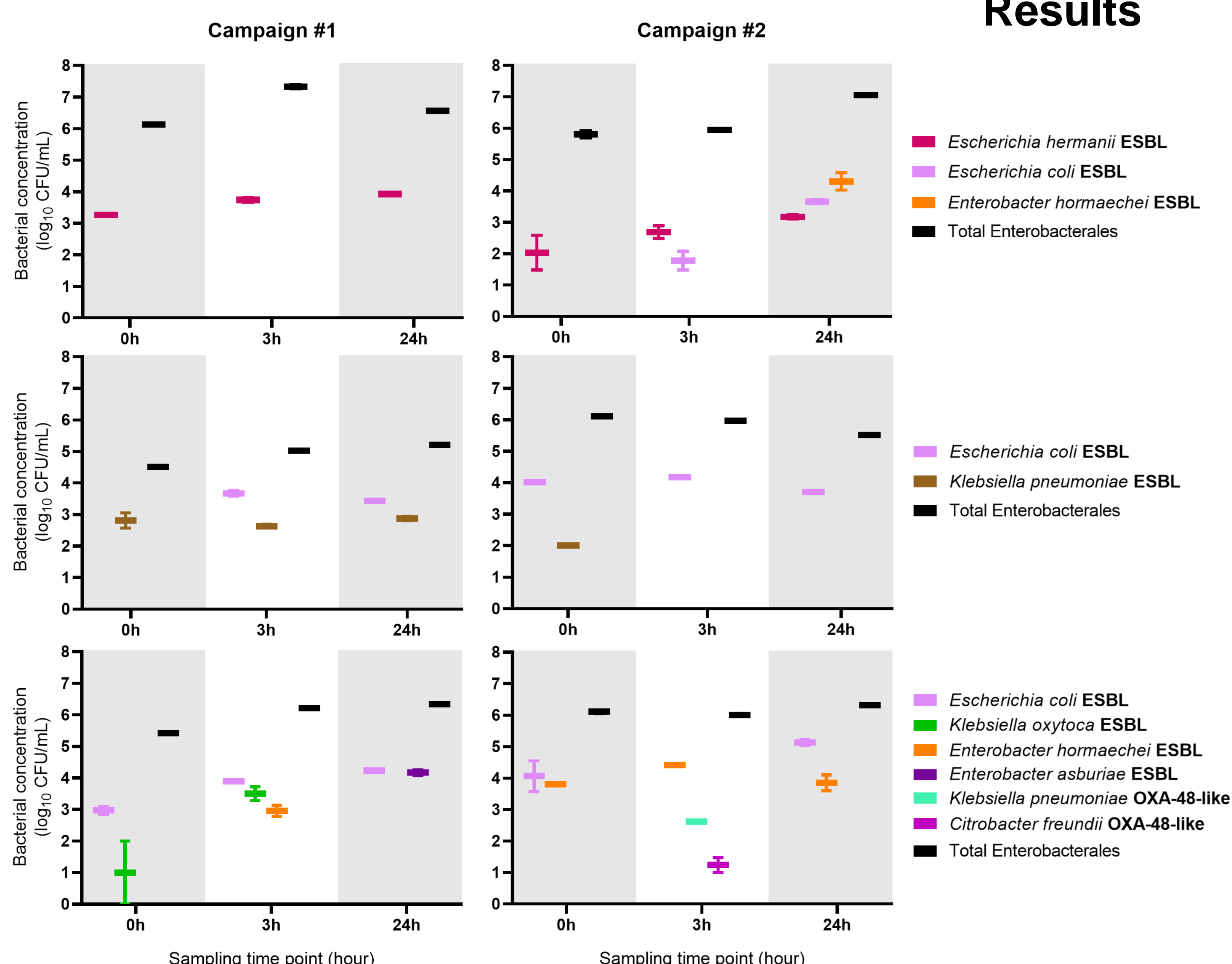
Wastewater dilution and isolation



Identification and resistant phenotypes confirmation



Results



All wastewater samples were MRE-positive (18/18)

- ESBL-E were ubiquitous across samples
- *E. coli* predominated (67%), followed by *Enterobacter* spp. (28%) and *K. pneumoniae* (22%)
- CPE were rarely detected (2 OXA-48-like in a single sample)

3-hour sampling frequently detected equal or greater isolates diversity

- Higher isolates yield at T=3h (2.0 isolates/sample) vs T=0h (1.5) and T=24h (1.83)

→ 3-hour composite sampling provides the best balance between performance and feasibility

Discussion

This study suggests that ESBL-E are endemic in French NH wastewater. Three-hour sampling is a compromise between operational feasibility and performance for detecting one-off events, although interpretations remain limited without strain-level molecular typing. CPE may be underdetected in NH, as two strains were identified without known colonised residents in the facility. However, the correlation between wastewater findings and resident colonisation remains to be established.