Feasibility and Functionality of SARS-CoV-2 Rapid Testing in K-12 School Health Offices

A pilot surveillance initiative in the Oregon School District (WI)
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01

Project history
An introduction to our surveillance research in the Oregon School District and surrounding communities
Clinical surveillance (2010-current)
• SC2/flu/multiplex rT-PCR and RPP testing for patients with ARI symptoms in 5 UW family medicine clinics in and around Oregon, WI

Community surveillance
ORCHARDS (January 2014-current)
• OSD students with ARI/ILI symptoms and their household members
• Specimens and epidemiological info collected over a 2-week period
• rT-PCR SC2/flu testing performed on all specimens
• RPP testing on OSD student (index case)

HARVEST (March 2022-current)
• Longitudinal cohort of OSD staff & teachers’ families
• Pooled specimens and household illness data collected weekly
• rT-PCR SC2/flu testing performed on all pooled specimens

GROVES (November 2019-current)
• Longitudinal cohort of OSD families
• Illness and travel information collected weekly

Complementary in-school surveillance
OSD RIDT (September 2021-current)
• Instantaneous SCV2/flu results for students with ARI/ILI symptoms attending school in-person

Air Surveillance (September 2021-current)
• Samplers placed in all 7 OSD schools in high-traffic areas
Oregon School District

= Surveillance Clinic
/ORCHARDS

(OREgon CChild Absenteeism due to Respiratory Disease Study)

(2014-present)

- Flagship study in Oregon, WI established in 2014
- Oregon School District composed of 3 elementary, 1 combined elementary-intermediate, 1 intermediate, 1 middle, and 1 high school
- Enrollment ~ 4,000 K-12 children
- 438 families enrolled during the 2021-2022 school year
- Tracking general and cause-specific absenteeism since September 2014
- Students with 2+ respiratory symptoms invited to participate
- Households of ill students added to testing in September 2016
- 24,000+ specimens collected over 9 influenza seasons
02

Implementation
Instrument training, equipment setup and systematic data collection
Joint Venture

- Our research team: *facilitation*
- QuidelOrtho Corporation: *in-kind contribution*
  - SOFIA 2 FIA analyzers (7)
  - Flu + SARS antigen FIA test kits
  - myVirena platform use
- Oregon School District: *participation by school health staff*
- Wisconsin Department of Health Services: *COVID-connect and funded rT-PCR testing of rapid negative specimens*
- Vendor – Fitchburg Pharmacy: *rapid negative pcr testing*
Training & equipment setup

- **Sofia 2 Fluorescent Immunoassay Analyzers** placed in the health offices of all 7 Oregon School District schools.

- Sofia 2 Flu + SARS Antigen FIA test kits provided to OSD schools.

- Two researchers from our team conducted trainings for health office staff in August 2021 prior to the Fall semester.
  
  **Trainings included:**
  - Demonstration and instructions for Sofia 2 FIA testing
  - Assistance setting up COVID-Connect reporting
  - Selection of symptomatic students/staff

- Results reported in near real-time to the myVirena platform via cloud technology.

- Negative RADT specimens sent to local laboratory for confirmatory rT-PCR testing.
Participant selection and testing

- Parents/guardians of OSD students had the option to consent their children for testing at the beginning of the school year.

- Students and staff were eligible for testing if they had at least two of the following symptoms: fever, chills, cough, shortness of breath/difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, nasal congestion or runny nose, nausea or vomiting, and diarrhea.

- Testing process took about 20 minutes:
  - 3 minutes to register in COVID-Connect
  - 1-2 minutes to swab
  - 15 minutes to run the test

- 13 health office staff (4 nurses, 9 health aides)
IN-SCHOOL TESTING TIMELINE

Symptomatic student/staff is identified

2+ respiratory symptoms, consented for testing and willing to be swabbed

Participant is swabbed and registered in COVID-Connect

School health staff enter demographic/symptom information into COVID-Connect and collect a nasal swab

Flu + SARS RADT performed

Health staff prepare specimen for testing using Sofia 2 FIA analyzer. If negative second swab collected for PCR testing

Results available

RADT results are shared with participant and family if <18yo, sent virtually to myVirena
Results

Qualitative & quantitative
1,226 rapid antigen diagnostic tests (RADTs) run during the 2021-2022 school year
- 103 specimens positive for SARS-CoV-2
- 35 specimens positive for Flu A, 20 positive for Flu B
- 6 specimens tested positive for both SARS-CoV-2 and Flu A
- 6 (0.5%) specimens yielded invalid results

Participants included 940 OSD students (77%) & 286 OSD staff members (23%)
Average tested student **10.9 years** (SD ± 3.8 years)

Percent positivity for OSD testing mirrored county levels (8.4 vs 9.2%, resp.)
Number of SARS-CoV-2 detections per week within K-12 schools of the Oregon School District (OSD: blue bars) and in Dane County, Wisconsin (red line) from August 29, 2021, through June 4, 2022.
<table>
<thead>
<tr>
<th>OSD lag/lead</th>
<th>Spearman’s Correlation</th>
<th>Generalized additive model results for the OSD count relationship with Dane County count, after accounting for the estimated time-form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated Spearman’s rho</td>
<td>p-value</td>
</tr>
<tr>
<td>2-week lag</td>
<td>0.55</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-week lag</td>
<td>0.66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>None</td>
<td>0.69</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>1-week lead</td>
<td>0.63</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>2-week lead</td>
<td>0.57</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

- Cross-correlation between Dane County and OSD weekly positive tests was maximal with no lag (rs = 0.69, P<0.001)
- GAM analyses showed 1-week lead & no lag models has significant positive associations (P<0.001)
Tests/Week

Omicron Surge

Illness Absenteeism

Influenza

Illness Absenteeism

September 2021 to Present
### Feasibility Assessment: School Health Staff Survey Results

<table>
<thead>
<tr>
<th></th>
<th>Sofia® rapid testing*</th>
<th>PCR testing*</th>
<th>COVID Connect*</th>
</tr>
</thead>
<tbody>
<tr>
<td>How easy was this resource to use?</td>
<td>4.62</td>
<td>---</td>
<td>3.46</td>
</tr>
<tr>
<td>How easy was it to collect a nasal swab for this test?</td>
<td>4.77</td>
<td>4.45</td>
<td>---</td>
</tr>
<tr>
<td>Would you like to utilize this resource next year?</td>
<td>12/13</td>
<td>11/13</td>
<td>12/13</td>
</tr>
<tr>
<td>How helpful was in-person training?</td>
<td>4.83</td>
<td>4.58</td>
<td>4.67</td>
</tr>
<tr>
<td>How confident were you in the accuracy of these results?</td>
<td>4.23</td>
<td>4.92</td>
<td>---</td>
</tr>
<tr>
<td>How useful was this resource for detecting cases of COVID-19?</td>
<td>4.54</td>
<td>4.85</td>
<td>---</td>
</tr>
<tr>
<td>How useful was this resource for detecting cases of Influenza?</td>
<td>4.46</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>How easy was it to select students and staff for testing?</td>
<td>3.83</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

*Ratings reported on a Likert scale from 1 (very difficult, not at all helpful, not at all useful, or not at all confident) to 5 (very easy, very helpful, very useful, or very confident)*
# Functionality Assessment: School Health Staff Survey Results

<table>
<thead>
<tr>
<th>Activity</th>
<th>Before training</th>
<th>After training</th>
<th>Mean change</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify COVID-like symptoms</td>
<td>3.85</td>
<td>4.46</td>
<td>+0.62</td>
<td>0.054</td>
</tr>
<tr>
<td>Register a student in COVID Connect</td>
<td>1.54</td>
<td>4.46</td>
<td>+2.92</td>
<td>0.001</td>
</tr>
<tr>
<td>Collect a nasal swab</td>
<td>3.54</td>
<td>4.77</td>
<td>+1.23</td>
<td>0.008</td>
</tr>
<tr>
<td>Perform a Sofia® rapid test</td>
<td>1.69</td>
<td>4.69</td>
<td>+3.00</td>
<td>0.002</td>
</tr>
<tr>
<td>Report test results to parent</td>
<td>3.38</td>
<td>4.69</td>
<td>+1.31</td>
<td>0.014</td>
</tr>
</tbody>
</table>

Ratings were reported on a Likert scale (1 = not at all confident, 2 = slightly confident, 3 = somewhat confident, 4 = fairly confident, 5 = very confident).
Troubleshooting: Common issues

- Uncertainty about returning to school
- Fear of getting covid from specimens
- Health office staff already very overworked
- Unfamiliar with Sofia
- Covid Connect (state reporting system) difficulties
- Figuring out how to work with vendor
04

Lessons learned
Implications for the continuation of in-school testing
Lessons learned

- School health offices will readily use rapid antigen testing
- Rapid tests were relatively easy to perform
- Reporting into state system was cumbersome
- Good utilization across the age range and across schools
- High acceptability from health office staff
- Low rate of invalid tests (<1%)
- Moderate levels of SARS-CoV-2 detected (8.4%)
- Good Comparability with county-wide testing
- Parents appreciated the convenience and no cost
Acknowledgements

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Questions?

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