BLUEPRINT FOR COMMUNITY COVID-19 TESTING

A guide to policies, procedures, and methods based on Healthy Davis Together's experience in Davis, CA

HEALTHY DAVIS TOGETHER

Davis California

UC DAVIS
UNIVERSITY OF CALIFORNIA

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BLUEPRINT OVERVIEW

This guide is designed to help healthcare providers, local government/public health officials, college/university public health departments, and business associations develop and implement plans for COVID-19 testing. As communities look forward to ongoing COVID-19 prevention plans through the end of 2021, regular testing remains a critical piece in controlling transmission through rapid identification and isolation of infected individuals. To enable regular testing, a community must be deliberate in removing barriers, such as accessibility, cost, safety, and predictability.

The purpose of this guide is to offer a community blueprint for standing-up a COVID-19 testing program based on Healthy Davis Together's experiences in Davis, California. Healthy Davis Together (HDT) is a joint project between the City of Davis and the University of California, Davis, that aims to control and prevent the spread of COVID-19 and facilitate a coordinated and gradual return to regular city activities. HDT is one of our many successful initiatives helping to combat this public health crisis across the country, and through sharing its learnings, we hope to be a resource for others in their local responses.

In this blueprint, HDT details our learnings—including steps, key considerations, and timing where appropriate—for widespread community testing. Whether or not testing operations exist through local healthcare providers or other not-for-profits currently, this guide will inform community-wide testing strategy and planning. If you're interested in learning more about **Healthy Davis Together** and/or our experiences related to testing, please contact Ken Burtis (**kcburtis@ucdavis.edu**) and Sheri Belafsky (**srbelafsky@ucdavis.edu**).

HDT COVID-19 TESTING OVERVIEW

Cited by **The New York Times** as one of the most ambitious COVID-19 response programs in the country, HDT developed and implemented a community-wide free testing program for both asymptomatic and symptomatic individuals. This is available to all ~70K Davis residents and hundreds of nonresidents who work in Davis along with members of their households. Asymptomatic tests are saliva-based and allow for results to be reported within 24-48 hours, while symptomatic results use an anterior nasal swab and provide results within 15 minutes. Tests are administered across the city of Davis at four community testing sites, two UC Davis campus testing sites, two mobile testing vans, and 13 K-12 school testing sites, allowing HDT to reach each of our priority testing cohorts.

Based on HDT's testing experience, we recommend the following:

- A minimum once per week asymptomatic testing model, which takes into account the latest stage of the pandemic, latest research, and rate of positive cases within the county/state, and an individual's risk level
- The use of rapid testing for symptomatic testers and for those with limited access to testing locations
- A PCR test with return of results in less than 36 hours, and a PCR or rapid antigen test that is able to measure infectiousness (Ct of 30 or lower) with results under 30 minutes
- Targeted testing locations that prioritize access and convenience across various population types
- A mix of brick and mortar, semi-permanent, mobile van, courier, at-home, and drive-through testing modalities to allow for optimal use of resources to reach diverse populations with different needs

HOW DO YOU STAND-UP A SAMPLE COLLECTION OPERATION?

Based on HDT's experience and model, we recommend the following steps to stand up a cohesive community-wide COVID-19 testing program:

1. Determine the overall goals for the testing program

Testing programs should have a clear target so that an appropriate support model can be developed. At a minimum, your goals should include desired testing frequency, percentage of population reached, test sensitivity/specificity, and turnaround time for results. In HDT's model, we initially sought to deploy a twice per week asymptomatic testing program which allowed for 90%+ test sensitivity/specificity and most results within 24 hours; in the end, a once per week model was the main one used, which still led to very low rates of COVID-19 infection in the community. Another key principle was to identify and address barriers to testing for special populations, including those with disabilities, income disparities, or other social determinants of health so that testing could be performed at a similar rate. This allowed HDT to achieve our broader program goals of sustaining a positivity rate of under 3% and reproduction number under one.

Feasible testing goals should be developed in line with your resource levels, community demographics, and transmission rate in your area. Goals should be translated into concrete metrics that can be tracked over time and supplemented with other qualitative/quantitative data (e.g. community surveys). If resources are an impediment to more ambitious testing goals, consider partnering with community organizations in your municipality, county, or state.

2. Identify a commercial lab to process test samples and a method to transport samples

To process testing samples collected on-site, communities will need to partner with a CLIA-certified commercial lab. Look for commercial labs in your area that meet your community's needs in terms of the number of total tests they can analyze (and how it compares to your expected sample volume), their turnaround times, sample transportation, and technology needed to report results.

Samples collected at testing sites will need to be transported to the identified lab partner for processing. A staff member from each of the testing sites can drop off the samples, the lab partner might be able to pick up the samples, a third-party (e.g., a shipping/delivery company) could be contracted to transport the samples each day, or your community can create a courier model in which there is one designated van that collects all samples at the end of the day and delivers them to the lab.

HDT uses a homegrown courier model for a variety of testing sites. The courier picks up samples from various testing sites at the end of the day and transports them to UC Davis's Genome Center for reprocessing.

3. Build the technology infrastructure to support testing operations

For purposes of efficiency, scaling, and managing private medical information, it is essential to have a secure electronic medical record (EMR) system in place that can be used for COVID-19 clinical testing. HDT uses the Point and Click Solutions EMR for test scheduling and results administration and has implemented access to the same solution for each of our community testing sites. Results are reported within 24 hours via HDT's Point and Click electronic medical records infrastructure. HDT's clinical team reviews all records and directly contacts any individual who tests positive to provide them instructions on how to isolate and seek further testing, as well as to begin contact tracing.

To manage these clinical lab results, HDT built an interface to connect the Point and Click instance to the UC Davis mass-testing laboratory system. It also created a linkage to CalREDIE, California's public health reporting system, to ensure cases were communicated promptly and accurately per state requirements. Both required dedicated data reporting integration capabilities and ongoing staff reporting support. If your community does not have the budget or team to do something similar, you would need to develop a manual workflow to allow for results reporting to various stakeholders.

4. Segment the population into priority testing cohorts

Based on the make-up of your community, different populations will have different needs to allow for testing access and convenience. By clearly defining your priority cohorts ahead of creating your plan for testing operations, your strategy can be tailored to each population's needs.

HDT segmented the Davis population into four priority testing cohorts – adults 18+, university students/staff, K-12 students/staff, and special populations (based on income, ability status, and race/ethnicity) – and developed targeted strategies for each:

Priority Cohort	Primary Testing Strategy
Adults 18+	Stand-up brick and mortar testing sites where a majority of Davis residents reside, and raise awareness of the availability of free and convenient testing through mass communications
University Students/Staff	Stand-up brick and mortar testing sites on campus, and issue a testing mandate[1] for those living on or attending class on campus, or coming onto campus to work
K-12 Students/Staff	Stand-up semi-permanent, outdoor testing sites at school sites, and engage with parent and teacher groups to support and promote testing
Special Populations	Deploy mobile testing vans to community locations that support underserved populations, and provide incentives to encourage turnout at those locations

1. Before issuing such a mandate, stay up to date with latest national guidelines from the Equal Employment Opportunity Commission, state/county public health departments, and/or private legal experts.

5. Select test types and collection methods

There are two broad categories of tests that detect active infection: PCR and rapid antigen tests. PCR tests represent the "gold standard" as they are highly sensitive, i.e. to the ability to detect positive cases; however, they do require 24 hours on average to determine a result. Rapid antigen tests provide immediate results (within 15-30 minutes). They are somewhat less sensitive than PCR tests and have a lower price point.

A good first step is to determine whether your tests will be used for screening; i.e., frequent asymptomatic testing, or to assess symptomatic individuals and close contacts of those infected. Use cases can be further refined using various test attributes, such as the level of specificity (i.e. the ability to detect negative cases), sample collection method (e.g. saliva-based), clinical requirements, and costs. For example, a low-cost, at-home test may allow for broad deployment to special populations if they do not have access to a community testing site.

For our screening operation, HDT deployed a custom saliva-based PCR test, which is highly sensitive at 95% and allows for return of results in less than 24 hours. This was deployed daily with the guidance to test twice per week as recommended by the **Rockefeller Foundation** to slow the spread of COVID-19. In parallel, HDT deployed Abbott's BinaxNOW antigen test to identify symptomatic individuals within 20 minutes.

6. Determine testing site locations and modalities

Once you have defined your priority testing cohorts, you can determine which testing locations best provide access and convenience. Consider testing locations near where your priority testing cohorts reside and/or at existing places where they frequent on a daily/weekly basis, such as schools, health centers, or other community buildings. Also, consider likely modes of transportation, such as walking, public transportation, and available parking. HDT arranged no cost parking at each site to avoid a possible barrier to participation.

Once you have identified locations, consider the modality to test at each as outlined below. Note that your strategy may require multiple modalities to reach your priority testing cohorts.

Testing Modality	Description	Value Proposition
Brick and Mortar	Centrally located permanent testing site to conduct large-scale testing	High volume, general community testing
Semi-Permanent	Semi-permanent, pop-up site to support outdoor testing	High volume testing for high trafficked locations that do not have the space for a full-time brick and mortar site
Mobile Testing Van	Mobile, small-to-medium scale pop-up testing site	Ideal for testing in under-tested geographies or populations with high positivity rates and limited testing capacity
Courier	Shuttle service to drop off and pick up tests at testing sites	Flexible testing, ideal for in-house testing, long term care and congregate living facilities
Drive-Through	Parking lot site with car lanes to allow for drive-up sample collection	Quick testing for time-constrained individuals or those extra cautious of leaving home
At-Home	Testing kits provided to individual to collect his/her own sample and analyze it remotely using smartphone	Convenient option for employees, students, and those with limited access to a community testing site

For indoor testing, ensure good ventilation by getting a professional assessment of the building's HVAC system. The space should have sufficient air changes per hour (at least 4), access to 100% outside air if possible, and be tested to avoid "dead air spaces" where virus-containing aerosols could linger. For outdoor testing, make a back-up plan for inclement weather. For both indoor and outdoor testing, estimate total space required by considering supply storage, queuing space, an admin/break area, and social distancing for all staff and individuals being tested (space calculator found **here**). Amenities for staff such as break spaces should also be considered in the space planning.

7. Model the testing process and related staffing needs

Mapping out the testing process from the perspective of the individual being tested is critical in enabling an efficiently run operation. HDT followed a similar process that accommodates appointments and walk-ins across each of our testing modalities:

The individual enters a queue line with directional signage, a clear flow route, and social distancing markers.

↓

Greeters confirm that the individual is not symptomatic and has had no known recent exposures.

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A check-in/registration attendant looks up the individual in the testing system to ensure they are registered and has filled out all necessary waivers.

↓

If not registered, the check-in/registration attendant will refer them to a designated technology expert on the team to complete registration.

↓

Once the individual is checked-in, the check-in/registration attendant assigns them to a sample collection station (or waiting area if walk-in).

↓

The sample collector explains the testing process, collects the sample, and places the specimen into a tube collection rack (process defined in Appendix D).

↓

The sample collector reminds the individual of how/when results will be communicated before guiding them to the exit.

Test type, length of test, hours of operation, and desired throughput will impact how many staff are required for each testing site. The number of sample collection stations should be directly related to your desired throughput, e.g. at approximately five minutes per test, four sample collection stations are needed to perform 100 tests over an eight-hour period. See **Appendix B** for a complete list of staffing needs to support the above process and support broader testing operations.

8. Determine equipment and supply needs

Apart from a simple courier model, each community testing modality requires IT equipment, sample collection and test kits, office supplies, cleaning products, other site equipment, and PPE. If using a mobile testing team, consider purchasing IT equipment for each team as opposed to each site to reduce costs. Non-IT equipment, such as cleaning products and other site equipment, may remain on site in storage for daily set-up.

Your specific set-up will depend on your expected volume, available space, and desired throughput, which should be used to estimate the amount of supplies you will need. Outdoor testing sites will require additional materials (e.g., tents), whereas indoor sites can use fewer supplies. Note that certain items are in high demand (e.g., PPE), and thus more prone to stock limitations, so it is important to establish strong supplier partnerships. See **Appendix A** for a list of supplies and equipment needed for testing.

9. Launch testing site and related communications

It is important that all staff members receive adequate training, especially those that do not have prior clinical

experience. Consider training staff on a broad array of testing site functions to allow for scheduling flexibility. Additionally, each staff member should have a strong understanding of all HIPAA-related requirements as to avoid potential breaches in tester confidentiality. Once the testing team is trained, consider conducting a dry-run or pilot at a limited capacity in advance of your official testing site launch date.

Promotion of the testing site should begin at least three to four weeks prior to the official launch date. Prepare a simple launch plan that includes: testing site details (e.g. hours of operations, appointment instructions/links), communication materials (talking points about the testing program and why testing is important), Frequently Asked Questions, marketing materials (e.g. flyers, poster, newsletter copy, email copy), social media strategy (content and channels) and an earned media strategy and materials (e.g. press release to announce site, identify media outlets/reporters, secure spokespeople for interviews). Inform and engage local leaders from across the community as well as county officials so they are aware of the testing site and can help to promote it. Consider preparing an easy-to-use communications "toolkit" with key messages, template materials and social media graphics that community leaders and organizations can use to promote the testing site through their communication channels. HDT partnered with the City of Davis and UC Davis's communications team on similar testing site communications, including targeted advertising. Communications consistently reinforced the importance of regular testing. In a bi-monthly tracking survey, the number of Davis residents who reported having been tested one or more times rose from 30% in September 2020 to 73% in March 2021. See **Appendix E** for sample communications HDT shared through earned and paid media, to encourage regular testing.

RESULTS TO DATE

Davis has had success in limiting the spread of COVID-19 in the community, with a sustained positivity rate of less than 1% since mid-February. As of April 24, 2021, Yolo County had performed the most tests per capita of California's 58 counties, as the county quadrupled the state's median at more than 1,200 daily tests per 100,000 residents. No other county was above 900, according to the weekly California Department of Health update.

HDT was able to maintain a near 24-hour results turnaround time since the launch of our testing and has continued to test new individuals each month. Key success stories include: sustained UC Davis student testing at close to 100% of students, an increase over time of community members who reported getting tested multiple times, and the identification of eight positive cases over the first three weeks of Davis public school testing which triggered outbreak prevention protocols.

LESSONS LEARNED

The following are additional considerations to keep in mind:

- It is important to reevaluate your testing strategy every four to six weeks to align your frequency with the stage of the pandemic and incorporate any new technologies that may make testing easier and/or more effective.
- The frequency of asymptomatic screening should be determined in tandem with symptomatic testing in order to obtain a holistic view of community infection.
- A flexible staffing model where staff are trained across a variety of positions will allow you to reassign staff across testing sites based on scheduling gaps and testing demand.
- Local testing locations, such as a school, may be more approachable and appealing than big, mass testing centers for parents and children alike.
- Standing up of testing sites alone may not drive frequent testing. Where mandating is not an option, health education and communications are necessary to convey the benefits of consistent testing.
- Outreach should be sent by trusted messengers and tailored to population types based on their media preferences and paired with incentives where necessary.

APPENDIX A
Sample Site Equipment and Supplies Checklist | Asymptomatic Screening

Items	Quantity Needed
IT EQUIPMENT	
Tablets and/or laptops and chargers	2 per mobile team
Internet hotspots	1 per mobile team
Extension cords and surge protectors	2 per mobile team
Barcode scanner	1-2 per mobile team
SAMPLE COLLECTION AND TEST KITS	
Pipetter	1 per test
Collection kits (e.g., swabs/test tubes)	1 per test
Labels for test tubes/bags	1 per test
OFFICE SUPPLIES	
Clipboards, pens, and permanent markers	1 per staff member
Information pamphlets about test procedures	1 per test
Name tags or identifying clothing / accessories for staff	1 per staff member

Items	Quantity Needed
CLEANING PRODUCTS	
Hand sanitizer	5 per site/week
Trash bins	5 per site
Cleaning products (e.g., disinfectant, paper towels)	1 per site/week
OTHER SITE EQUIPMENT	
Signage (includes social distancing markers)	15 per site
Pop-up tents (outdoor only)	3 per site*
Tables	6 per site
Chairs	5 per site
Cones/stanchions for line delineation	10 per site
Plexiglass barriers	5 per site
Securable storage containers for PPE and other supplies	10 per site
Space heaters, fans, or air filters	2 per site
Tube collection racks	5 per site
Trash bins and bags designated for hazardous waste	5 per site
Cooler/ice packs for sample refrigeration	1 per site
PPE	
N95 masks for test administrators	1 per staff member/day
Disposable gloves of various sizes	1 per staff member/day
Disposable isolation gowns	1 per staff member/day
Face shields or eye protection	2 per staff member/day

Sample Site Equipment and Supplies Checklist | Point of Care Testing Station, specific to BinaxNOW

Items	Quantity Needed
SAMPLE COLLECTION AND TEST KITS	
BinaxNOW test kits	Dependent on population and use cases
Medical sharps containers (or Biohazard bags)	5 per site
OFFICE SUPPLIES	
Clipboards, pens, and permanent markers	1 per staff member
Information pamphlets about test procedures	1 per test
Name tags or identifying clothing / accessories for staff	1 per staff member
CLEANING PRODUCTS	
Hand sanitizer stands	1-2 per site
Trash bins	1-2 per site
Cleaning products (e.g., disinfectant, paper towels)	1 week's worth per site
OTHER SITE EQUIPMENT	
Trays (for BinaxNOW Ag Card when test is being performed)	1-2 per site
Manual Timers	2-3 per site
PPE	
N95 masks for test administrators	1 per staff member/day
Disposable gloves of various sizes	1 per staff member/day
Disposable isolation gowns	1 per staff member/day
Face shields or eye protection	2 per staff member/day

APPENDIX B
Sample Staffing Needs

Site Roles	Description	Number Needed[1]
CORE TESTING TEAM		
Site Supervisor	Manage site operations to ensure individuals are being tested within the defined process and cadence	1 per site
Greeter	Welcome testers, direct entrance traffic, and prepare for check-in/ registration	2 per site
Check-in/ Registration Attendant	Check-in testers and support registration, including completion of necessary waivers	2 per site
Technology Expert	Troubleshoot any issues that arise with using any testing related systems	2 per site
Sample Collector[2]	For molecular tests: collect and store sample for transport to commercial lab; for antigen tests: collect and analyze sample and report results	11 per site

1. Assumes staffing figures for one brick and mortar community testing site that can collect up to 1,000 samples over an eight-hour period,
2. May require clinical experience based on test type

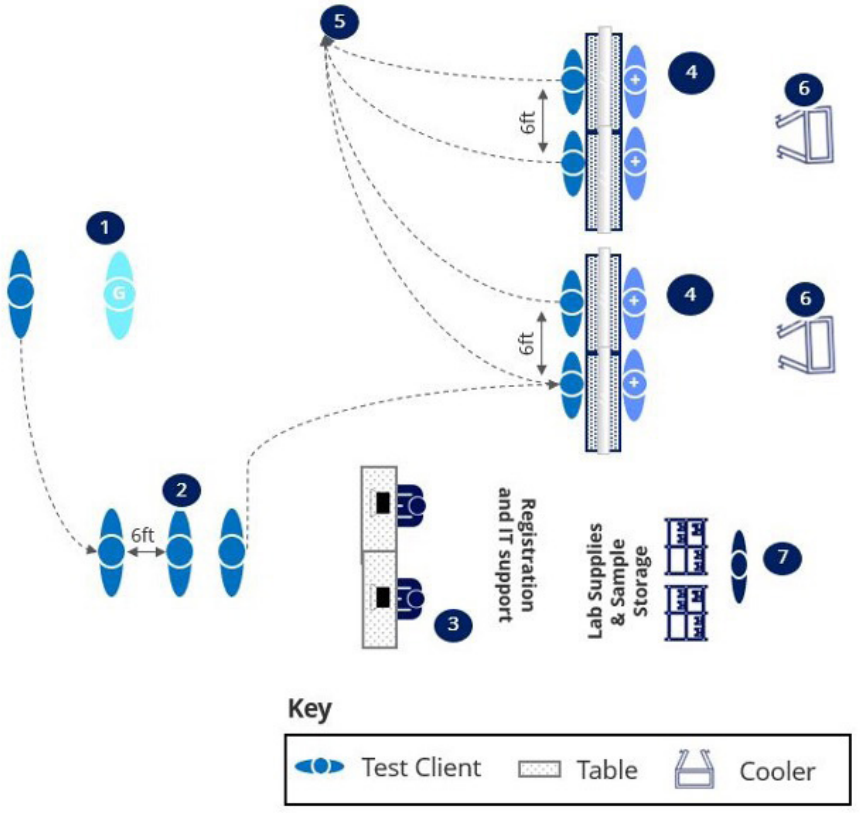
Site Roles	Description	Number Needed
ADMINISTRATIVE SUPPORT		
Site Stand-Up Lead	Scout and secure site locations, ensure site accessibility, and align set-up to state and county guideline	1 per site
Procurement Specialist	Purchase equipment/supplies and manage stock through developing supplier relationships	1 per site
Human Resources Representative	Recruit, screen, and hire site staff and conduct related tracking and monitoring	1 per site
Courier Personnel	Transport supplies to/between sites from stockpile and testing samples to the commercial lab	1 per site
Communications and Marketing Specialist	Design and produce signage, promote locations and scheduling availability, and monitor for tester feedback	1 per site
Security Guard	Patrol property and/or monitor surveillance equipment to maintain security of personnel and equipment	1 per site

APPENDIX C
Brick and Mortar Testing Site Overview

The following shows an example walk-up layout and subject journey[1]

1. (Optional) Individual schedules appointment to be tested and is assigned a time slot
2. Individual arrives at the testing site at scheduled time slot (or walk-in without appointment) and is asked screening questions by greeter before lining up
3. Individual lines up and waits for his/her turn to check in
4. Check-in/registration personnel validates tester ID, provide 'boat' of testing materials, and assigns individual to sample collection booth
5. Sample collector walks individual through sample collection process (see **Appendix D**)
6. Sample collector externally decontaminates the tube and places in a collection rack for delivery to the commercial lab
7. Subject follows directional signage to designated exitSamples are batched and shipped via courier to the lab

1. This information is meant to be a general guideline, but it is not intended to be medical or clinical advice; the licensed Provider Partner operating the sample collection site will provide all clinical and medical standard of care decisions.



APPENDIX D

Sample Collection Process

Saliva samples are collected as follows:

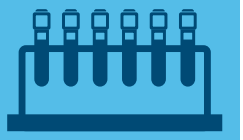
1. One member of the collection staff is available to observe and provide oral assistance in the collection process and ensures that a correct amount of saliva has been collected.

2. Subject is provided with a 0.9 ml bar coded tube and a tapered plastic pipet.

3. Subject is given a small aliquot of water (~0.7 ml) to swish around the mouth.

4. Subject gently expels liquid from the mouth through the pipet into the 0.9 ml tube and replaces the tube cap.

5. Sample collector externally decontamintates the tube and places in a collection rack for delivery to the commercial lab.



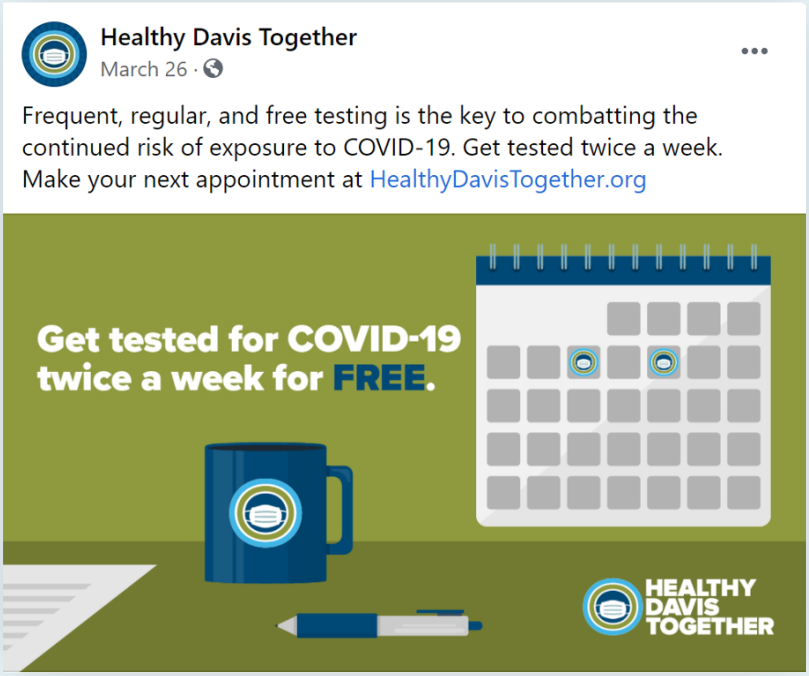
APPENDIX E

Healthy Davis Together messaging about COVID-19 testing was shared via organic social media, earned media, and paid advertising (on TV, out-of-home, print, social media, and digital) with people who lived or worked in Davis, with the goal to promote the HDT community testing program and availability of quick, painless, and free testing. Specifically, messages urged people to get tested once to twice a week. Once vaccination became more prevalent, communications also emphasized the importance of continuing to get tested for COVID-19 even after being vaccinated.

Sample creative below demonstrates key themes that we learned, through regular focus group and survey research, were important to convey:

1. The importance of frequent testing (at least 2x week)
2. Testing is quick, painless, and free
3. Testing is a way to protect the people you care about
4. Symptom-free doesn't mean COVID-free
5. Regular testing is a way to reclaim the moments we miss

Frequent Testing



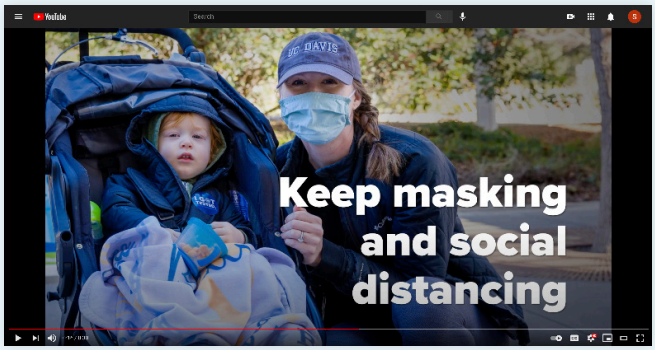
Quick, painless and free

Protect the people you care about

https://www.youtube.com/watch?v=MJTSUIx43e8

Symptom-free doesn't mean COVID-free

Get back to the moments you miss



https://www.youtube.com/watch?v=T9TFITwI7a0

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