Revitalizing Public Health: Technology Infrastructure and COVID-19 Pandemic Response

2021 CHEAC Annual Meeting

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Technology in COVID-19 Pandemic Response

- Scope of Technology
  - Public and internal communication
  - Workforce capacity
  - Data tracking and reporting
  - Public health services
- Adaptability: Overcoming Challenges and Gaps
- Epidemiological Surveillance
- Laboratory Testing

Technology in COVID Response

- Public and internal communication
  - TeleTask, Qualtrics, email encryption, mobile email access, MS Teams
- Workforce capacity
  - Mobility – Laptops, mobile hotspots, VPN
  - Workflows – Barcode printers, barcode scanners, macros
- Data tracking and reporting
  - CalREDIE, CalCONNECT, NSSP, GIS, accessibility, SharePoint, Access and Excel
- Public Health Key Information Systems
  - EHR, LIMS, Qualtrics, SharePoint, Salesforce

Communication

- TeleTask – Quickly reach people on a call list, inform a batch of people about a cancelled clinic, and communicate reminders through batch texts, emails, and phone calls.
- Qualtrics - Quick creation of surveys, digital receipts for incentives, configurable interface for vaccine eligibility (supports PrepMod)
- Email encryption
- Cloud & phone email access
- Microsoft Teams
- Intranet – internal team communications, restricted access

Mobility & Workflows

- Mobile COVID Response Workforce
  - Laptops with VPN
  - Cell phones with County email access
  - Mobile hotspots
  - Touch stations
  - Teleworking
- Workflow Improvements
  - Barcode printers (Testing, Lab)
  - Barcode scanners (regular & QR)
  - Tablets
  - Macros and other automations

Data Tracking and Reporting

- CalREDIE, CalCONNECT, NSSP
- GIS & website accessibility
- SharePoint – Flexible & secure database creation
  - County-level COVID data tracking
  - COVID operations team collaboration & communication
  - Improved onboarding of staff (policies & trainings for new staff)
  - Other databases (media response tracking, inventory tracking, incentive tracking)
- Access and Excel – Allow multiple users simultaneous edit access

Public Health Information Systems

- Trained Staff
- Key Systems
  - Electronic Health Record System (EHR)
  - Laboratory Information Management System (LIMS)
  - SharePoint
  - Qualtrics
  - Others (Salesforce)

Technology Infrastructure and Epidemiological Surveillance

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Managing COVID-19 Case Trend

- Data System and Applications
  - SharePoint
  - GIS Dashboard
  - CalREDIE
  - CalCONNECT
- Interactions between systems

Lab results reported into CalREDIE → CalREDIE tracks and manages COVID-19 laboratory results → SharePoint manages COVID-19 cases → CalREDIE transfer case records into CalCONNECT → Case's initial outreach by CalCONNECT VA Survey → Case interview captured in CalCONNECT → GIS Dashboard processes COVID-19 cases and display case trend to the public

- Usage
  - Track case trend
  - Identify health inequities
  - Communicate to public on current trend

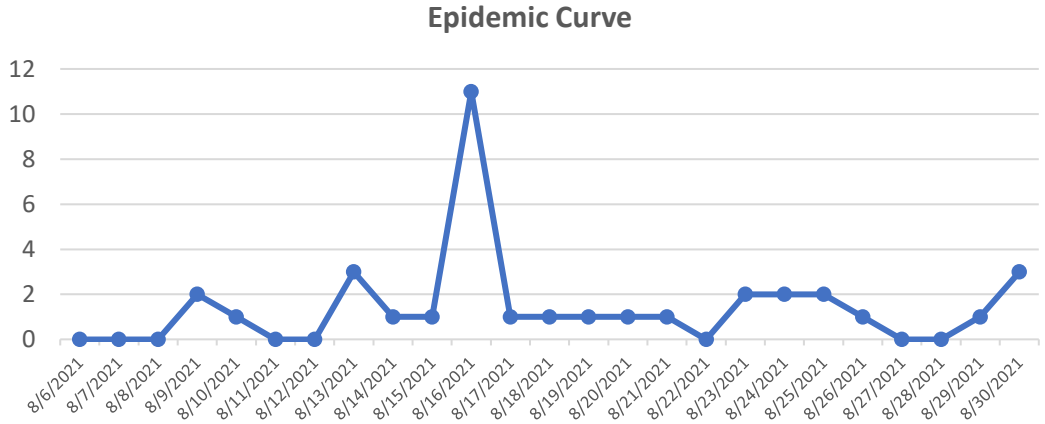
COVID-19 Response Metrics

- Data System and Applications
  - SharePoint
  - GIS Dashboard
  - CalREDIE
  - CalCONNECT
- Usage
  - Assess response's performance
  - Monitor staffing capacity and workflow

COVID-19 Outbreak Surveillance

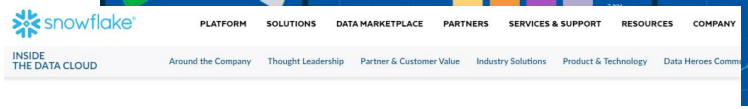
- Data System and Applications
  - CalCONNECT
  - Qualtrics
  - Microsoft Excel
- Usage
  - Track outbreaks' progress and burden
  - Evaluate epidemiological linkages

Date + and symptomatic	Index?	Source of exposur	episode date	LAST DAY ON CAMPU	Period 1 Classroon
/4-8/15 . Tested 8/6. Symptomatic 8/4	cheer	cheer	8/4	8/4	901
Symptomatic 8/4/2021 8/4-8/16	football	football	8/4	8/4	0-1st Football PE
Symptomatic tested at fieldhouse with school 8/4-8/15	cheer	cheer	8/4	8/4	800 OA
ore Throat Last practice 8/4 symptomatic 8/5 tested 8/6.	football	football	8/5	8/4	0-1st Football
ested 8/9 for football no symptoms	708, 5th period	unknown	8/9	8/9	0 and 1st PE
ested 8/9 was in class vaccinated	707, 1st period		8/9	8/10	707
/10-8/21 Symptomatic 8/10			8/10	8/9	P.E. Family Life
/13/2021 to 8/30/2021 per MD	410, 5th period	unknown	8/13	8/12	P.E.
/13/21-8/24 outside source	406, 6th period	outside source	8/13	8/13	P.E.
/16-8/27 +Antigen for exposure on 8/13	unknown	unknown	8/13	8/13	706
/14-8/25 symptomatic tested 8/16 PCR outside	unknown	PE soccer, 6th period	8/14	8/13	311
Symptomatic 8/15 tested 8/16	5th period	period, 404 5th period?	8/15	8/13	114
Exposure to sib.	if first, PE 2nd period	Which is first? Him or sib	8/16	8/10	105
/16-/8/27 Lost sense of tase 8/17		707 & 410 1st period & 5th period	8/16	8/11	707
/16-8/27 Sibling was positive at another school	404, 5th period	household contact	8/16	8/13	805
/16 no symptoms	unknown	Frosh PE?	8/16	8/13	210
/16/21-8/26/21 per MD orders	PE, 3rd period		8/16	8/13	303
Tested for sports + antigen+ PCR symptomatic 8/16-8/27	702 4th period?	407th 1st period?	8/16	8/13	407
Rapid 8/16-8/27 by MD symptomatic 8/16	unknown	708 5th period, PE soccer	8/16	8/13	503
/16-8/30/2021 per MD orders never symptomatic	407 1st period?	PE soccer 6th period & 811	8/16	8/16	407
/16-8/26 Symptomatic 8/17	unknown	406 4th period	8/15	8/16	206
/16-8/27 high fever	503 2nd period	211 4th period	8/16	8/16	410
Symptomatic 8/16. Tested 8/17	PE 5th period	108 3rd period?	8/16	8/16	408
Tested at MHS antigen and PCR on 8/17/2021 Fever			8/17	8/9	P.E.
/17-8/30 Exposed outside of school	4th) & 6th period	outside source	8/17	8/13	0-1st football
CR+ 8/20 Symptomatic 8/18 at school	307 1st period	503, 2nd period	8/18	8/18	307
Symptomatic 8/18 tested 8/20		outside source	8/18	8/13/2021 was out for exposure S.Rollins unmasked	
Symptomatic 8/19 tested 8/20		404 4th period?	8/19	8/19	118
/20 symptomatic after school. Tested 8/24		206 3rd period, softball	8/20	8/20	105
/21 symptoms		307 1st, 705 2nd, PE 3rd	8/21	8/20	307
Symptomatic 8/23 Tested Antigen and PCR 8/26		PE 5th period	8/24	8/26/2021 sent home Was on ca	609
/24/2021 not symptomatic CHANGED PCR + SYMPTOMATIC		302 4th period	8/24	8/24/2021 prior was 8/13 was c	PE/Basketball
lo proof provided from parent	209 1st period?			8/11	209
CR came back inconclusive a second time. symptomatic				SPORTS	MCCAAP
		406 4th period, PE 5th period	8/23	8/26	609
	unknown	unknown	8/25	8/25	304
Tested 8/25/2021	unknown	209 1st period?	8/25	8/24	209
Symptomatic 8/29. Tested Antigen + 8/30	unknown	unknown	8/29	8/27	506
Antigen test + 8/30/2021	unknown	302 4th period, 703 5th perio	8/30	8/27	606
Antigen test + 8/30/2021 PCR test 8/30	unknown	302 3rd period	8/30	8/27	205
Antigen test + 8/30/2021		206 3rd period	8/30	8/27	409
Symptomatic 8/23 PCR 8/25 results 8/28		cheer	8/23	8/25	503



Monitoring COVID-19 Vaccination Efforts

- Data System and Applications
  - Snowflake Data Warehouse
  - GIS Dashboard
- Usages
  - Track vaccination efforts
  - Manage large data
  - Monitor for health inequities for targeted interventions
  - Communicate efforts to the public



AUTHOR
Snowflake

SEP 15, 2021

Snowflake Provides the Data Backbone for California's Digital COVID-19 Vaccine Record

Partner & Customer Value > Customer Stories

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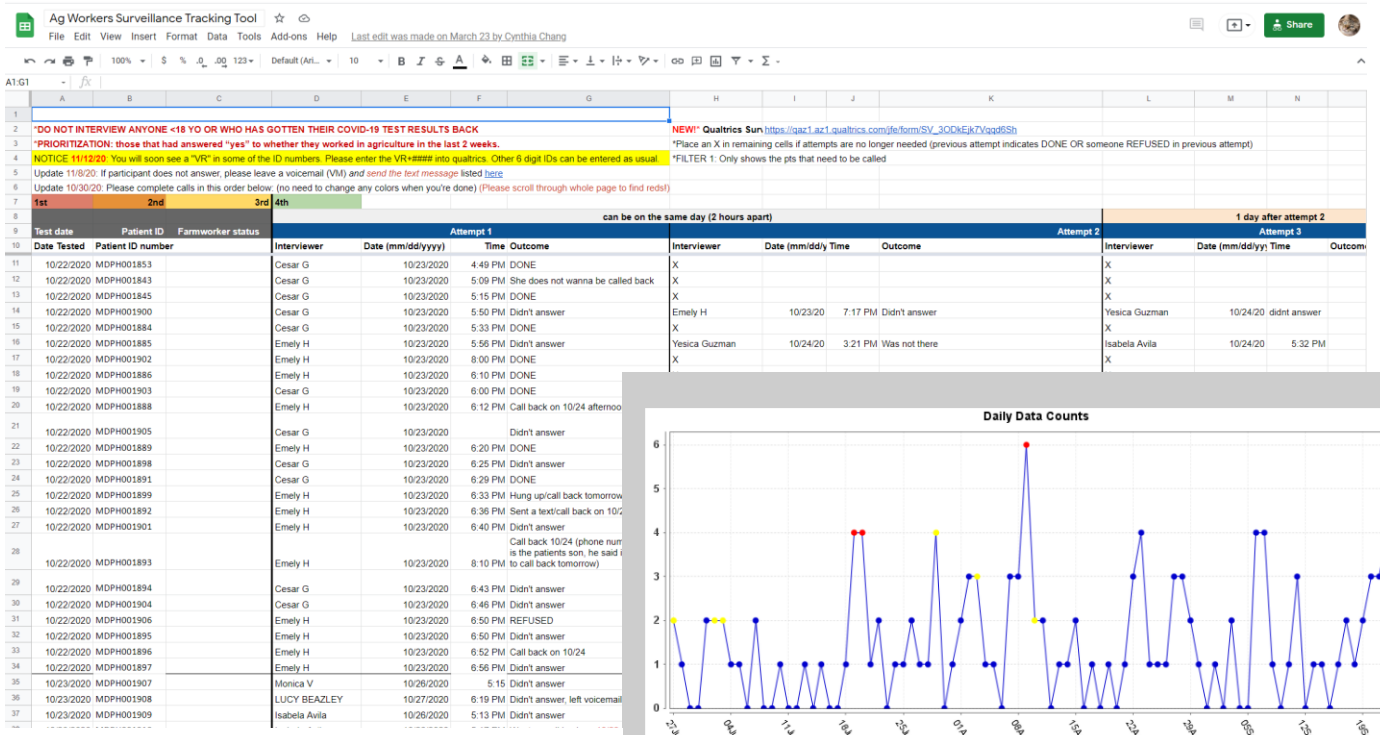
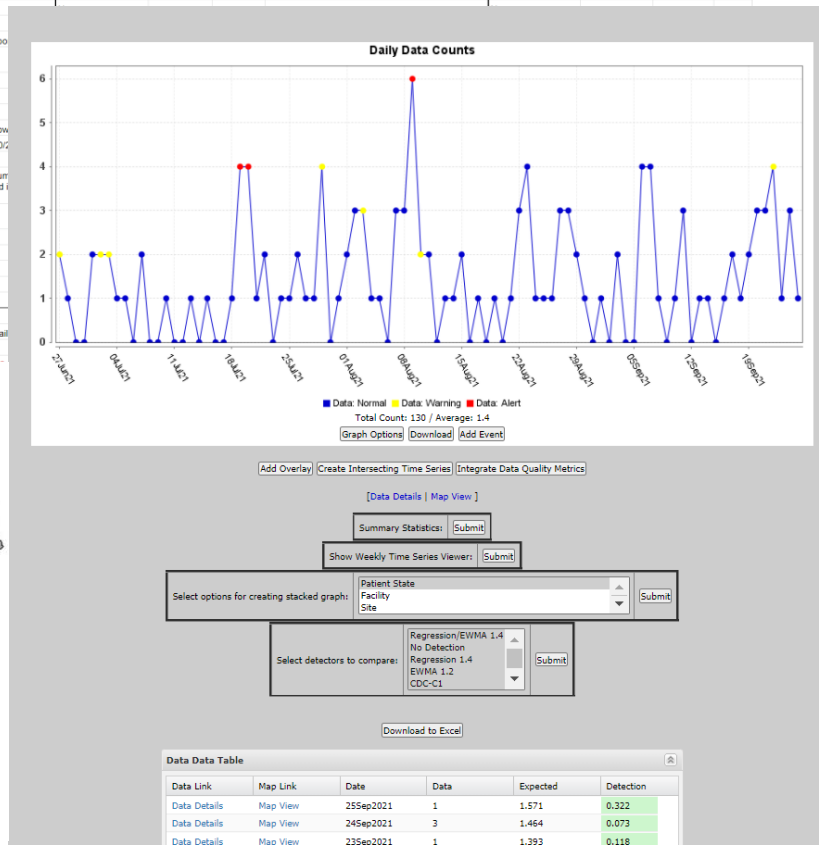
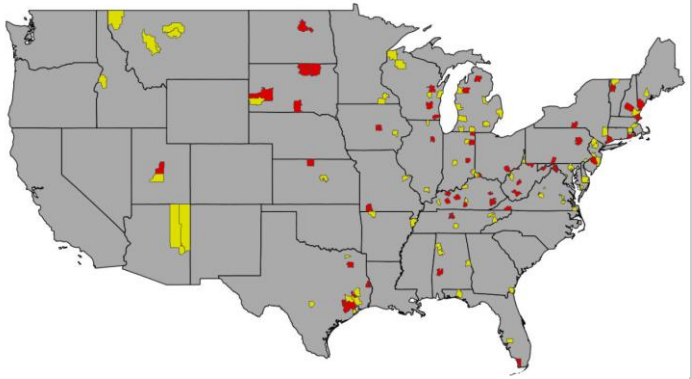
Conducting COVID-19 Surveillance Studies

- Data System and Applications
  - Google Sheets
  - Qualtrics
  - Centers for Disease Control and Prevention's National Syndromic Surveillance Program (NSSP)
- Usages
  - Monitor for underlying

  Trends
  - Explore smaller populations to assess risks







Epidemiological Surveillance Best Practices

- Data Integration
- Data Quality
  - Data merging
  - Data cleaning
- Buy-ins from partners for onboarding onto new systems

Laboratory Testing Challenges During the Pandemic

- Outdated Laboratory Information Management System
  - Manual processes for sampling handling & reporting
  - MS Access database limitations
  - No interfaces
- Unmanageable Data
  - Required a lot of clerical work
  - Double entry across systems
  - Manual entry into CalREDIE

COVID Testing Workflow

COLOR LEGEND
- OA = Office Assistant
- LT = Lab Tech
- PHM = Public Health Microbiologist
- Results Team

1
Patient Samples

2
Receive & Process Samples
- Move samples to BSC
- Date & time stamp requisition forms
- Assign & label samples with corresponding lab numbers
- Make a copy of requisitions & give them to Result's Team to enter and if any, have OAs clarify discrepancies

3
Office Assistant
Enter Patient info into Access Lab Database

4
Prep Samples
- Under the BSC, - Check patient's first & last names & DOBs matches requisition form
- Check media type Store samples or continue with processing samples for testing
- Prep samples to load onto Janus G3 or continue with manual

5
Janus G3

OR

Manual

Manual Prep

6
Extract Samples & Purify Nucleic Acids

Chemagic 360

OR

Qiacube connect

7
PCR SETUP

Automate Janus qPCR

OR

Manual

- Under PCR Hood, Make Master Mix & add to PCR plate
- Load samples

8
Analytik Jena (AJ)
Or
7500 FAST DX

OR

9
Analyze & Intrepret Data in Run Sheet
- Once PCR run is complete, analyze & interpret data
- Give run sheet to OA to result

10
Enter Results
- into Access Lab Database
- Fax reports to providers

Results Team
- Report to patient or facility
- Manual entry to CalREDIE
- Scanning into Laserfiche

Orchard's Sequoia Laboratory Information Management System (LIMS)

- Significantly improved laboratory processes
  - Providers placed orders electronically
  - Barcodes & scanners streamlined workflows
  - Faster turnaround times (TAT)
- High volume & throughput capability
  - Instrument interfaces
- Interfaces with CalREDIE/CCRS
  - Eliminated manual entry into CalREDIE (MLR)

LIMS:
COVID Testing Workflow

COLOR LEGEND
- OA = Office Assistant
- LT = Lab Tech
- PHM = Public Health Microbiologist
- Results Team

1

Patient Samples
Client enters info via Outreach Portal & print barcode labels & or requisitions

MOBILE CLINIC

Outside Facility:
-Schools
-SNF
-JAIL
-County Health Depts

2

Receive & Process Samples
- Move samples to BSC
- Scan & check in samples into LIMS
- If no barcode, print & label samples
- If any, have OAs clarify discrepancies

3

Clarify & Answer Calls
OAs clarify discrepancies with clients

4

Prep Samples
- Under the BSC,
- Check patient's first & last names & DOBs matches requisition form
- Check media type Store samples or continue with processing samples for testing
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Janus G3

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OR

9

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10

Enter Results
PHM approves & release results in LIMS

Mobile Clinic:
Results received via patient portal

Outside Facility:
Results received via Outreach portal

CalREDIE/CCRS:
Results received via HL7 INTERFACE

Overcoming Laboratory Challenges

- Maximum laboratory workspace reached: Expand lab space
  - Need to expand the laboratory
- A modern LIMS is expensive to maintain
  - Need more funding to support maintenance cost
  - Keep working with the vendor to improve system, stay relevant
- Laboratory Workforce Infrastructure
  - More laboratory staff & equipment to increase lab testing capacity
  - Public Health Microbiologists are hard to recruit
  - Need more ongoing funding to support laboratory workforce & infrastructure

Takeaways

- Have flexible & adaptable systems
- Train staff in available information systems
- Seek continuous improvement in key systems
- Have a technology mindset toward solving problems

Innovation *Automation* *Change*

Questions?

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