COVID-19
Surveillance Update
Presentation to SCCWRP Commission
June 11, 2021
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Background

• COVID-19 pandemic has put wastewater based surveillance of viral pathogens at the forefront of public health

• California’s wastewater community has been active in Wastewater Based Surveillance for SARS-CoV-2
  • More than 40 facilities are presently monitoring and have at least six months of data
  • Several facilities (including SCCWRP member POTWs) have more than a year of data

• You have expressed interest in us continuing to work on data quality and ensuring the data are being used effectively
Potential Sources of Variability

Sample Type
Influent or Settled Solids

Sampling Strategy
Grab or Composite

Sampling Frequency
Daily? Weekly?

Virus Capture
Direct processing, Filter concentrate

Virus Inactivation
Heat Chemical

Fresh Processing, Storage, or Preservation
Refrigerate Freeze Chemically preserve

Purification of Viral RNA
Commercial kit, published protocol, In-house protocol

Target Selection
Which gene target?

Virus Quantification
RT-qPCR or RT-ddPCR
Potential Sources of Variability

Stanford Collaboration

- **Sample Type**: Influent or Settled Solids

CSU Fullerton Collaboration

- **Sampling Strategy**: Grab or Composite
- **Sampling Frequency**: Daily? Weekly?

Virus Capture

- Direct processing, Filter concentrate

Virus Inactivation

- Heat
- Chemical

Fresh Processing, Storage, or Preservation

- Refrigerate
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Target Selection

- Which gene target?

Virus Quantification

- RT-qPCR or RT-ddPCR

Manuscript sent to CTAG
From Method Comparison to Effective Data Use

- Our previous work focused on laboratory measurement methods
  - Variability
  - Sensitivity

- SCCWRP is coordinating the CA Water Quality Monitoring Council Committee on Wastewater Based Epidemiology

- Goal of WBE Committee is to identify how we can make better use of the wastewater data
WBE Committee Membership

Water Quality Monitoring Council members/alternates
  - Steve Weisberg – Southern California Coastal Water Research Project Authority
  - Karen Mogus – State Water Resources Control Board
  - Peter Vroom – City of San Diego
  - Brian Laurenson - CASQA

Public Health Community
  - Mark Starr – California Department of Public Health
  - Alex Yu - California Department of Public Health
  - Mike Balliet - Santa Clara County Public Health

Wastewater Community
  - Naoko Munakata – Los Angeles County Sanitation Districts
  - Greg Kester – California Association of Sanitation Agencies

Research Community
  - Ali Boehm – Stanford
  - Josh Steele – Southern California Coastal Water Research Project Authority
  - Kara Nelson – UC Berkeley
  - Colleen Naughton – UC Merced
Two Use Cases

1. Descending SARS-CoV-2 case curve

2. SARS-CoV-2 variant analysis
Focus on Descending Case Curve

• WBE committee has realized best use of data is not in addressing questions about the ascending curve

• We know less about the descending phase, where there are fewer data streams

• Focus now on data uses for the descending side of the curve at the urging of the public health community
Suggestions to Improve Sensitivity

• Remove heat inactivation step
  • 50% of treatment plants using heat inactivation

• Concentrate or measure a larger volume
  • ~30% of labs are not concentrating

• Measure SARS-CoV-2 using digital RT-PCR
  • 60% of labs are using RT-QPCR

• Use sludge samples
  • 25% of labs are collecting sludge
Where the Committee is Taking this Information

• Used science done by SCCWRP to make recommendations to the wastewater measurement community

• Recommendations influencing wastewater measurement decisions throughout US
Two Use Cases

1. Descending SARS-CoV-2 curve

2. SARS-CoV-2 Variant Analysis
SARS-CoV-2 Variant Analysis

- SARS-CoV-2 variants in wastewater is a high priority for the Committee
  - High public health impact

- Science of measuring SARS-CoV-2 variants in wastewater is an active area of research

- Two approaches to measuring SARS-CoV-2 variants
  - Targeted analysis to look for every individual variant
  - Broad screening of viral genomes using sequencing
Suggestions on SARS-CoV-2 Variants

• Because methods are not yet standardized, committee recommends working with your local researcher

• SCCWRP is collaborating with UCI, Stanford, UNC, and others

• Test and refine methods to identify and track variants in wastewater