Establishment and Evaluation of a Large Contact-Tracing and Case Investigation Virtual Training Academy

Olivia Golston, MPH, Michael Prelip, DPA, MPH, Debbie Bain Brickley, DrPH, MPH, Anne Cass, MPH, Lisa Chen, MD, Alina Dorian, PhD, Alice Gandelman, MPH, Chris Keh, MD, Andrew Maher, MPH, Roger Myrick, PhD, MA, Michael J. A. Reid, MD, MA, MPH, Karen White, MBA, MPH, Rachel Willard-Grace, MPH, and Shira Shafir, PhD, MPH

During the COVID-19 pandemic, the Virtual Training Academy (VTA) was established to rapidly develop a contact-tracing workforce for California. Through June 2021, more than 10 000 trainees enrolled in a contact-tracing or case investigation course at the VTA. To evaluate program effectiveness, we analyzed trainee pre- and postassessment results using the Wilcoxon signed-rank test. There was a statistically significant ($P < .001$) improvement in knowledge and self-perceived skills after course completion, indicating success in training a competent contact-tracing workforce. (*Am J Public Health*. 2021;111(11): 1934–1938. https://doi.org/10.2105/AJPH.2021.306468)

Early in the COVID-19 pandemic, contact tracing and case investigation were identified as key strategies to help decrease the spread of disease. To support this public health need, it was necessary to rapidly build a workforce of contact tracers (CTs) and case investigators (CIs).

INTERVENTION

The goal of the Virtual Training Academy (VTA) is to train a skilled workforce of CTs and CIs to effectively combat the spread of COVID-19 in the state of California.

PLACE AND TIME

The VTA offered its first course in May 2020 and has held 35 weeks of introductory CT and CI training as of June 2021. Because the VTA is a virtual

training program, trainees and staff participate remotely.

PERSON

VTA trainees are prospective CTs and CIs. Although some are public health professionals, many are local or state government staff who have been redirected to support California's contact-tracing efforts during the pandemic. Most trainees have a non–health career background (Table A, available as a supplement to the online version of this article at http://www.ajph.org). VTA participants came from 56 of California's 61 local health jurisdictions and more than 100 different state departments.

PURPOSE

After he issued the March 19, 2020, stay-at-home order in California,[1] Governor

Gavin Newsom required statewide expansion of contact-tracing capacity to proceed with staged reopening.[2] The workforce is composed of two complementary roles. CIs contact individuals who have tested positive for COVID-19, provide instructions and resources for isolation, and elicit a list of contacts who may have been exposed to the virus.[3] CTs then reach out to the identified contacts and instruct them to quarantine to prevent further disease transmission.[3] With a population of nearly 40 million,[4] California requires a large workforce of CTs and CIs to help contain outbreaks early at a local level. This need for rapid workforce development led to the establishment of the VTA.

IMPLEMENTATION

The VTA is implemented by subject matter experts from the University of

California, San Francisco and the University of California, Los Angeles in partnership with the California Department of Public Health. The flagship program of the VTA is a week-long introductory CT and CI training course, which the California Department of Public Health promotes to California's local health jurisdictions. Originally, trainees could enroll in either a 14-hour CT track or an 18-hour CI track, depending on their anticipated job assignment. Both tracks covered the same core information,

with the CI track including additional information critical for the case investigation role. Given the demand for CIs throughout the state, the CT-only course was discontinued in December 2020.

During the course, trainees attend live didactic webinars covering topics that include the epidemiology of COVID-19, interviewing techniques, determining quarantine and isolation dates, and socioeconomic and racial disparities in COVID-19 cases and

deaths (Figure 1).[5] Case reporting is covered briefly, although more in-depth training is provided outside the VTA through other trainings.

The VTA places a strong emphasis on active learning and skill building. Thus, to complement the webinars, all trainees participate in three hours (CT course) or six hours (CI course) of "skills lab" sessions. The skills labs are held in virtual breakout rooms and allow trainees to role-play interviews and discuss challenging scenarios with a small

Topic	CT Course	CI Course	Corresponding Knowledge Questions	Corresponding Self-Assessment Questions
Epidemiology of COVID-19	☑	☑	K1, K2	S1, S2, S3
Overview of CT/CI roles, responsibilities, and confidentiality	☑	☑	K3, K4, K5	S4, S5, S6
Principles of Containment	☑	☑	K7, K8	
Determining quarantine dates	☑	☑	K6	S7
Determining isolation dates		☑	K17	S12
Conducting a CT Interview	☑	☑	K9, K10	S8
Interviewing Skills & Building Rapport	☑	☑	K11, K12	S9
Conducting a CI Interview		☑	K16	S13, S14
Health Coaching Techniques	☑	☑	K13, K14	S11 (CT) or S15 (CI)
Cultural Humility	☑	☑	K15	S10

FIGURE 1— **Overview of Virtual Training Academy Contact Tracing and Case Investigation Course Topics**

Note. CI = case investigator; CT = contact tracer. See Tables B and D (available as supplements to the online version of this article at http://www.ajph.org) for specific knowledge check and self-assessment items.

group of peers under the guidance of trained course facilitators. The sessions are designed to develop skills and to raise trainee confidence. Optional skills labs are also offered, including a session to practice conducting interviews in Spanish.

To supplement synchronous course components, the course Web page offers resources to support trainees. Webinar recordings, presentation slides, and handouts are posted for trainees to review. Additionally, demonstration videos for the state's main case investigation and contact-tracing data management platform are provided.

EVALUATION

It is vital to California's COVID-19 response that the VTA successfully prepare trainees for the job. To evaluate this, pre- and postcourse assessments are administered.

The "knowledge check" contains true/false and multiple-choice questions that measure understanding of key course concepts (Figure 1; Table B, available as a supplement to the online version of this article at http://www.ajph.org). Those passing the postcourse knowledge check within two tries are eligible to begin work as a CT or CI.

The skills "self-assessment" measures self-perceived ability to perform key job skills (Figure 1; Table D, available as a supplement to the online version of this article at http://www.ajph.org). Self-perceived ability to perform each skill is rated on a scale from 1 (not at all) to 5 (very well). The ratings on all items are averaged to obtain a composite score of self-perceived skills for each trainee before and after the course.

We analyzed assessment results from the weeks of June 29, 2020 to March 22, 2021, during which time

1445 unique trainees completed the CT course and 3352 unique trainees completed the CI course. We did not include previous cohorts, as assessment instruments were not yet finalized. We included only trainees who completed all questions on both the pre- and postassessment in the analysis for that assessment so that the individual-level change in performance could be measured. We used a one-tailed Wilcoxon signed-rank test and found that the improvement in performance on the knowledge check was statistically significant ($P < .001$) for the CT and CI tracks, as well as for the subset of trainees with non–health career backgrounds in each track. A majority of trainees (76.9% in the CT track and 72.6% in the CI track) received a perfect score or missed only one question on the postcourse knowledge check, compared with 25.8% and 18.5% on the respective preassessments. The improvement in performance on the self-assessment was also statistically significant ($P < .001$) for both tracks and for the trainees who reported non–health career backgrounds. Overall results are shown in Table 1, and question-level results are shown in Tables C and D (available as supplements to the online version of this article at http://www.ajph.org).

These results indicate that VTA trainees left the VTA with a strong foundation in the knowledge required to be a CT or CI. Furthermore, they greatly improved their self-perceived ability to perform key job skills. The significant improvements extended to trainees without a health-related career background, who had lower mean precourse scores than the other trainees but showed a larger percentage improvement. These results point to the effectiveness of the VTA at training

participants, regardless of career background.

ADVERSE EFFECTS

No adverse effects of the training program are known.

SUSTAINABILITY

Once an online training platform is established, courses can be deployed to fill gaps in the public health workforce and respond to emerging challenges. At the VTA, course offerings have evolved in response to the changing needs of health departments, with newer programs including specialized training courses for staff who are designated to assist schools with reopening or to manage outbreaks in congregate settings. The VTA has also recently launched a vaccine communication course intended to provide CTs and CIs with the skills necessary to address vaccine hesitancy. Although the frequency of program delivery may decline after the pandemic eases, virtual programs such as the VTA can be a centralized and sustainable way to train an effective public health workforce.

PUBLIC HEALTH SIGNIFICANCE

Based on these results, the VTA has succeeded in its goal of quickly and effectively training CTs and CIs who have a strong foundation in the knowledge and skills required for the job and will help to protect public health by reducing the spread of COVID-19.

Even once in-person trainings can safely resume, there are benefits to virtual training programs, including the ability to simultaneously train workforces in multiple geographic locations

TABLE 1— Summary of Assessment Results by Course Track and Career Background

	No.	Mean (Pre)	Mean (Post)	% Change	P
Knowledge check					
Contact tracing					
Overall	1404	12.17	14.03	15.4	<.001
Nonhealth	1054	12.03	13.98	16.2	<.001
Health	336	12.58	14.18	12.7	<.001
Case investigation					
Overall	3262	13.90	15.92	14.6	<.001
Nonhealth	1930	13.70	15.86	15.7	<.001
Health	1230	14.20	16.04	12.9	<.001
Self-assessment					
Contact tracing					
Overall	1327	3.19	4.33	35.6	<.001
Nonhealth	991	3.10	4.25	37.3	<.001
Health	321	3.48	4.56	31.2	<.001
Case investigation					
Overall	3079	3.33	4.45	33.9	<.001
Nonhealth	1827	3.24	4.40	35.9	<.001
Health	1157	3.46	4.54	31.3	<.001

Note. Analyses include trainees who answered all questions on the pre- and postassessment between June 29, 2020 and March 22, 2021. Knowledge check scores are out of 15 for the contact-tracing (CT) course and are out of 17 for the case investigation (CI) course. The self-assessment score is out of 5 for both tracks and is the average of 11 (CT) or 14 (CI) questions. See Tables B and D (available as supplements to the online version of this article at http://www.ajph.org) for specific questions. *P* values were obtained using a 1-tailed Wilcoxon signed-rank test comparing paired pre- and postassessment scores. "Overall" results contain all trainees. "Nonhealth" results include only the subset of trainees who indicate a "nonpublic health-related" pre–COVID-19 job classification, whereas "health" results include the subset of trainees who indicated having a pre–COVID-19 job as a disease investigator, in public health, or in an allied health field. Occasionally, trainees did not have career information available so are only included in the overall analysis; this applies to 14 trainees for the CT knowledge check, 15 for the CT self-assessment analysis, 102 for the CI knowledge check, and 95 for the CI self-assessment.

without requiring travel and to share lessons learned across local health jurisdictions. The success of the VTA should encourage the further development and use of online training programs, both during the COVID-19 pandemic and for future public health needs that arise. AJPH

ABOUT THE AUTHORS

Olivia Golston is with the Fielding School of Public Health, University of California, Los Angeles. Michael Prelip, Alina Dorian, and Shira Shafir are with the Department of Community Health Sciences, Fielding School of Public Health. Debbie Bain Brickley, Andrew Maher, Michael J. A. Reid, and Karen White are with the UCSF Pandemic Initiative for Equity and Action, University of California, San Francisco. Anne Cass is with the Center for Infectious Diseases, California Department of Public Health, San Diego. Lisa Chen is with the Curry International Tuberculosis Center, University of California, San Francisco. Alice Gandelman is with the California Prevention Training Center, University of California, San Francisco. Chris Keh is with the Center for Infectious Diseases, California Department of Public Health, Richmond. Roger Myrick is with the Institute of Global Health Sciences, University of California, San Francisco. Rachel Willard-Grace is with the Center for Excellence in Primary Care, Department of Family and Community Medicine, University of California, San Francisco.

CORRESPONDENCE

Correspondence should be sent to Olivia Golston, Fielding School of Public Health, Department of Community Health Sciences, 650 Charles E. Young Dr South, 36-071 CHS, Box 951772, Los Angeles, CA 90095-1772 (e-mail: olivia.golston@ucla.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

CONTRIBUTORS

O. Golston conducted the statistical analysis and drafted the article. O. Golston, M. Prelip, A. Cass, A. Dorian, R. Myrick, M. Reid, K. White, and S. Shafir conceptualized the analysis. M. Prelip, A. Cass, C. Keh, M. Reid, and S. Shafir reviewed and revised the article. D. B. Brickley, L. Chen, A. Gandelman, A. Maher, and R. Willard-Grace designed the Virtual Training Academy training program. All authors approved the final version of the article.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.
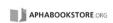
HUMAN PARTICIPANT PROTECTION

The University of California, Los Angeles, Office of Human Research Protection Program determined that this project did not meet the definition of human participants research, so did not require institutional review board approval.

REFERENCES

1. Office of Governor Gavin Newsom. Governor Gavin Newsom issues stay at home order. March 19, 2020. Available at: https://www.gov.ca.gov/2020/03/19/governor-gavin-newsom-issues-stay-at-home-order. Accessed October 22, 2020.

2. Office of Governor Gavin Newsom. Governor Newsom provides update on California's pandemic resilience roadmap. April 28, 2020. Available at: https://www.gov.ca.gov/2020/04/28/governor-newsom-provides-update-on-californias-pandemic-resilience-roadmap. Accessed February 20, 2021.

3. Centers for Disease Control and Prevention. Case investigation and contact tracing: part of a multi-pronged approach to fight the COVID-19 pandemic. October 21, 2020. Available at: https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html. Accessed October 22, 2020.

4. US Census Bureau. 2019 American Community Survey 1-Year Estimates, Table DP05. Available at: https://data.census.gov/cedsci/table?g=0400000US06&tid=ACSDP1Y2019.DP05. Accessed October 22, 2020.

5. Tai DBG, Shah A, Doubeni CA, Sia IG, Wieland ML. The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clin Infect Dis.* 2021;72(4):703–706. https://doi.org/10.1093/cid/ciaa815