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Using Grand Rounds to Train and Prepare a Local Public Health Workforce To Manage COVID-19 Outbreaks During the 2020–2021 Pandemic Winter Upsurge

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In response to the coronavirus disease 2019 (COVID-19) pandemic, the Los Angeles County Department of Public Health (DPH) expanded its workforce by >250 staff during Fall 2020 to manage the expected volume of outbreaks, which ultimately peaked. The workforce included reorganized groups of physicians, nurses, outbreak investigators from several DPH programs, and a 100+ member data science team tasked with designing and operating a data system and information flow process that became the backbone infrastructure of support for field investigation and outbreak management in real-time. The accelerated workforce expansion was completed in 3 months. To prepare new and reassigned permanent staff for fieldwork, DPH and several faculty from the Emory University Rollins School of Public Health adopted a flexible, skills-based series of medical Grand Rounds. These 16 sessions were grounded in practice- and problem-based learning principles using case studies, interactive scenarios, and didactic presentations based on scientific and public health practice information to teach knowledge and skills that were needed to manage COVID-19 outbreaks in different sectors. The evaluation suggests positive experience with the training series as well as impact on job performance.

Keywords: COVID-19; outbreak management; public health workforce; training; Grand Rounds

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BACKGROUND

Los Angeles County (LAC) is the most populous county in the United States (US Census-LA, 2020). Its population of 10 million is larger than 42 other states and nearly twice that of Cook County, Illinois, the second largest county in the country (US Census-CC, 2020). The Los Angeles County Department of Public Health (DPH) oversees public health services for Los Angeles County. Prior to the pandemic, the Department, like other local health departments across the country, was understaffed and underfunded, which did not allow for adequate planning to mitigate a large global emergency like the coronavirus disease 2019 (COVID-19) pandemic (National Association of County and City Health Officials, 2019). In the wake of this pandemic, the Department had to expand its capacity quickly to manage the escalating outbreaks in the community while simultaneously developing plans to address these outbreaks. As one of the co-directors of the Outbreak Management Branch (OMB) stated, "we were building the ship as we were sailing it" (personal communication, 2021). The daily number of COVID-19 infections in Los Angeles County exceeded 20,000 by December 2020 (Los Angeles County Department of Public Health COVID-19 Dashboard [DPH Dashboard], 2020). DPH added more than 250 contracted workers, including more than 100 data monitors and epidemiologists to a data science team, all in a 3-month period during Fall 2020. COVID-19 outbreaks occurred in multiple sectors during the pandemic—health care, skilled nursing facilities (SNFs), congregate living, areas occupied by persons experiencing homelessness (PEH), worksites, and educational and day care settings (Figure 1). To respond to the rapidly evolving COVID-19 situation, DPH devised a plan to expand and prepare a new workforce to manage outbreaks in these sectors.

Prior to the pandemic, onboarding and training staff for fieldwork was a stepwise process that required several months. During the COVID-19 pandemic, this timeline was not feasible. New and reassigned staff had to learn on the job. The situation was further complicated by the simultaneous priority to roll out the newly Food and Drug Administration–approved COVID-19 vaccines. Because onboarded staff were immediately deployed to the field, training opportunities were limited and frequently compressed due to competing priorities, heavy workload, and other urgent on-the-job duties. Evolving scientific discoveries about SARS-CoV-2, the virus that causes COVID-19, necessitated constant updating of scientific and public health practice information, especially for those working in specialized settings and with particular populations such as SNFs, K–12 education, colleges/universities, and PEH groups.

DPH constructed a logic model to identify how a training program should work to supplement on-the-job mentored training during the COVID-19 pandemic (Figure 2) (Levin et al., 2004). The Department needed a flexible, time-sensitive, and practical teaching/learning method for this program. Based on these considerations, DPH selected the Grand Rounds method (Mahajan et al., 2021; Sandal et al., 2013; Storjohann et al., 2021), coupling it to a virtual training platform so that training could be delivered in a compressed period of time and in a practical way to improve the knowledge and job performance of the newly hired and reassigned OMB staff.

The origins of Grand Rounds in medical education and in other professional training can be traced back to John Hopkins Medical School in the late 1800s (Sandal et al., 2013). The original format consisted of faculty leading residents from one patient to another explaining how each was diagnosed and treated. In the late 1900s and into the 21st century, Grand Rounds became 1-hour "translational" seminars covering recent research and medical advances on a given topic and their application in medical practice (Sandal et al., 2013). The Grand Rounds teaching and learning method was chosen as a practical way to train a new workforce that did not have weeks to be trained during the COVID-19 pandemic. The aim of our program was to develop, implement, and evaluate a training curriculum using the Grand Rounds method to orient and update newly contracted as well as existing, reassigned permanent staff on the nuances of COVID-19 science and the evolving best practices to prevent and manage this disease's outbreaks.

METHOD

Method Overview

DPH collaborated with experienced public health faculty from Emory University's Rollins School of Public

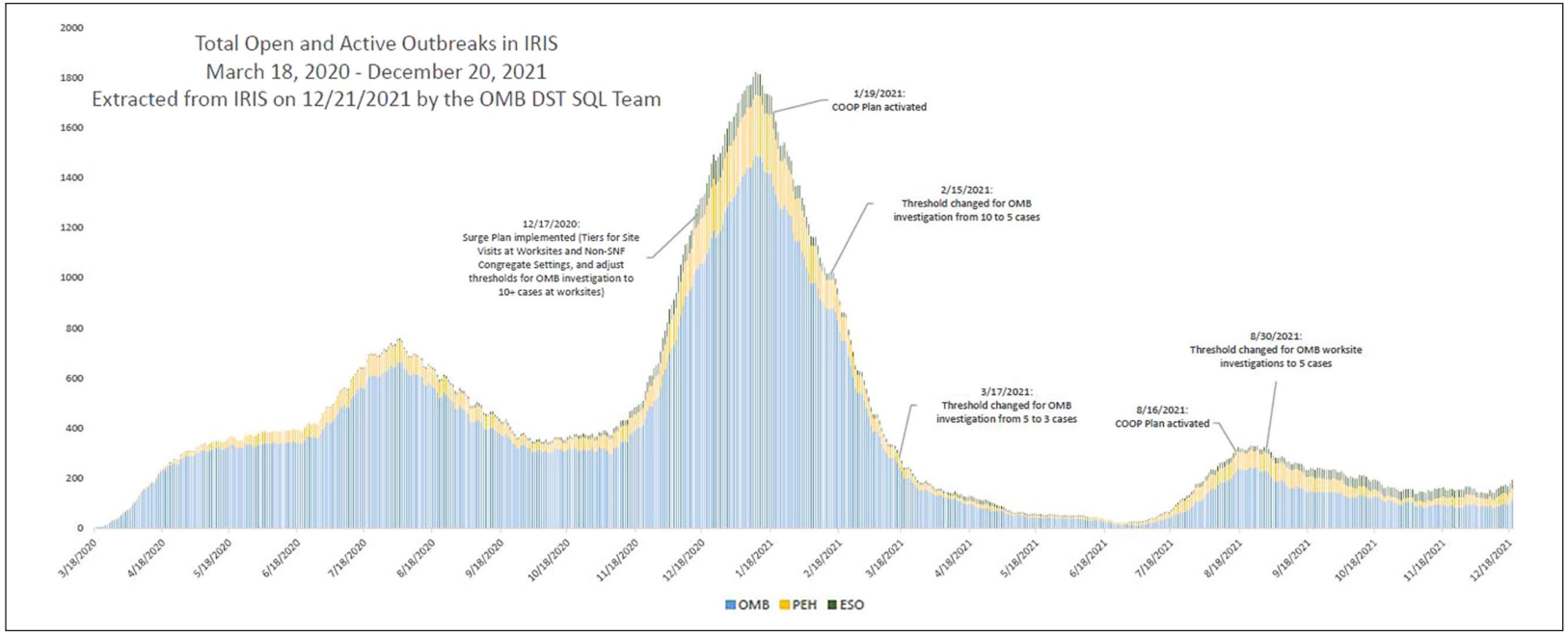

FIGURE 1 Workload of the Outbreak Management Branch: The Number of Outbreaks from March 18, 2020, to December 20, 2021

Note. COOP = continuity of operations plan; DST = data science team; ESO = education sector operations; IRIS = integrated reporting investigation and surveillance system; OMB = outbreak management branch; PEH = persons experiencing homelessness sector.

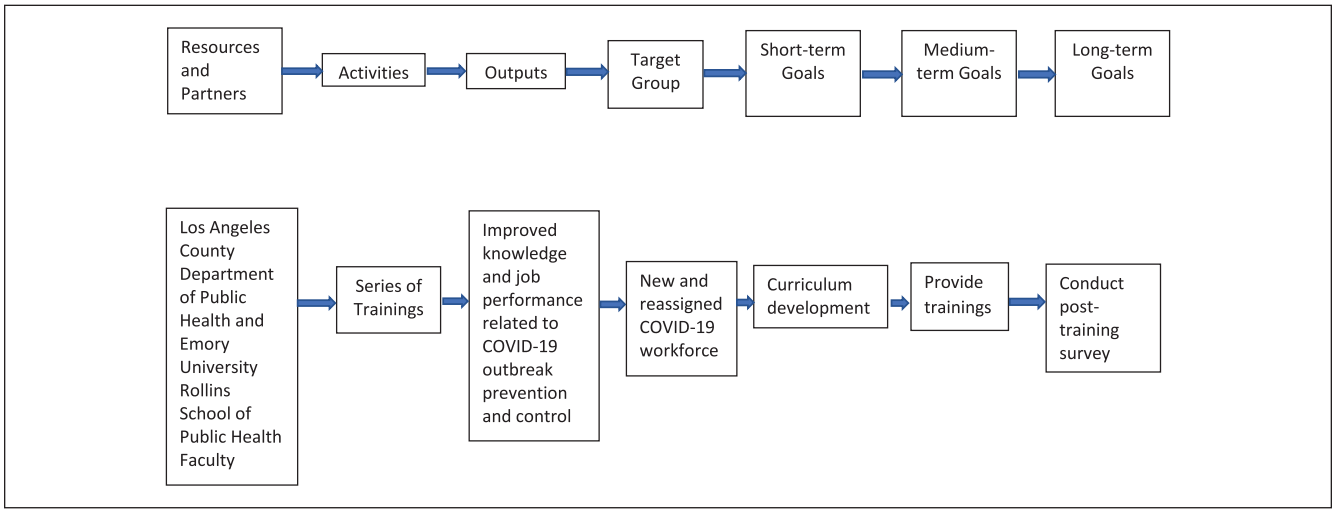

FIGURE 2 Logic Model for a Program to Train a New Public Health Workforce to Prevent and Control COVID-19 Outbreaks

Health ("Emory") to develop and present 16 Grand Rounds that provided specialized, practical, and up-to-date information on SARS-CoV-2. It was intended as an intuitive approach for workforce development, especially at a time when learning opportunities were limited by the overwhelming needs of the COVID-19 winter upsurge during 2020–2021 (Figure 1). The sessions covered a range of content and methods to stop the spread of the virus. A post-training survey was designed to provide context and insights into how attendees perceived the quality of the curricular content and the impact the training had on their job performance.

Curriculum Development

All staff, including contracted personnel, in DPH's OMB, received training on how to conduct outbreak investigations in a variety of sectors and in particular populations (e.g., SNFs, educational sector, work sites, PEH). In addition, to prepare them for each specific sector, they received other on-the-job education and ongoing mentoring from a more experienced medical/public health colleague working in the same sector. The Grand Rounds were developed to provide a consistent foundational starting point to augment and complement these existing trainings, experiential learning, and mentorships.

All Grand Rounds sessions were developed in collaboration with the Emory faculty. Emory University's School of Public Health has been a leader in COVID-19 surveillance, mitigation, and vaccine development since the onset of the pandemic (In the Media Archive, 2021), and its faculty are nationally renowned for their work in infectious disease, epidemiology, and prevention. Many of them have served as epidemiologists in the Centers for Disease Control and Prevention (CDC). For example, the first faculty has trained and mentored several epidemiologists around the globe. He previously led the CDC's collaboration with the U.S. Defense Threat Reduction Agency. The second faculty is a veteran field epidemiologist with more than 15 years of experience investigating emerging infectious diseases across 8 different countries in Asia and the South Pacific. The third faculty is a former Epidemic Intelligence Service officer who has worked on several CDC initiatives during the past 30 years, including non-pharmaceutical interventions for influenza pandemic preparedness, vaccine development, and global response to tuberculosis, the AIDS epidemic, the Ebola outbreak in West Africa, and the Severe Acute Respiratory Syndrome and Middle East Respiratory Syndrome in the United States.

In November and December 2020, OMB leadership held several meetings with the Emory faculty to develop a novel curriculum that would meet the specific needs of DPH's outbreak management staff. This DPH–Emory working group adapted the Grand Rounds format to provide a population health focus on COVID-19 epidemiology, infection dynamics, and up-to-date guidelines for investigating and managing outbreaks. The group also made each of the sessions as useful and as interactive as possible. The development process was grounded in practice- and problem-based learning (Al-Azri et al., 2014; Bryk et al., 2015; Joshi et al., 2021), with a strong emphasis on addressing challenges in real-world environments (Burgess et al., 2017; Margolis et al., 2009). The series used case studies, interactive scenarios, and

principles of iterative learning (Inkelas et al., 2015; Kuo et al., 2015; Provost & Murray, 2011).

The final curriculum contained five key elements tailored to adult learning (Bryan et al., 2009): (a) The practice importance of each topic selected for the Grand Rounds. (b) Providing real world COVID-19 examples to demonstrate strategies that can be used to solve logistical/in-the-field problems/challenges in several sectors. (c) Providing examples that resonated with and were relevant to the attendees' current job duties. (d) The content matched the need and diversity of the attendees' job experiences, job categories, and backgrounds. And (e) the curriculum offered case studies and interactive scenarios, mixed in with didactic presentations, to teach new knowledge and skills.

Series Implementation

To minimize the likelihood that the series would disrupt the demanding schedules of the staff, the 16 Grand Rounds were scheduled twice a week during the lunch hour. The virtual sessions were held on consecutive Thursday and Friday afternoons from 12:00 p.m. to 1:00 p.m. Pacific Standard Time via a Microsoft Teams webcast. The series began on December 17, 2020, and ended on February 19, 2021, with a break for the Christmas holidays on December 24 and 25. In addition to discussions led by the faculty, each session reserved ample time to take questions from the attendees and answer them in an interactive, team-oriented forum. Each session was moderated by two OMB health program analysts and featured in-session polling, attendance tracking, and online chat capability. Attendance at each of the sessions was strongly recommended but was not mandatory. All sessions were recorded so staff who could not attend were able to view them at a later time. A Microsoft Teams channel (forum) was created and provided to attendees so they could easily access video recordings at their convenience while still being able to leave comments and chat with colleagues afterward.

The series was promoted widely across DPH, including to OMB, Environmental Health, and the Acute Communicable Disease Control division. It was also advertised on DPH's intranet homepage through a scrolling banner that read "Grand Rounds Emory Epi Series 2020–2021."

Grand Round Sessions

The 16 Grand Rounds sessions are summarized in Table 1. The first two sessions were dedicated to the development and programmatic issues regarding vaccines to prevent SARS-CoV-2 infection. The next three topics pertained to case definitions and epidemic curves for COVID-19 surveillance, and the analysis, interpretation, and graphical presentation of epidemiologic data. Sessions 6 through 8 covered SARS-CoV-2 transmission and testing. The remaining sessions focused on respiratory viruses, COVID-19 comorbidities, contact tracing, and outbreak investigations for K–12 education, institutions of higher education, worksites, SNFs, mass gatherings, early childhood education, and particular populations such as PEH.

Most sessions provided real-world examples and discussion questions relevant to health and public health professionals working in the field. For example, the details on how to handle and administer the recently available Pfizer vaccine were discussed in the session covering vaccine distribution. In the session about disease surveillance, examples of how data from Los Angeles County could be used to define local outbreak cases including those persons who tested positive at SNFs and at work sites were presented. A practical perspective on ways in which cases could and should be epidemiologically linked to confirm disease clusters was also provided. For the session on epidemic curves, examples of real-world charts from Hubei Province in China with colored bars representing cases from within and outside of Wuhan were shown and discussed. And similarly, in another session, an example of an outbreak among hairstylists in Missouri was used as an illustrative example of how best to interpret analyses and graphs of a COVID-19 outbreak. Finally, in one of the sessions on K–12 schools, a scenario was generated to simulate large and microdroplet movements for a poorly ventilated classroom over time. The simulated situation showed how SARS-CoV-2 transmission could occur rapidly among both symptomatic and asymptomatic individuals.

For each type of setting and particular population, the three Emory faculty went through examples of outbreaks in Los Angeles County and walked the attendees through the steps that each investigation may take, and which mitigation strategies could be employed based on sector type or a particular group. For example, one of the faculty led a discussion on what to do if an institute of higher education was shut down due to an outbreak and there was no one there to talk to during a site visit. The interactive discussion considered actions such as getting the index case and close contact information via the phone, through email, or by reviewing medical records, recognizing that these data, obtained this way, may be less complete and less reliable. For contact tracing, a real-world example in Oregon that occurred from March 2020 to February 2021 was used to facilitate a lively discussion about what worked and what did not during that

TABLE 1
Summary of the Content for Each of the 16 Grand Rounds Sessions

Title of session	*Number of attendees*	*Learning objectives*	*Sample discussion points or interactive questions*
Development of vaccines against SARS-CoV-2	200	➢ Review vaccine-induced immunity ➢ Understand the steps in vaccine development ➢ Outline the types of vaccines that are in development for SARS-CoV-2 ➢ Review the U.S. approval process for SARS-CoV-2 vaccines	• Describe a study design to assess the efficacy of a COVID-19 vaccine to prevent asymptomatic SARS-CoV-2? • Is it possible that annual vaccinations for COVID-19 will be required? • What is an effective way to assure the community that the vaccine(s) is/will be safe? • What is the estimated proportion of the population that will need to be vaccinated to achieve herd immunity?
Programmatic issues with vaccines against SARS-CoV-2	173	➢ Summarize COVID-19 vaccine efficacy estimates ➢ Prioritizing groups for vaccination ➢ Handling of and logistics for the vaccine ➢ How to administer the vaccine ➢ Vaccine hesitancy by group ➢ Surveillance of COVID-19 vaccine safety	• Q&A with attendees on vaccine characteristics • Q&A with attendees on vaccine prioritization • Q&A with attendees on vaccine hesitancy
Case definitions and surveillance of COVID-19	200	➢ Know the 3-tiered case definition for COVID-19 surveillance (Confirmed, Probable, and Suspect) ➢ Understand the sources of COVID-19 data ➢ Understand the use of public health surveillance data ➢ Define epidemiologic linkage in the classification of COVID-19 ➢ Know the role of clinical, laboratory, and epidemiologic criteria in the surveillance of COVID-19	*Discussion of two Los Angeles County case examples at non-residential sites:* • Is this an outbreak? What further information is needed to verify? • What other information should be obtained from the company? • Are the positive cases epidemiologically linked [use of a decision tree]? • How should an outbreak case be managed?
Epi curves and surveillance of COVID-19	165	➢ Understand how to construct an epidemic curve ➢ Understand the relationship between transmission dynamics, incubation period, and epidemic curves ➢ Understand reporting lag and impact on surveillance and mortality data ➢ Estimation of case mortality ➢ Tracking epidemic progress	• How do we measure the impact of COVID-19 in Los Angeles County? • How do we assess interventions in Los Angeles County? • Why have estimates for the case fatality ratio changed over time? • How has the character of the pandemic changed over time? • Adjustment and correction strategies for addressing limitations in estimating the case fatality ratio • How do we assess progress in COVID-19 control?

(continued)

TABLE 1 (CONTINUED)

Title of session	*Number of attendees*	*Learning objectives*	*Sample discussion points or interactive questions*
Analysis, interpretation, and graphical presentation of epidemiologic data	188	➢ Review and a refresher on the primary tools that are typically used by a field epidemiologist ➢ Utilize attack rate ratios and other measures of relative risk where appropriate ➢ Understand ways of approaching missing data ➢ Appreciate the difference between personal and public data visualization ➢ Consider a variety of ways to analyze epi curve data	• What proportion of Los Angeles County cases are lost to follow-up or refuse to name contacts? In which zip codes? What race/ethnicity groups and which poverty levels? How could future program changes address incomplete data and improve performance? • What variables are commonly incomplete in COVID-19 outbreaks? Which variables have >90% completeness in COVID-19 case registries?
Transmission dynamics of SARS-CoV-2	231	➢ Become familiar with: ■ The three principal modes of COVID-19 transmission ■ Risk factors for SARS-CoV-2 transmission in any setting ■ SARS CoV-2 is transmitted by an infected individual with or without symptoms	• What is the principal mode of transmission of SARS-CoV-2? • What situations can generate respiratory droplets? • In general, how long can aerosols float in a room without ventilation? • Who do you think will be at the highest risk of becoming infected by SAR-CoV-2 in a household with a symptomatic case of COVID-19?
An introduction to antigen tests, NAATs, and serologic tests for detecting/diagnosing SARS-CoV-2	187	➢ Become familiar with: ■ Laboratory techniques for SARS-CoV-2 testing ■ Who should be tested ■ Interpretation of testing results and follow-up	• Who should be tested? • Which SARS-CoV-2 test is considered the gold standard? • Can we use viral testing (NAAT or antigen) for contact tracing? Can NAAT tests produce false negative test results?
Testing performance of assays used to diagnose COVID-19	181	➢ Continuation of previous training on January 21, 2021, with the same learning objectives	• What is the impact of poorly sensitive tests on screening programs? • Scenario: Dr. Y has asked you to establish a screening protocol for 1,000 inmates at a prison in Los Angeles County. You have 5,000 relatively inexpensive rapid antigen tests. You need to calculate the positive predictive value and negative predictive value for each test. Then evaluate how well you would trust a negative test result. What would be the implication of trusting the test results? How could and should test be used in this scenario?

(continued)

TABLE 1 (CONTINUED)

Title of session	*Number of attendees*	*Learning objectives*	*Sample discussion points or interactive questions*
Outbreak investigations among persons experiencing homelessness (PEH)	189	➢ Learn steps to control current COVID-19 outbreaks and prevent additional cases ➢ Determine the scope of the outbreak ➢ Prevent the occurrence of future outbreaks ➢ Determine risk factors for outbreaks ➢ Evaluate the effectiveness of control or mitigation measures ➢ Gain a better understanding of transmission dynamics within a key population ➢ How to respond to public concerns or pollical pressure	• Scenario: If you were leading the team for the first COVID-19 outbreak among PEH in Seattle, what would be your primary objective? • If you were leading this team, how would you modify the methods to investigate the outbreak? How would they differ from the methods that are typically used in a standard outbreak investigation? • For multi-city outbreak investigations, what factors differ across shelters in Seattle, Boston, San Francisco, and Atlanta—i.e., those that you are most interested in learning about? • What implications will the PEH investigations have on rolling out vaccinations for the homeless population?
Considerations in handling outbreak investigations in K–12 schools	187	➢ Become familiar with: ■ The steps of outbreak investigations in schools ■ The objectives for outbreak investigations in schools ■ Methods for outbreak investigations in schools ■ Analyses used in outbreak investigations in schools ■ Control measures for outbreaks at K–12 schools ■ Actions required after an outbreak is found and confirmed in K–12 schools—i.e., procedures for interviewing, contact tracing, case management	• Who is responsible for leading the outbreak investigation—i.e., surveillance, contact tracing, and outbreak management at schools in Los Angeles County? • How do you block the mode of transmission in a school setting? • Why is a cluster not necessarily an outbreak?
Considerations in handling outbreak investigations in institutions of higher education (IHE)	204	➢ Become familiar with: ■ Management of outbreaks ■ Who is mainly affected by outbreaks in IHE ■ Where and when do outbreaks occur	• What happens if the IHE administration decides to "close" the campus and everyone is gone when you get there? • How does the department of public health define a COVID-19 outbreak at an IHE? • How do you differentiate a single-source versus a multiple-sources outbreak?
Workplace outbreak investigation	122	➢ Become familiar with: ■ The steps for an outbreak investigation at a workplace ■ Control measures to prevent COVID-19 at a workplace ■ Sector analysis	• What descriptive epi analyses might help you best characterize a workplace COVID-19 outbreak at a meat packing plant in South Dakota? • What kind of workplace outbreak control/prevention measures should be offered to businesses? • What is the most challenging setting for investigating and controlling a COVID-19 workplace outbreak? What control or mitigation measures can be implemented at this setting?

(continued)

TABLE 1 (CONTINUED)

Title of session	*Number of attendees*	*Learning objectives*	*Sample discussion points or interactive questions*
Contact tracing	183	➢ Become familiar with: ■ The goal of contact tracing ■ The main elements of contact tracing ■ Principles for prioritizing types of COVID-19 case(s) for investigation and contact tracing. ■ Period of infectiousness for COVID-19 ■ COVID-19 isolation guidelines ■ Metrics for evaluating whether contact tracing has been effective	• Should some types of cases be prioritized for COVID-19 outbreak investigation? • Should some types of contacts be prioritized for contact tracing? • Suppose we identify a person with asymptomatic COVID-19, when is that person considered infectious? • How long should contacts quarantine?
COVID-19 versus other common respiratory viruses and COVID-19 related comorbidities	160	➢ Become familiar with: ■ The signs and symptoms of COVID-19 versus the flu ■ The difficulty in distinguishing COVID-19 from the flu ■ The basics of when to test and who to test ■ Factors associated with COVID-19 severity: infecting dose, how our immune system reacts, taste and smell abnormalities, and comorbidities	• Why do we need to test suspected cases? • Besides signs and symptoms, what does the common cold, influenza, and COVID-19 have in common?
Skilled nursing facility (SNF) outbreak investigations	213	➢ Become familiar with: ■ Steps specific to SNF COVID-19 outbreak investigation ■ Primary aims of SNF COVID-19 outbreak management ■ What are the control/mitigation measures for managing SNF COVID-19 outbreaks?	• Scenario: Tomorrow morning at 8 AM, Drs T and L informed you via MS Teams that you are the lead investigator for a COVID-19 outbreak in a Los Angeles County Skilled Nursing Facility, *Senior's Paradise*. You know that at least some of the *Senior's Paradise* residents have received a COVID-19 vaccine. What are your aims in investigating and managing this outbreak?
Considerations in handling outbreak investigations in mass gatherings, preschool, and early education	169	➢ Become familiar with: ➢ Investigating mass gathering outbreaks ➢ Investigating outbreaks in day care facilities	• What is a mass gathering? • How do you handle outbreaks in day care? • What do you do if "everyone" is at home (i.e., due to lockdown)? • What do we need to define in these circumstances?

Note. PEH = persons experiencing homelessness; IHE = institutions of higher education; SNF = skilled nursing facilities; NAAT = Nucleic Acid Amplification Test.

outbreak investigation. For workplace outbreaks, several techniques on how best to create epidemic curves by zones defined by job type, shift, or locations within a company, were taught in real time. And finally, the Sturgis mass gathering outbreak investigation in South Dakota was presented as a prime example of a super spreading event (Dave et al., 2020; Firestone et al., 2020).

Post-Training Survey

The Grand Rounds were evaluated by recording attendance at each session through Microsoft Teams. A rapid assessment survey was administered after the completion of the last Grand Rounds session. Attendees were able to click on a link to a 15-question anonymous survey instrument. The participation rate for this post-training survey was estimated by dividing the number of staff who participated in the survey by the number who had attended more than half of the sessions. Reminders to complete the survey were included in the interdepartmental newsletter a total of three times during the period, February 25 to March 26, 2021. Reminder emails to complete the survey were also sent a total of 12 times during this period. Named the "Emory University COVID-19 Grand Rounds Attendee Feedback Survey," the instrument included questions related to attendees' previous education and experiences in outbreak management and/or epidemiology, the series' training objectives, and attendees' satisfaction with the sessions. The questions were in multiple-choice, check-all-that-apply, and open-ended formats. The mean, standard deviation, and range for a rating of the overall quality of the Grand Rounds series were scored by the attendees with 1 being the *lowest or worst score* and 10 being the *highest or best score*. Frequencies were generated for the multiple-choice and check-all-that-apply responses. The survey, data collection, and analysis plan were considered exempt by the DPH Institutional Review Board.

DPH analyzed the proportion of participants who agreed that: (a) the 16-session series improved knowledge of outbreak management; (b) the series improved job performance; (c) participation and engagement were encouraged throughout the interactive series; (d) relevant cases/examples/live situations were discussed throughout the series; (e) sufficient time was allocated for each session; and (f) the training content and objectives met expectations.

RESULTS

Attendees

Attendance at the 16 Grand Round sessions ranged from 122 staff for session 12 on outbreak investigations at worksites to 231 staff for session 6 on SARS-CoV-2 transmission dynamics (Table 1). A total of 165 attendees attended more than half of the sessions, and 132 completed the post-training survey (estimated participation rate = 80%). Table 2 describes the racial/ethnic and educational background, along with years of experience in

TABLE 2
Characteristics of the 132 Emory University COVID-19 Grand Rounds Series Attendees Who Participated in the Post-Training Survey, December 2020 Through February 2021

Characteristics	*n (%)*
Race/Ethnicity[a,b]	
Non-Hispanic White	31 (23.5%)
Hispanic	31 (23.5%)
Black	23 (17.4%)
Asian	27 (20.5%)
American Indian/American Native	1 (0.8%)
Native Hawaiian/Pacific Islander	5 (3.8%)
Multi-racial	6 (4.5%)
Refused to answer	12 (9.1%)
Highest degree or level of education you have completed?[b]	
M.D.	21 (15.9%)
Ph.D.	8 (6.1%)
Master's	65 (49.2%)
Bachelor's	28 (21.2%)
Associates degree	7 (5.3%)
Prefer not to answer/Other	3 (2.3%)
Years of outbreak management/epidemiology experience[b]	
>20	8 (6.1%)
10–20	9 (6.8%)
5–10	13 (9.8%)
2–5	25 (18.9%)
<2	77 (58.3%)
Job title[b]	
Administrative Assistant	8 (6.1%)
Public Health Investigator	24 (18.2%)
Epidemiologist/Biostatistician/Data Monitor	48 (36.4%)
Health Data/Program Analyst	12 (9.1%)
Medical Director	2 (1.5%)
Public Health Nurse	18 (13.6%)
Physician Specialist	14 (10.6%)
Other	6 (4.5%)

Note. n = Sample size.
[a]Some attendees reported more than one race category. [b]Percentages may not sum to 100% due to rounding.

public health and current job titles for the 132 attendees who completed the survey. The majority (58.3%) reported having less than 2 years of experience in outbreak management or epidemiology. Only 22.7% reported having more than 5 years of experience in outbreak management or epidemiology. The most common job title reported on the survey was for the Epidemiologist/Biostatistician/Data Monitor category (36.4%). The next most common job titles were Public Health Investigator (18.2%), Public Health Nurse (13.6%), Physician Specialist (10.6%), and Health Data/Program Analyst (9.1%).

Post-Training Survey Results

The attendees' evaluation of the Emory University COVID-19 Grand Rounds Series is summarized in Table 3. More than 80% of survey respondents overall, and for those with $<$ 2 years and 2 or more years of experience in outbreak management, agreed that the training helped them improve their job performance. Nearly 90% of respondents overall, and over 90% of respondents with $<$ 2 years of experience, agreed that their understanding of outbreak management and epidemiology improved with the training. Overall, 82.6% of survey respondents agreed that participation and engagement were encouraged throughout the series. Overall and for each stratum of respondents by job experience, approximately 87% agreed that several relevant cases, examples, and live situations were discussed in the Grand Rounds series. Overall, approximately 80% of respondents agreed that there was sufficient time allocated for each session. Approximately 90% of respondents report that the training content and objectives met their expectations. The average rating from 1 (*lowest*) to 10 (*highest*) for the overall quality of the Grand Rounds was 9.13 (standard deviation = 1.05, minimum = 5, and maximum = 10).

DISCUSSION

Ongoing education is essential for maintaining a prepared public health workforce. Participants in this novel Grand Rounds format gave high ratings for the quality of the training. Approximately 80% agreed that the series improved their job performance, and approximately 90% agreed that the series improved their understanding of outbreak management. Overall, participants appreciated the real-world examples and the ample interactive opportunities for troubleshooting challenges with other colleagues, using hypothetical as well as real-world outbreak scenarios.

However, despite these favorable ratings, there were a number of challenges that the developers and administrators of this series encountered during its implementation. For example, due to the diverse professional backgrounds of the 250+ staff who were onboarded to OMB during Fall 2020, developing and delivering a curriculum with the right content and tenor was inherently difficult to do. Despite this challenge, the series did receive favorable ratings from across most attendees who had different ethnic, educational, and training backgrounds. Another challenge encountered in implementing the series was the unexpected magnitude of the COVID-19 winter upsurge. Because it was greater than anticipated, the upsurge placed considerable time constraints on DPH staff, disrupting or delaying efforts to deliver the Grand Rounds on a more compressed timeline. The attendance, nevertheless, was still relatively robust despite this situation—165 staff members attended more than half of the sessions.

Taken as a whole, the series fulfilled a vital need for OMB staff by augmenting and complementing sector-specific education and mentoring which were generally available to new/reassigned personnel but were not sufficiently organized to orient them on the current science and best practices for COVID-19. An important, but underappreciated, aspect of the training series was the availability and enthusiasm of the Emory faculty; they encouraged self-learning and continuing education throughout, frequently providing weblinks to their presentations and to online locations where attendees could find further information or resources to help them do their job well.

In designing the curriculum, the developers recognized that virtual participation was a necessary technological element that the attendees would need to adapt to, given the lockdown restrictions that were in place during the pandemic. For the administrators of the series, making this virtual experience a reality was equally, if not more difficult, as not every staff (especially those who were newly onboarded) were familiar with the virtual platform, Microsoft Teams, and in many instances had not yet been given access to DPH internet or a virtual private network. Fortunately, all of the 16 Grand Rounds sessions were recorded and uploaded to an easy-to-access online folder. This allowed staff who had missed some or all of the original live sessions to access the training series later, viewing and reviewing the recorded content as a self-directed learning experience.

Although the post-training survey contributed key insights into the processes and the impacts of the Grand Rounds series on job performance and on the handling of outbreaks in the field, the program evaluation design, nonetheless, had several limitations. First, to maintain

TABLE 3
Results From the Post-Training Survey for the Emory University COVID-19 Grand Rounds Series, Overall and by Attendees With Less Than 2 Years of Experience in Outbreak Management or Epidemiology

Question[a]	*Agree, n (%)*	*Neither agree nor disagree, n (%)*	*Disagree, n (%)*
Overall (n = 132)			
Impact			
The training helped me improve my job performance	109 (82.6%)	16 (12.1%)	7 (5.3%)
The Emory Epi Series improved my understanding of outbreak management/epidemiology	118 (89.4%)	8 (6.1%)	6 (4.5%)
Experience			
Participation and engagement were encouraged throughout the series	117 (88.6%)	8 (6.1%)	7 (5.3%)
Several relevant cases/examples/live situations were discussed	115 (87.1%)	9 (6.8%)	8 (6.1%)
Sufficient time was allocated for each session	108 (81.8%)	13 (9.8%)	11 (8.3%)
Satisfaction			
The training content and objectives met my expectations	119 (90.2%)	7 (5.3%)	6 (4.5%)
For attendees with < 2 years of experience in outbreak management/epidemiology (n=77)			
Impact			
The training helped me improve my job performance	65 (84.4%)	8 (10.4%)	4 5.2%
The Emory Epi Series improved my understanding of outbreak management/epidemiology	71 (92.2%)	3 (3.9%)	3 (3.9%)
Experience			
Participation and engagement were encouraged throughout the series	69 (89.6%)	5 (6.5%)	3 (3.9%)
Several relevant cases/examples/live situations were discussed	67 (87.0%)	6 (7.8%)	4 (5.2%)
Sufficient time was allocated for each session	64 (83.1%)	7 (9.1%)	6 (7.8%)
Satisfaction			
The training content and objectives met my expectations	70 (90.9%)	4 (5.2%)	3 (3.9%)
For attendees with 2+ years of experience in outbreak management/epidemiology (n = 55)			
Impact			
The training helped me improve my job performance	44 (80.0%)	8 (14.5%)	3 (5.5%)
The Emory Epi Series improved my understanding of outbreak management/epidemiology	47 (85.5%)	5 (9.1%)	3 (5.5%)

(continued)

TABLE 3 (CONTINUED)

Question	*Agree, n (%)*	*Neither agree nor disagree, n (%)*	*Disagree, n (%)*
For attendees with 2+ years of experience in outbreak management/epidemiology (n = 55)			
Experience			
Participation and engagement were encouraged throughout the series	48 (87.3%)	3 (5.5%)	4 (7.3%)
Several relevant cases/examples/live situations were discussed	48 (87.3%)	3 (5.5%)	4 (7.3%)
Sufficient time was allocated for each session	44 (80.0%)	6 (10.9%)	5 (9.1%)
Satisfaction			
The training content and objectives met my expectations	49 (89.1%)	3 (5.5%)	3 (5.5%)

Note. n = Sample size.
[a]Percentages may not sum to 100% due to rounding.

anonymity for the post-training survey, it was not possible to link the attendance data with the survey data, prohibiting further analysis that could have explored the relations between self-reported actions and real attendance outcomes. Second, as with any cross-sectional evaluation, the introduction of selection, recall, and social desirability biases was likely; these biases may have affected the survey responses. Finally, while the self-reported impacts on job performance suggest that the Grand Rounds training series was a promising intervention, time and resource constraints, along with the pandemic's urgency and severity, made it difficult to conduct an appropriate follow-up—for example, a skills-based study to confirm or verify the learning and actions reported by the attendees.

IMPLICATIONS FOR PRACTICE

The vast majority of the virtual Grand Rounds attendees reported applying their newly acquired knowledge and skills to help them improve their job performance. Training staff in departments of public health using this format appears to be a good approach for teaching new skills and preparing newly hired and reassigned permanent staff for fieldwork, especially under the unprecedented conditions of the COVID-19 pandemic, where adequate time and resources for longer, longitudinal trainings were not available. The present description and evaluation of the training series showed that foundational evidence-based knowledge and skills for outbreak management can be introduced and taught virtually in a short period of time and can be presented in such a way as to make the content succinct, easier to understand, and purposefully geared toward helping staff troubleshoot real-world problems. The promising milestones reached in Los Angeles County using this educational approach, and the lessons learned during the series' implementation suggests that the series' application during normal time operations may lead to an even more capable and engaged public health workforce if continued. Virtual Grand Rounds should be easier to facilitate in the future, as the use of this virtual learning format has become more commonplace in trainings and for meetings among adult learners. Using Grand Rounds, coupled with a virtual platform, to train a public health workforce during the pandemic was a novel extension of the use of Grand Rounds in medicine. Further research using this method in other public health emergencies is needed to assess whether Grand Rounds, delivered virtually, in person or in combination, can remain useful and is effective in preparing designated disaster service staff to handle urgent and less-than-ideal circumstances as were encountered during the COVID-19 pandemic.

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