SF-RAD:

Correlative analysis of wastewater trends with clinical cases and hospitalizations through five dominant variant waves of COVID-19

Funded by
NIH RADx-rad Grant
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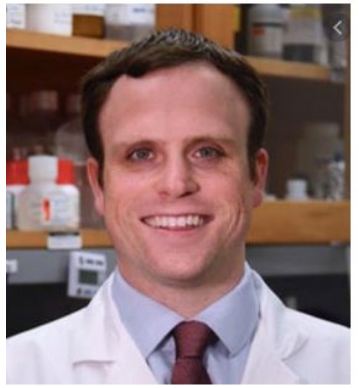
UNIVERSITY OF MIAMI

Weill Cornell Medicine



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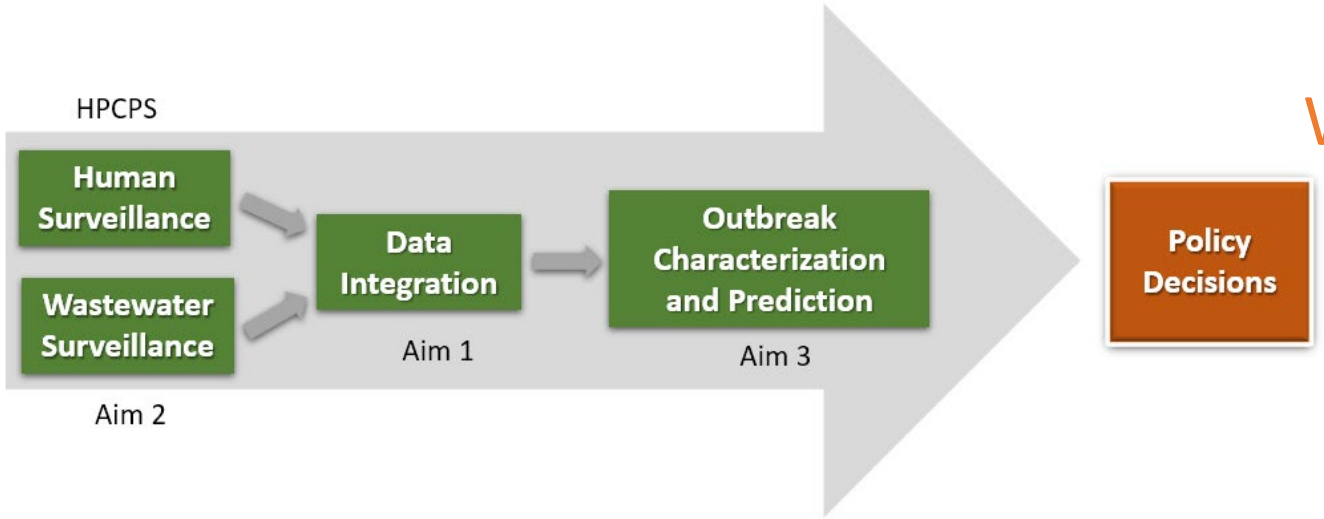
Aims

1. Data standardization and informatics infrastructure
2. Wastewater characterization
3. Integration with human health surveillance



SARS-CoV-2 Wastewater-Based Surveillance

RADx SM Radical

www.covidsfrad.org

Human Surveillance

Student Campus Residents, UMiami Gables/Marine (Sep. 2020)

Fall'20/Spring'21

- Students tested weekly (nasal swab, qPCR) Supplemented by breath test
- COVID results and total tests by building/dorm room

Summer/Fall'21

- Unvaccinated students tested weekly
- All students tested when wastewater exceeds

University Hospital, UMiami Medical (Sep. 2020)

- Treat known COVID patients
- Electronic medical records pulled regularly

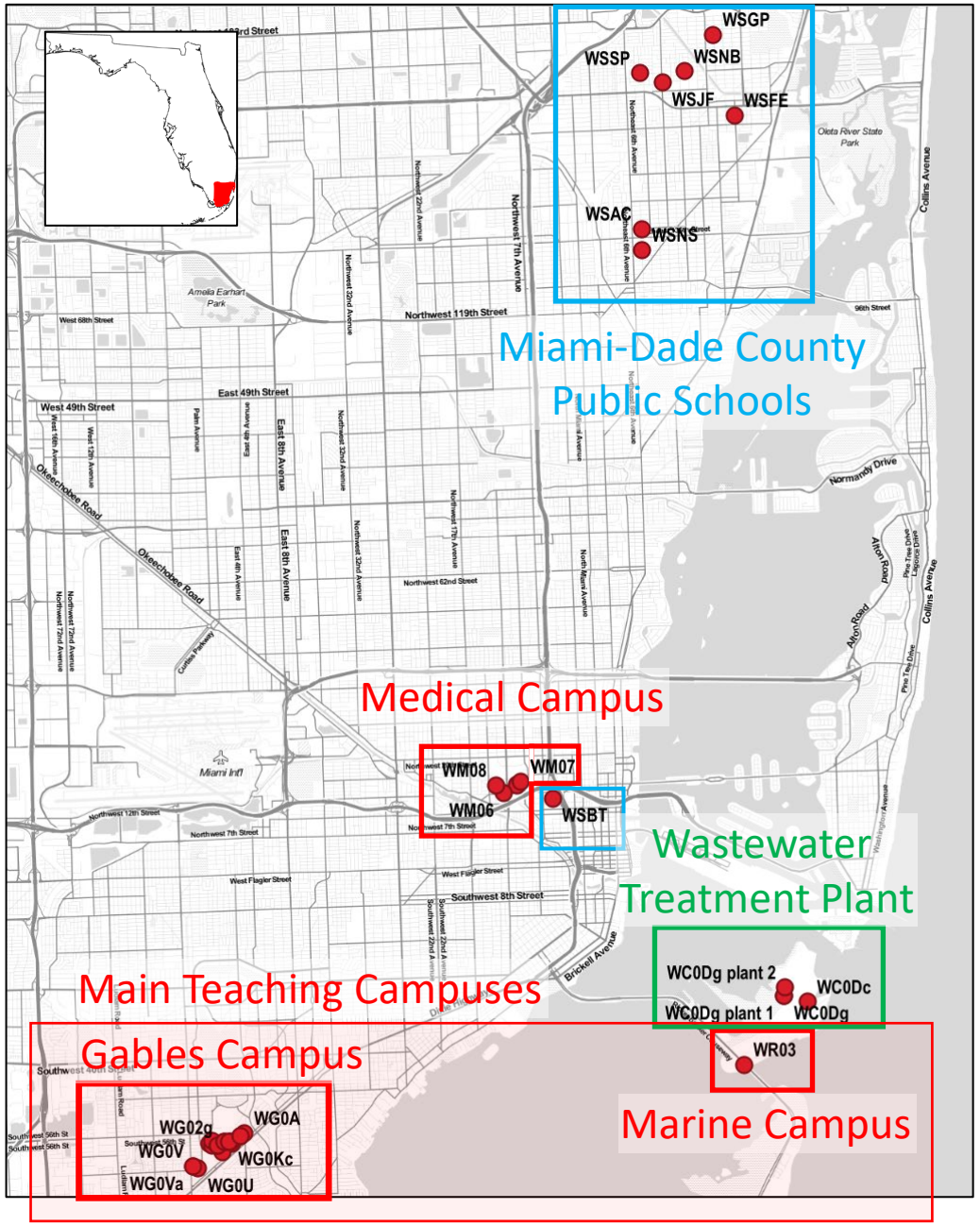
Miami-Dade County Residents, FDOH WWTP (Jan. 2021)

- Positives by zip code
- Number of tests by zip code
- Augment with Biobot wastewater data (Apr. 2020)

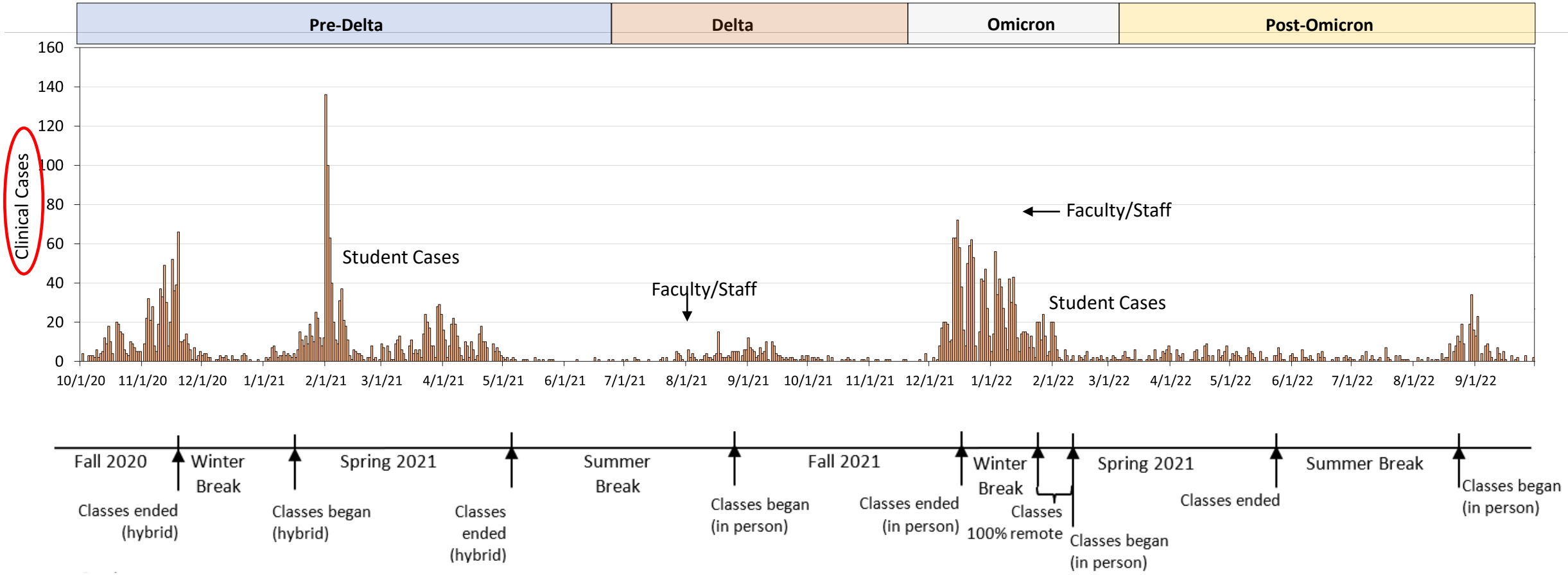
Pilot, **Miami-Dade County Public Schools**, MDCPS (Jan. 2022)

- In collaboration with RADx-UP project (Gwynn, PI)
- 9 Schools (4 Elementary, 2 Middle, 3 High Schools)

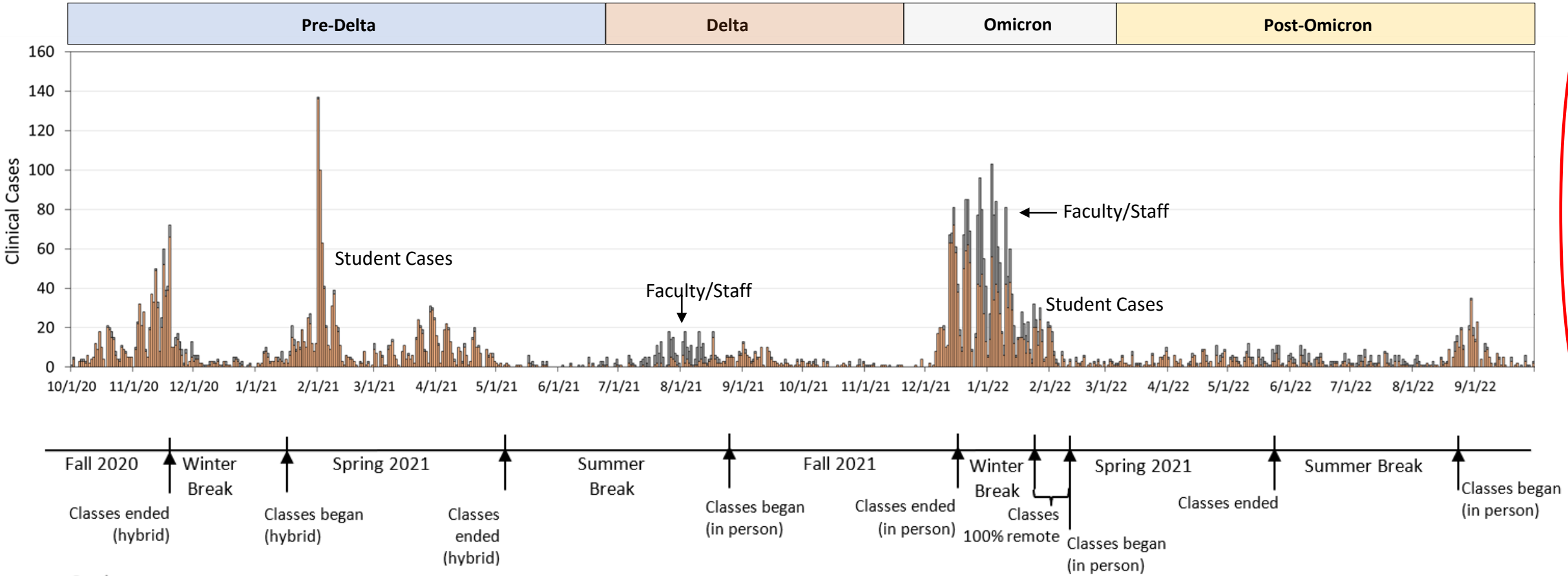
Sample Collection Plans



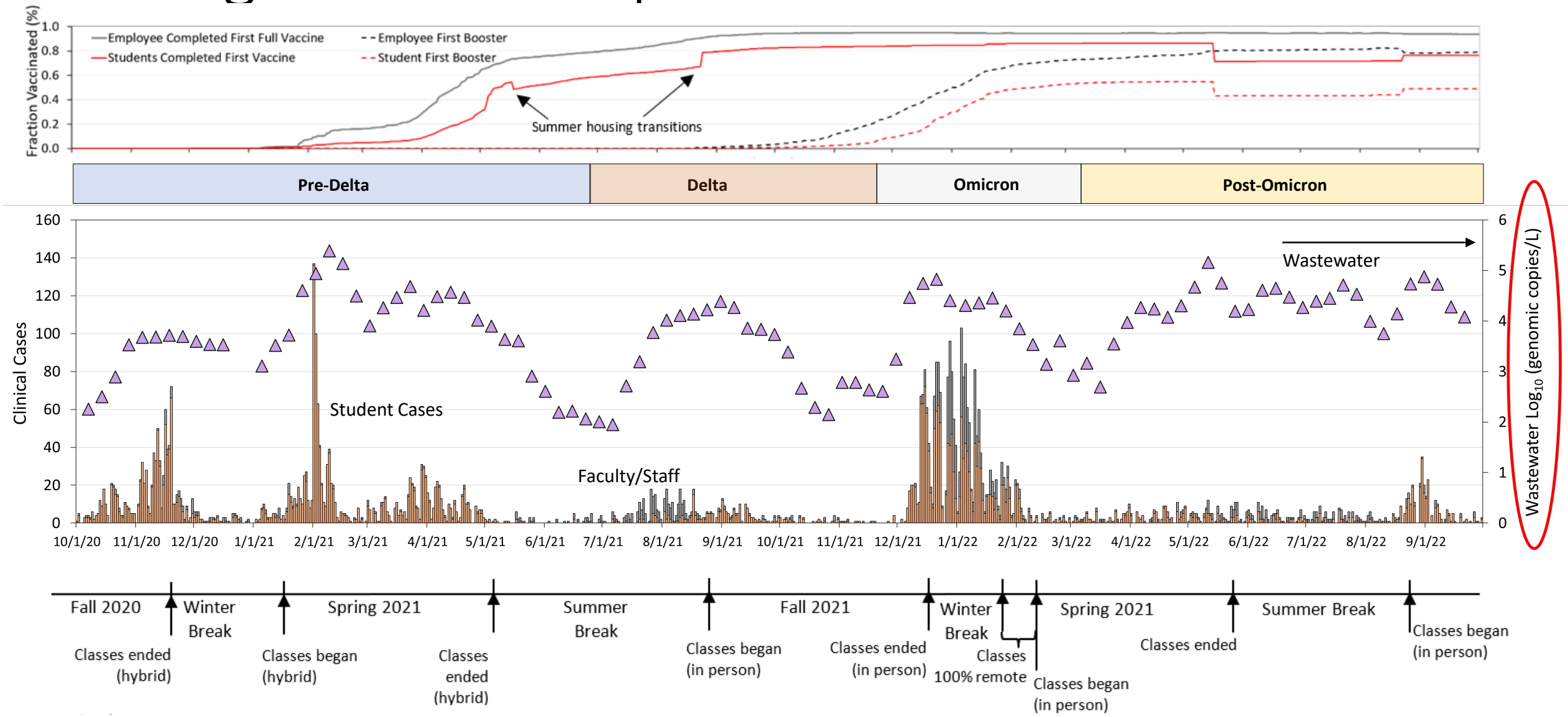
Undergraduate Campus



Undergraduate Campus

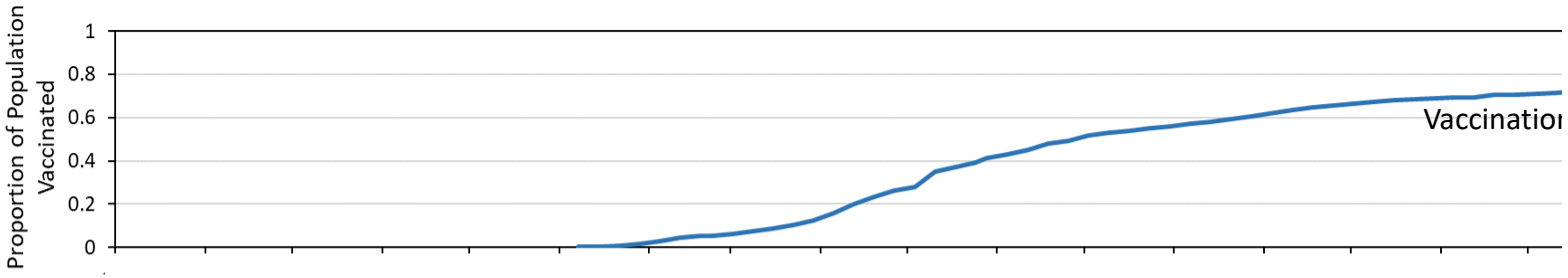


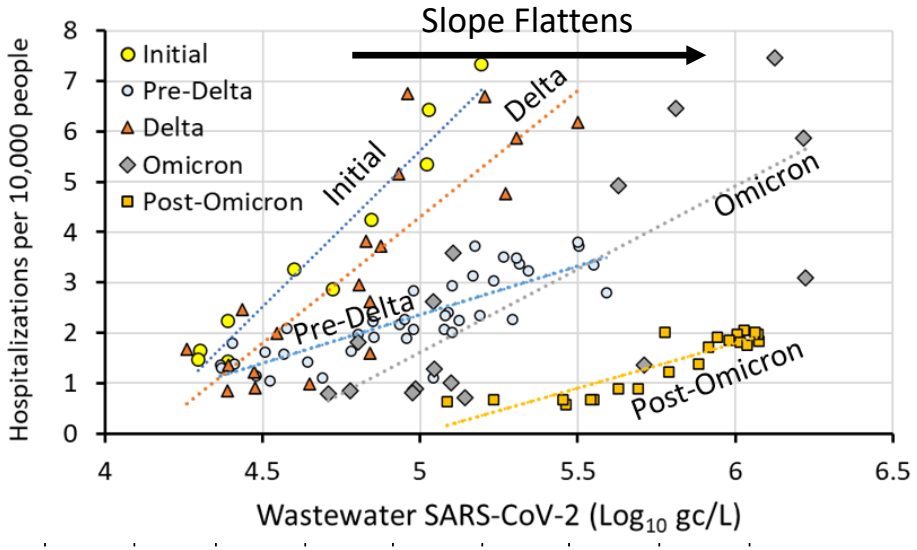
Undergraduate Campus

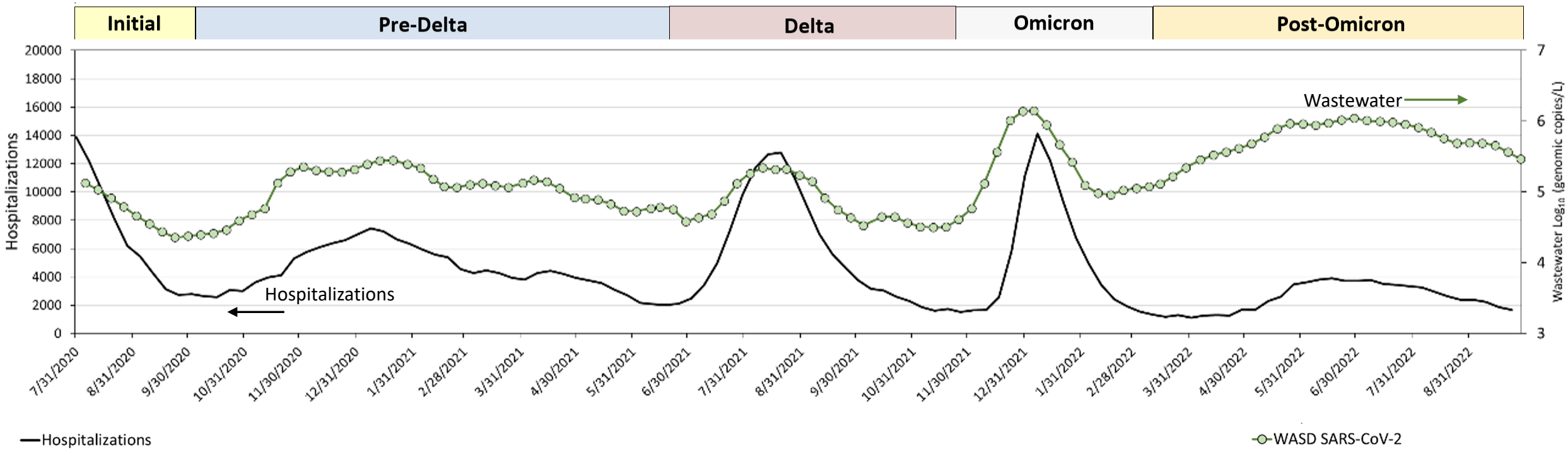


Hospitalizations

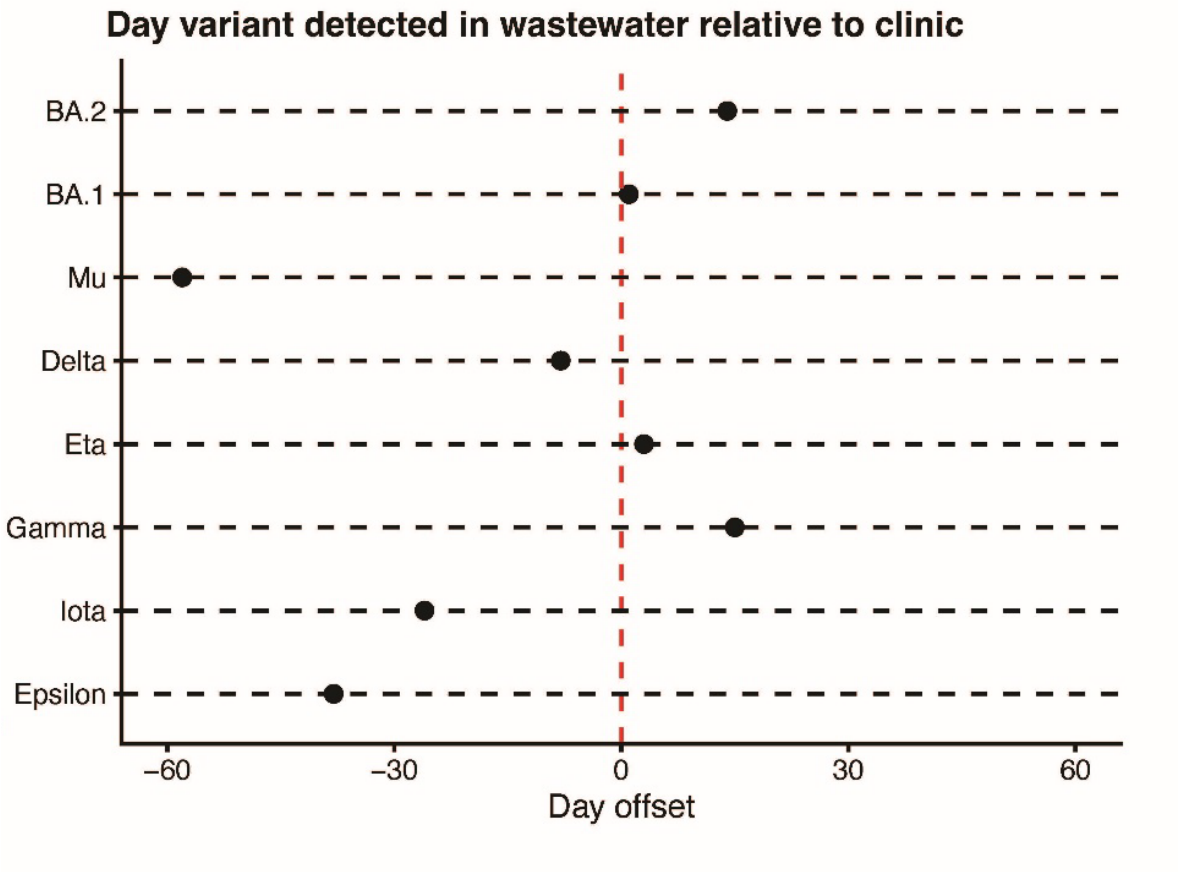
Hospitalizations

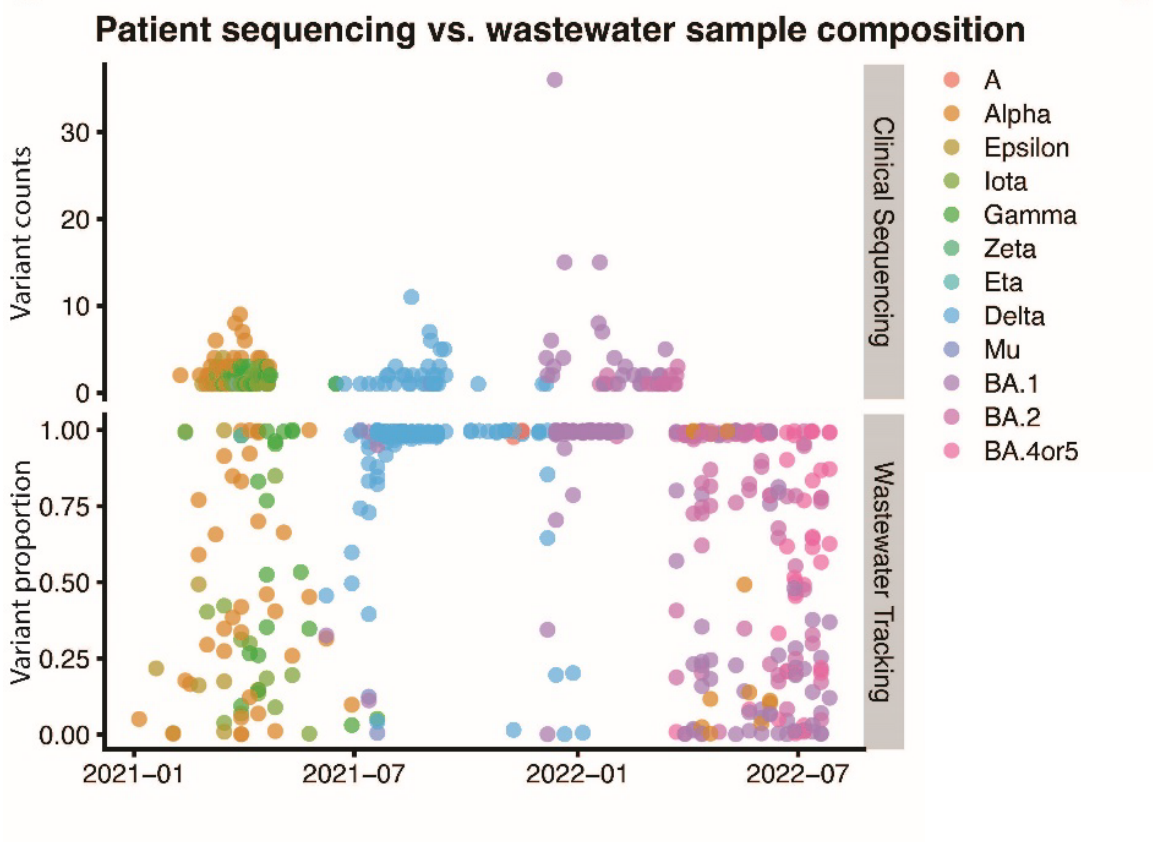






Detection and anticipation of SARS-CoV-2 Variants of Concern (VOCs) in wastewater with amplicon NGS





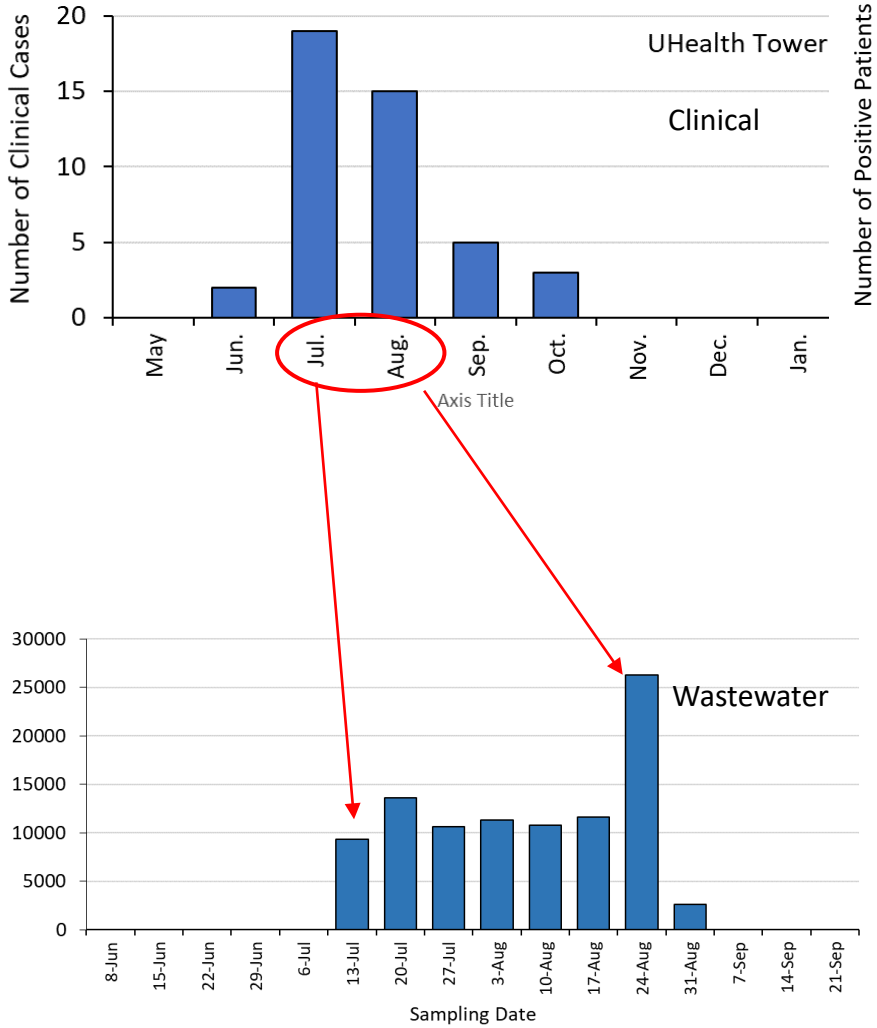
ARCTIC amplicon preparation and Illumina NovaSeq6000 NGS

Hospital Wastewater

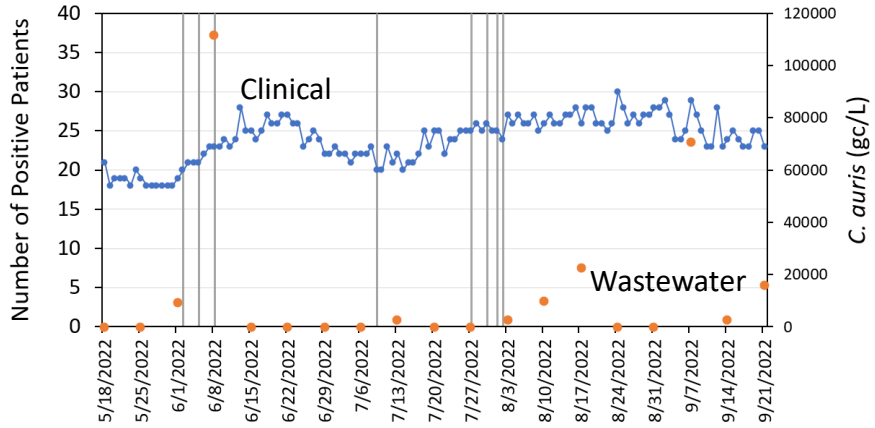
Comorbidities

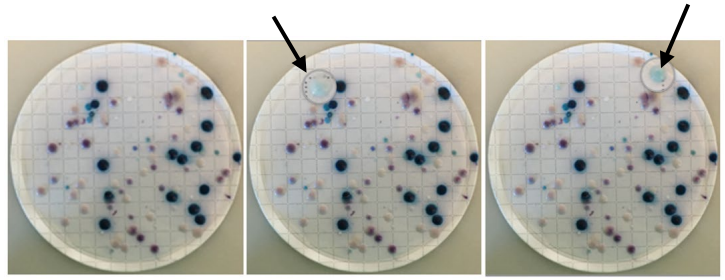
	Delta	Omicron	Omicron subvariants
	Lab1	Lab1	Lab1
Lab1	1.00	1.00	1.00
Male gender	-0.14	0.04	0.16
Ventilator use	-0.37	-0.81	-0.23
Admission to critical care unit	-0.50	-0.73	0.23
Cancer diagnosis	-0.24	0.25	0.14
Cardiovascular disease	-0.76	-0.39	0.02
Immunosuppressive condition	0.37	-0.60	0.43
Nicotine use	-0.75	0.04	0.17
Asthma	-0.10	-0.02	-0.13
Chronic kidney disease	-0.34	-0.77	0.62
Chronic lung disease	0.19	-0.19	-0.10
Diabetes	-0.46	-0.35	0.17
Hypertension	-0.87	0.01	0.17
Remdesivir administration	0.76	-0.03	-0.08
Inpatient mortality	0.06	-0.21	-0.31
Number of inpatients	0.69	0.75	0.18
Age	-0.66	-0.30	0.24
Duration of hospitalization (days)	-0.71	-0.37	0.01

Mpox



Candida auris





Candida auris cultured from wastewater

Additional Targets

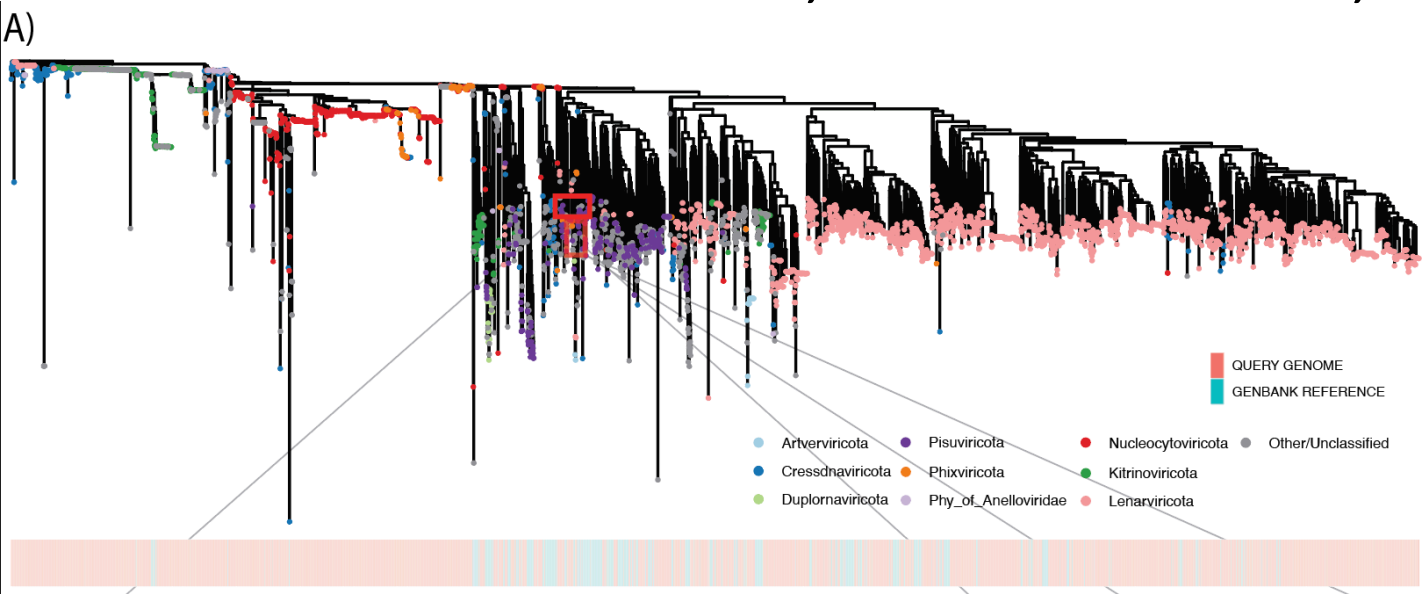
Additional Targets

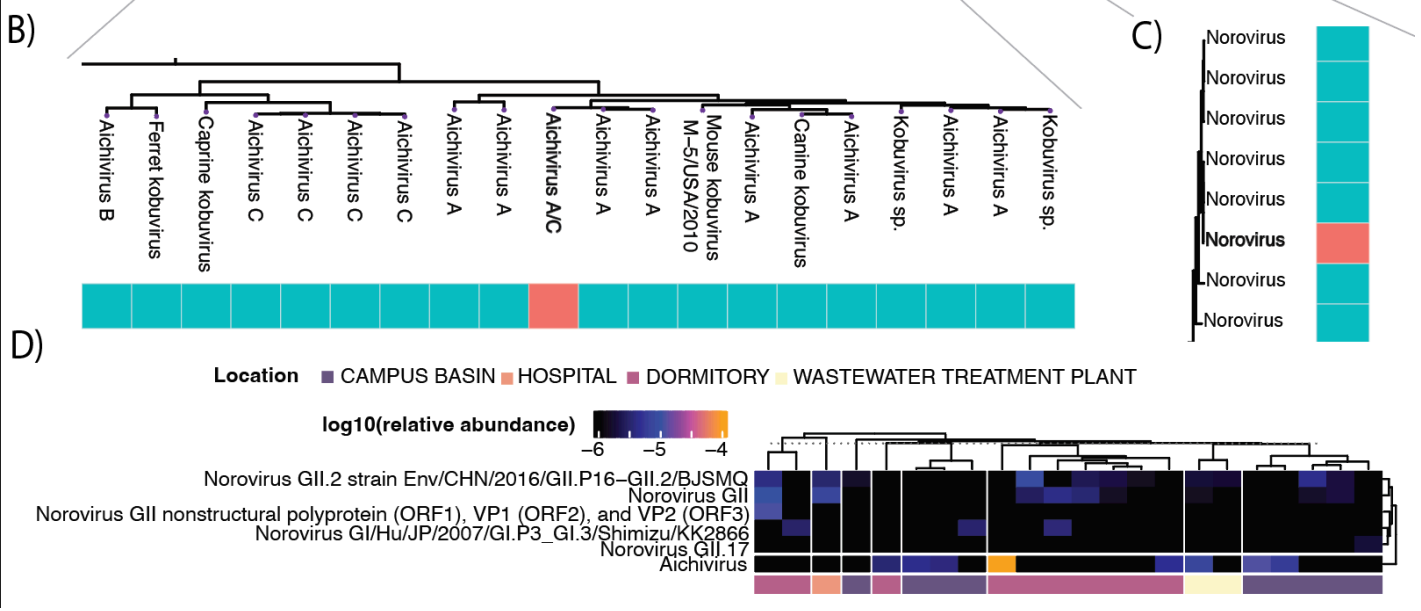
Table 1: Included on the Viral Surveillance Panel.[1]

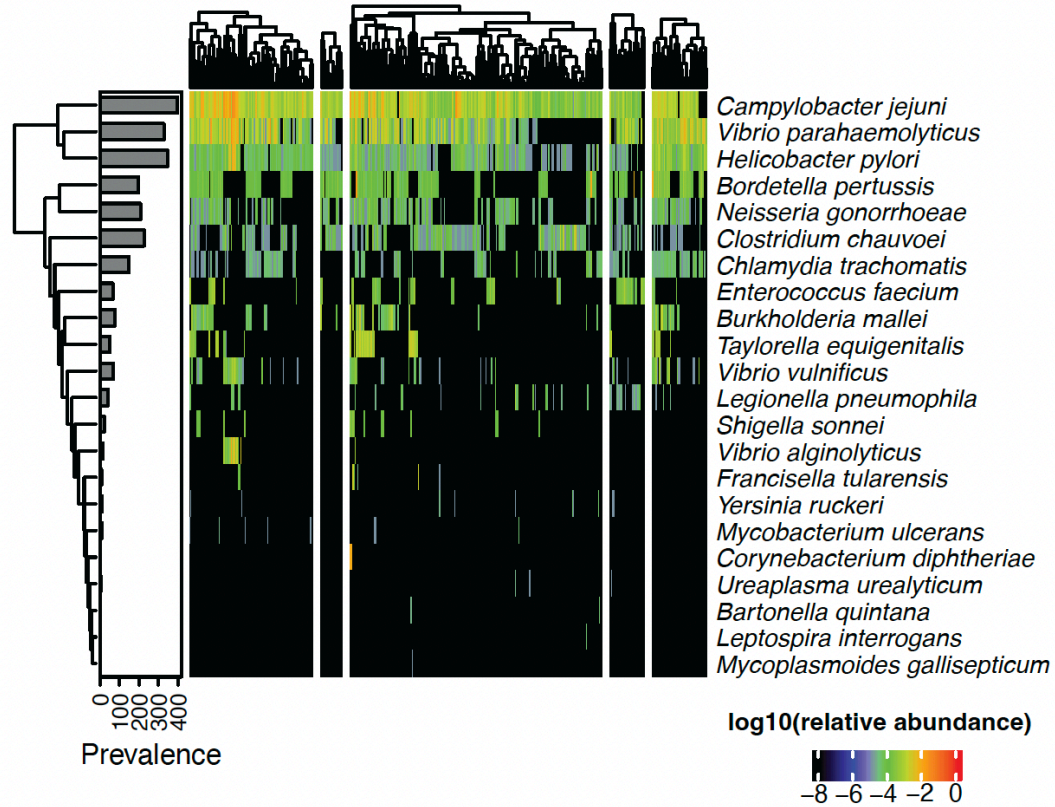
Adenovirus	R Hepatitis B virus	Parechovirus
Aichivirus	R Hepatitis C virus	Parvovirus
Astrovirus	R Hepatitis E virus	R Poliovirus
Chapare virus	R Human Immunodeficiency Virus 1	Polyomavirus
R Chikungunya virus	Human Immunodeficiency Virus 2	Respiratory syncytial virus
Coronavirus-229E	R Influenza A virus	Rhinovirus
Coronavirus-HKU1	Influenza B virus	Rift Valley fever virus
Coronavirus-OC43	Japanese encephalitis virus	Rotavirus
Coronavirus-NL63	Junin virus	R Rubella virus
Coxsackievirus	Kyasanur Forest disease virus	Sabia virus
Crimean-congo haemorrhagic fever virus	Lassa fever virus	Salivirus
Dengue virus 1	Lujo hemorrphagic fever virus	Sapovirus
Dengue virus 2	Machupo virus	SARS-COV
Dengue virus 3	Marburg virus	R SARS-COV-2
Dengue virus 4	MERS-CoV	Tick-borne encephalitis virus
Eastern equine encephalitis virus	Metapneumovirus	Torque Teno virus
Ebola virus	Monkeypox virus	Variola virus
Enterovirus	Nipah virus	R Venezuelan equine encephalitis virus
Guanarito virus	Norovirus	R West Nile virus
Hantavirus	Omsk hemorrhagic fever virus	Western equine encephalitis virus
Hendra henipavirus	Oncolytic human papillomavirus	R Yellow fever virus
Hepatitis A virus	Parainfluenza virus	R Zika virus

Candida auris

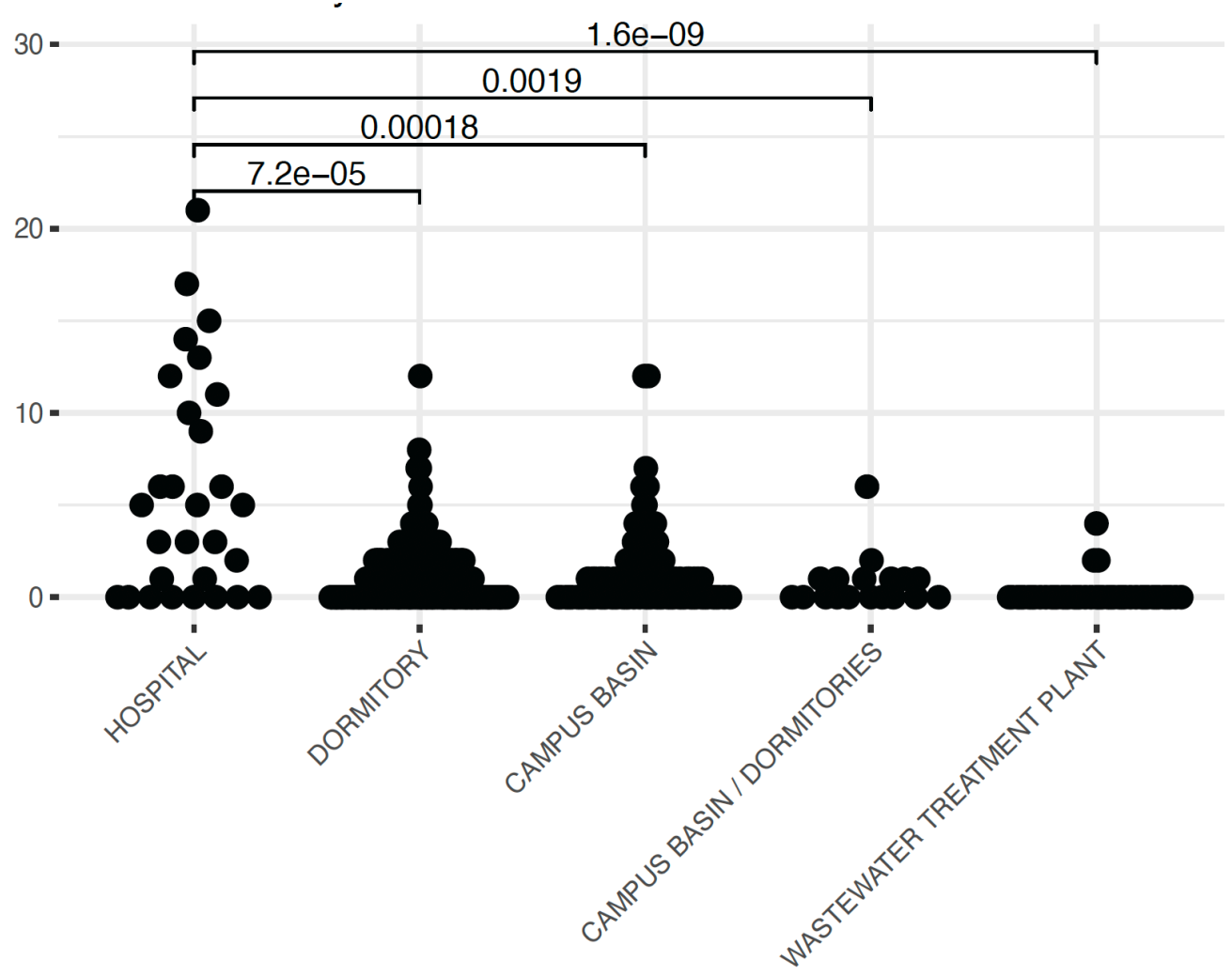
Discovery, geography, and phylogeny of noroviruses, aichiviruses, and myriad bacteria







Anti-microbial resistance (AMR) genes are significantly higher in hospital sewage



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