Practical Strategies and Tools for Use by Occupational and Environmental Medicine Departments During COVID-19 Pandemic Surges

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Objectives: Occupational and environmental medicine (OEM) departments in healthcare institutions can be quickly overwhelmed when COVID-19 infection rates rapidly and simultaneously increase in the workforce and the patients served. Our goal is to present a detailed toolkit of practical approaches for use by front-line OEM specialists to address workforce management tasks during pandemic surges. **Methods:** Specific focus is on tasks related to employee symptom triage, exposure risk assessment, workplace contact tracing, and work restrictions. **Results:** Tools include strategies used by customer call centers, two decision support algorithms (exposure due to cohabitation or non-cohabitation), a color-coded employee case tracking tool, a contact tracing protocol, and documentation templates that serve as memory aids for encounters. **Conclusions:** These tools are created with commonly used software. Implementation is feasible in most front-line OEM settings, including those with limited resources.

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Clinical Significance: Detailed strategies to support the specific tasks performed by front-line occupational and environmental medicine (OEM) specialists during COVID-19 pandemic surges are lacking. Five strategies are presented that can be easily adopted by OEM departments, including those with limited resources. A novel algorithm for COVID-19 exposures due to cohabitation is included.

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Learning Objectives

- Discuss the challenges faced by occupational and environmental medicine (OEM) departments in dealing with healthcare workforce shortages during the COVID-19 pandemic.
- Summarize the new tools developed by the authors for use by OEM departments, focusing on the practical needs of small- to medium-size facilities.
- Discuss newly developed decision support tools designed for use in employees restricted by work due to exposure at home or elsewhere and in unique hospital settings that pose special challenges.

INTRODUCTION

In early 2020, healthcare personnel (HCP) around the world became aware of the deadly infection known as severe acute respiratory syndrome (SARS)-CoV-2 or COVID-19. The virus spread quickly and a pandemic was declared on March 11, 2020.[1] Shortages in frontline HCP and support staff is one of the most serious challenges facing healthcare institutions during the pandemic.[2,3] This becomes increasingly difficult during surges when the numbers of COVID-19 infections increase in both the general population and the HCP population. These facts highlight the crucial responsibilities of occupational and environmental medicine (OEM) departments to not only restrict infected employees from working but also to promptly return them to work when it is safe to do so. When rapid influxes of COVID-19 cases occur, OEM workload dramatically increases, and teams can be overwhelmed.

Recent publications describe valuable OEM strategies implemented by large healthcare systems to tackle this increased workload.[4–9] The worth of these approaches is undisputable. However, the implementation may not be feasible for smaller healthcare systems and/or those with limited resources. In contrast, this work presents practical strategies that can be readily adopted by most facilities. These include (1) application of methodology commonly used by commercial customer call centers to manage employee telephone visits, (2) algorithms to guide decisions involving evaluation, testing, and work disposition, (3) a case tracking repository, (4) a contact tracing protocol, and (5) documentation templates that serve as memory aids during employee encounters.

The Veterans Affairs Loma Linda Healthcare System (VALLHS) operates a mid-sized hospital providing care to over 69,000 patients in the southern area of California in the United States. The OEM department consists of five permanent staff (two physicians, two nurses, and two administrative clerk) caring for approximately 3550 HCP. The geographical region served by the facility includes two large urban counties: San Bernardino and Riverside. During the first

TABLE 1. Cumulative COVID-19 Positive Cases, Population Estimates, and Infection Rates

	Total Cumulative Cases	Estimated Total Population	Cases per 100,000
Riverside County	281,257	2,468,145	11,395
San Bernardino County	284,520	2,217,398	12,831
California	3,534,557	40,129,160	8,808
United States	29,086,442	327,771,490	8,874

The total number of cumulative confirmed COVID-19 cases and estimated total population of residents in Riverside and San Bernardino counties (ie, geographical area surrounding the Veterans Affairs Loma Linda Healthcare System), the state of California, and the United States from March 11, 2020 to March 10, 2021. Data derived from the California Open Data Portal, COVID-19 Time-Series Metrics by County and State.[10] Cases per 100,000 were calculated by dividing total cumulative cases by the estimated population and multiplying by 100,000.

year of the pandemic (March 11, 2020 to March 10, 2021), these areas recorded the highest infection rates in the United States, with the number of confirmed COVID-19 cases per 100,000 residents exceeding that of California and the entire United States (Table 1).[10] Nearly 22% (776 out of the 3554 total employees) of VALLHS employees were placed on work restrictions during the year. Over 17% (N = 591) contracted the virus themselves, with the remaining 5% (N = 185) restricted from work because they were cohabitating with one or more persons reported to be infected with COVID-19. The fluctuating pattern in cases per month in our workforce closely followed those of San Bernardino county (Fig. 1),[11] and Riverside county (data not shown). And over the year, our OEM team managed 4481 cases of employees reporting symptoms and/or COVID-19 exposures.

The response of the national Veterans Health Administration (VHA) to the pandemic involving planning, policy development, resource management, voluntary testing for employees with concerns for infection, and comprehensive self-help resources for HCP mental health is described elsewhere.[8,9] In contrast to these centralized activities, the design of OEM procedures for COVID-19 issues was delegated by VHA to its individual medical centers. This afforded flexibility in developing processes to fit unique circumstances that may exist at any given local site. At VALLHS, an incident command center team was created consisting of executive leadership and the department heads of Medicine, Nursing, Laboratory, Emergency Department, Infectious Disease Prevention (IDP), and OEM. The facility-wide activities of this group included procuring and distributing personal protective equipment (PPE) supplies, resource allocation, and management of the clinician labor pool. These activities are outside the scope of this article. Rather, our focus is on front-line OEM processes and tools to manage employee COVID-19 issues involving exposure and symptomology assessment, testing, isolation, quarantine, work restrictions, and contact tracing. These approaches were developed and successfully implemented by a team of OEM providers and the licensed independent practitioners (LIPs) who were temporarily recruited to assist in these duties. Also of critical importance in the development of these approaches, was the untiring, supportive efforts of the OEM nursing and clerical staff, and the significant collaborative contributions of the IDP and incident command teams.

METHODS

The decision trees, Employee Case Repository, and documentation templates described below were created and are regularly updated using Microsoft® PowerPoint, Excel, and Word software programs, respectively.

Employee visits are recorded in detail in the employees' personal electronic health charts. To protect privacy, access to the charts is restricted to the OEM team and the recruited LIPs. The Employee Case Repository spreadsheet which tracks employees who have experienced exposure to the virus or are infected themselves is centrally located on a shared drive which is accessible to only the OEM, IDP, and incident command teams.

For the VALLHS employee COVID-19 case data, HCP were counted as a positive case if they either (1) received a positive result from a test performed at our local facility by reverse transcription-polymerase chain reaction (PCR) assays targeting COVID-19 RNA or (2) the employee self-reported a positive PCR test result that was performed at another facility. Cases of cohabitation were primarily based on employee reports of a housemate testing positive.

It is important to note that recommendations, criteria, and definitions related to COVID-19 vary across nations and are ever-changing as scientific knowledge about the virus expands. Specific recommendations presented here serve as examples. Tools should be modified appropriately after a review of the most appropriate and up-to-date expert recommendations. This work has been designated as an operational activity (not research) by the VALLHS Institutional Review Board.

RESULTS

Team-Based Care and Call Center Strategies

During pandemic surges, certain medical practices (eg, elective surgery, dentistry, and audiology) experience major workload declines while others, such as OEM departments, have a significant increase in tasks.[3] To tackle these large workload escalations, we temporarily assign LIPs who work in units with reduced work to the OEM team. For example, during the largest pandemic surge (December 2020 to January 2021), seven LIPs (an anesthesiologist, a clinical informaticist, a chiropractor, two nurse practitioners, and two audiologists) were recruited. The work of these clinicians consists of conducting telephone visits for triaging HCP with symptoms and/or COVID-19 exposure, ordering testing and communicating results, issuing work restrictions and return to work (RTW) clearances, and conveying instructions to employees related to quarantine, isolation, and monitoring. Visits vary from 5 to 30 minutes depending on the purpose.

A team-based care delivery model has been developed to manage employee calls. In other words, rather than one practitioner conducting all visits for an individual case, multiple clinicians provide care during the course of exposure or infection. Two approaches commonly used in customer-based call centers are also applied. The first is the next available agent routing schema for incoming calls. Each morning, a non-clinical administrative support clerk assembles a list of the providers who are on duty that day. As calls are received, they are rapidly screened by the clerk by merely asking if the call is related to COVID-19. If yes, the call is immediately transferred to the first name on the list. If the provider is unavailable, the call is routed to the next clinician. This process continues until the call is fielded.

The second call center strategy employed is the paradigm of universal (also known as flexible or cross-trained) agents; meaning all agents are trained in managing most, if not all, issues a customer may have.[12–15] For this to be successful, all providers are trained in workplace contact tracing and all aspects of employee COVID-19

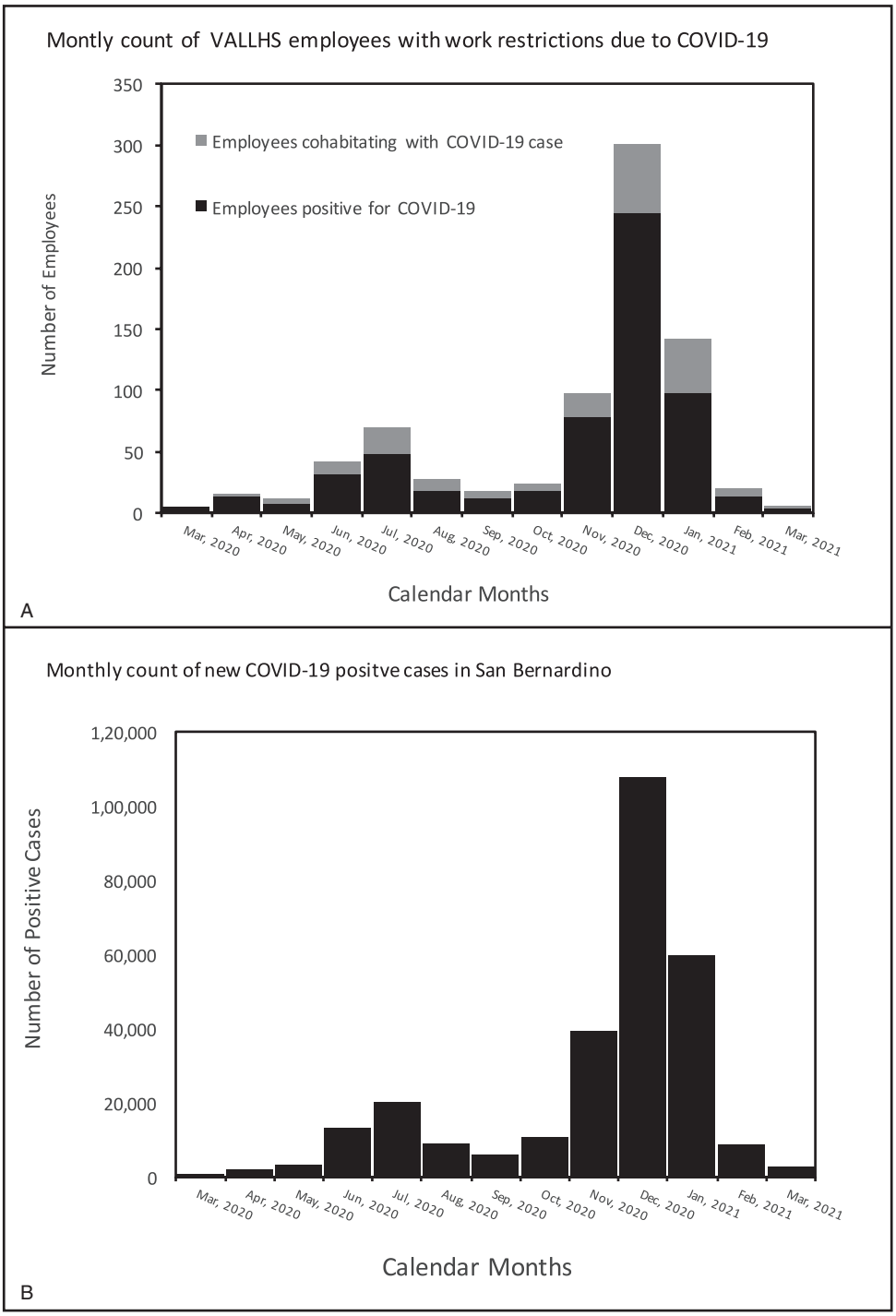

FIGURE 1. Trends in monthly COVID-19 cases over time. The number of new work restrictions per month imposed on VALLHS employees from March 11, 2020 till March 10, 2021 (upper panel). Includes employees restricted from work due to reported or confirmed COVID-19 infection (blue bars) and due to cohabitation with a reported COVID-19 positive person (orange bars). In the lower panel is the number of new confirmed cases of COVID-19 infection per month over the same period in the general population of the area surrounding VALLHS (ie, residents of San Bernardino County).[11] COVID-19, severe acute respiratory syndrome (SARS)-CoV-2; VALLHS, Veterans Affairs Loma Linda Healthcare System.

assessment, testing, data collection, and work status management. This training involves three phases: First, LIP recruits attend two to three "one-to-one" sessions with the OEM chief physician. Next, they observe an OEM provider conducting employee telephone visits and performing the tasks. Analogous to medical training, this "shadowing" continues until the LIP is comfortable with the work (typically 5–7 days). The third phase of learning for the recruits is accomplished via ad hoc team huddles and with the use of the tools described below. Team huddles are brief (<10 minutes), face-to-face, focused meetings in which clinical staff come together to exchange information and engage in shared decision-making.[16,17] Typically, huddles are daily and scheduled ahead of time, however, our huddles are unscheduled and occur as needed throughout the day. These meetings provide a mechanism for recruits to discuss cases with experienced providers and determine the best course of action. They also are used to communicate updates regarding viral outbreaks in the facility, new organizational policies, and changes in expert guidelines.

Workplace Contact Tracing

Workplace contact tracing starts with the identification of a positive employee case. At the initial triage phone visit, the clinician determines the dates of the employee's infectious period and if the

person was physically at the facility. Per Center for Disease Control (CDC) guidelines,[18] the infectious period begins 48 hours prior to the onset of symptoms, or prior to the date of the positive test (if HCP is asymptomatic) and ends after 10 days. If the employee was not on-site during this period, contact tracing ceases. For those on-site while infectious, the employee's supervisor is apprised of the dates and locations the individual worked via phone and encrypted email. The email includes definitions of exposure and instructs other employees working at the same time and location to conduct self-assessments. Specifically, coworkers determine their own level of exposure risk and self-screen for COVID-19 symptoms. Employees with positive screening call OEM for further evaluation. If more than two positive cases are revealed in a particular department within a single contact tracing, the OEM and IDP teams determine if mass testing is warranted (ie, all patients and employees within a unit are tested for the virus).

Decision Trees

Two algorithms guide the decisions of the OEM and LIP clinicians regarding testing, monitoring, and work restrictions. The tools are created with presentation-making software. One or the other algorithm is used depending on where exposure occurred. If the exposure is due to a COVID-19 positive individual who is residing in the same household as the HCP, the Cohabitation algorithm (Fig. 2, Upper Panel) is used. An important feature of this tool is the ''initial test and re-test'' strategy. The initial COVID-19 test determines if workplace tracing is needed and answers the question ''Is the employee currently infected?''. The second test is performed prior to re-entering the workplace and determines if the worker contracted the virus during their quarantine period. This decision tree was developed in response to the number of our employees living with housemates reported to be COVID-19 positive. Of the 776 VALLHS employees work-restricted during the year, 35% (273/776) were quarantined due to cohabitation. Work restriction is imposed even though the HCP themselves are asymptomatic and initial testing was negative. Of these 273 employees, 88 (32%) subsequently tested positive when re-tested before returning to the workplace. The Non-cohabitation decision tree is used (Fig. 2, Lower Panel) if the employee cannot identify a known contact or if the exposure occurred in the workplace or community. For a glossary of the terms used in the decision trees, see Table, Supplemental Digital Content 1, http://links.lww.com/JOM/A993.[19–25] For a detailed description of the algorithm pathways, see Text, Supplemental Digital Content 2, http://links.lww.com/JOM/B4. For the majority of the first year of the pandemic, COVID-19 vaccinations were not available, and therefore, the initial versions of the decision trees did not include the vaccination status of the employee. Once vaccinations were obtainable at our facility, we modified the algorithms to include vaccination status. These updated versions are presented here.

A novel feature of both algorithms involves work locations with unique COVID-19 challenges. These Special Units care for patients who have difficulty adhering to social distancing and wearing masks (eg, housed in our nursing home or acute psychiatric unit), or who are at higher risk of morbidity or mortality from COVID-19 infection (eg, dialysis unit). Unit-wide screening of employees by COVID-19 antigen assay is performed twice weekly in these locations and is managed by the incident command and IDP teams. Positive antigen test results are confirmed with PCR testing. Due to this increased surveillance, and to maintain adequate staffing in these work areas, the Active Monitoring[19] period is shortened. This strategy mitigates the risk of staffing shortages in these areas, especially during surges.

Employee Case Repository

For a team-based approach to be successful, a means of communicating the status of individual cases within the group of providers is needed. This information exchange is accomplished with the employee's health chart and the Employee Case Repository spreadsheet. The employee's chart serves as the primary account and records the details of each visit. Next, specific information is manually entered by the provider into the Employee Case Repository spreadsheet. The ''coauthoring'' feature of the spreadsheet software is activated to allow multiple users to enter data in the spreadsheet simultaneously. The file is comprised of three worksheets: *Employee Status*, *RTW Positive*, and *RTW Cohabitation*. All three sheets record the date of the visit, employee's name, telephone number, Job Title/Department, the initials of the OEM provider(s) involved in the case, and an ''Ancillary Notes'' column for useful information. These Ancillary Notes are free text entries to assist in case management. Typically, repository data entry is completed within 2 minutes or less.

The *Employee Status* sheet records exposure and testing information. Each row corresponds to an individual employee. Columns include the presence of COVID-19 symptoms (yes or no), status (at work or at home), start and stop dates of monitoring, if any, and a brief description of the exposure source, if known. Variables related to COVID-19 testing include date ordered, results, and if performed at our local facility or an outside laboratory. A mock-up of this sheet is seen in Figure 3. A distinctive feature of this worksheet is the color-coded graphics that allows quick assessment of testing status by visual inspection. For example, suppose an asymptomatic employee reports a high-risk exposure and is scheduled to work in less than 48 hours. In this instance, rapid COVID-19 testing is ordered with the results becoming available within 2 to 3 hours. On the spreadsheet, rapid testing is indicated by coloring the row red. In contrast, if the employee's next scheduled workday is 3 days in the future, a standard PCR test is ordered with the results becoming available within 2 to 3 days. In this instance, the row is colored blue. The benefit of this coding is realized when a different clinician views the sheet at a later time. A red row signals the need to periodically check for laboratory results over the next few hours, whereas a blue row indicates the results will not be available on that same day. Color coding is also used to represent test results. Once a provider retrieves the results, the red or blue color is changed to white if negative or yellow if positive.

The *RTW Positive* spreadsheet is used when an employee's test result is positive. Information from the *Employee Status* sheet is transferred to this sheet, and the clinician records the date the HCP's home isolation period will end (ie, 10 days from symptom onset or, if asymptomatic, from the date of their positive test, whichever is earliest). Each day, the sheet is reviewed to determine which employees are nearing the end of their isolation period. When HCP are within 2 days of the end date, a provider initiates a phone visit to re-evaluate for symptoms and to discuss the RTW protocol. The RTW protocol includes the employee being evaluated by their primary care provider (PCP) and obtaining a note stating the date they are considered to have recovered. Ancillary notes in this spreadsheet might include verbiage such as ''symptoms persist, continue to stay home, re-evaluate next week.'' In addition to tracking isolation periods, this sheet is used to identify workplace outbreaks. It records the job title and department(s) the employee has worked in, therefore, patterns of positivity within hospital locations can be recognized. If patterns are seen, contact tracing and mass screening within those locations are promptly initiated.

The third spreadsheet (*RTW Cohabitation*) records the cases of employees whose initial test results are negative, but who are quarantined due to cohabitation. It records the earliest date they may work again (ie, 10 days from the date of the cohabitator's positive test). It also records the date and results of the re-testing performed on the eighth day. If re-test results are negative, unvaccinated employees work under Active Monitoring[19] and the monitoring start and stop dates are recorded. If the re-test result is positive, the

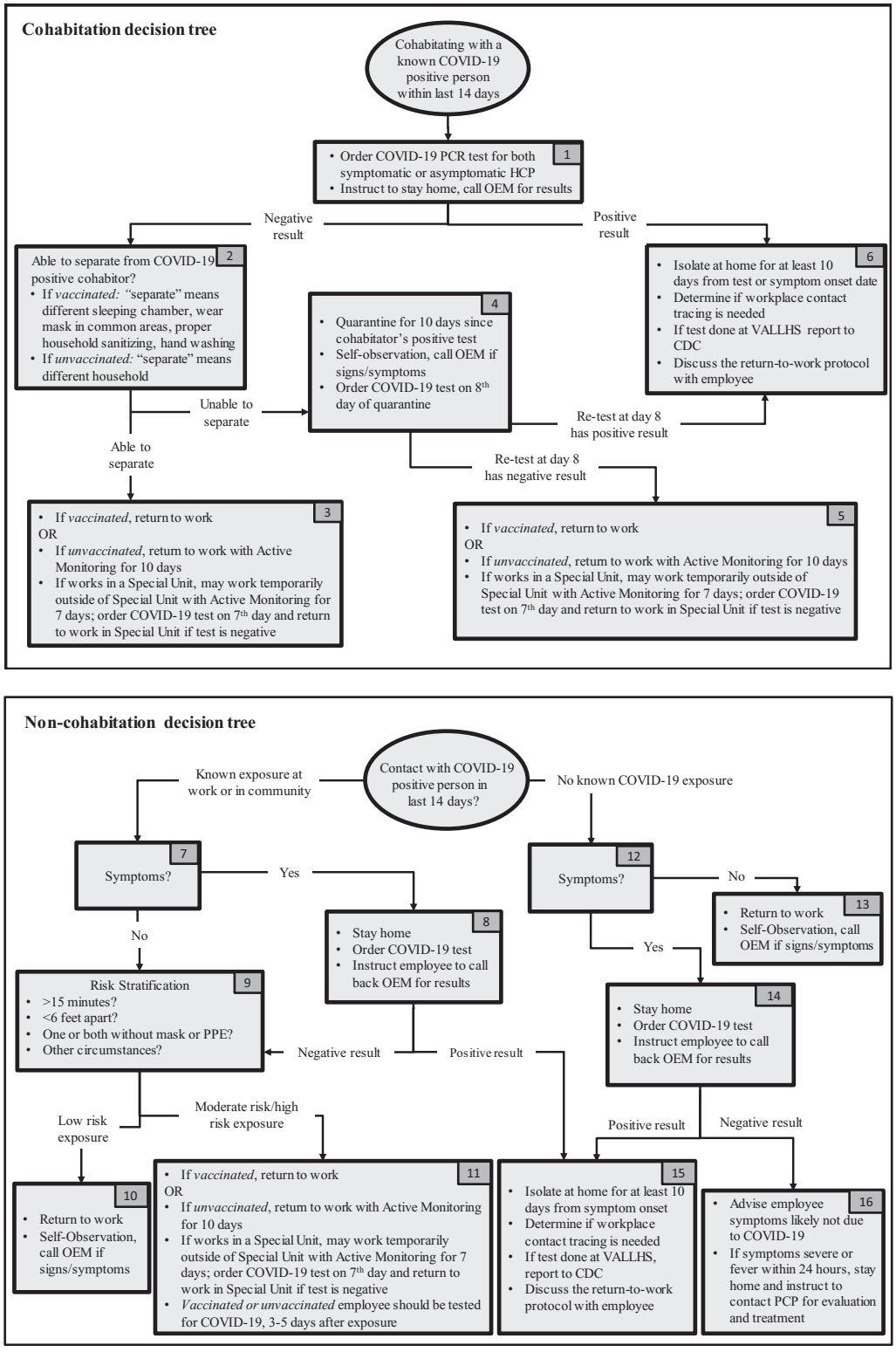

FIGURE 2. Cohabitation and Non-cohabitation decision trees. The Cohabitation decision tree (upper panel) is used if COVID-19 exposure occurs due to cohabitation. If no known contact is identified or contact occurred in the workplace or community, the Non-cohabitation (lower panel) tool is used. See Table, Supplemental Digital Content 1, http://links.lww.com/JOM/A993, for a glossary of terms, and Text, Supplemental Digital Content 2, http://links.lww.com/JOM/B4, for a detailed description of the algorithms. CDC, Center for Disease Control; COVID-19, severe acute respiratory syndrome (SARS)-CoV-2; HCP, healthcare personnel; OEM, occupational and environmental medicine; PCP, primary care provider; PPE, personal protective equipment; RT-PCR, reverse transcriptase-polymerase chain reaction; VALLHS, Veterans Affairs Loma Linda Healthcare System.

Visit date	Full name	Department	Position	AM start/end date	S/S	Test	Test Date	Location	Result	Work Status	Phone No	Source	Notes (Provider(s) Initials)*
11/272020	Doe, John	OTHER CLIN	Pharmacist		Yes	Yes	11/30/2020	In House	Negative	Home	000-022-0021	Coworker	Cohabitor's test is pending (MDC)
11/30/2020	Doe, Debbie	OTHER CLIN	Covid Screener	11/25/20 to 12/05/20	No	Yes	11/30/2020	In House	Negative	Work	000-006-0006	Family	+COVID-19 relative visited (DC/SH)
11/30/2020	Doe, Yann	NURSING	Nurse		Yes	Yes	12/1/2020	In House	Positive	Home	000-005-0005	Unknown	symptoms, worked in unit A & unit B (SH)
12/1/2020	Doe, Amid	NON-CLIN	Police officer		Yes	Yes	12/1/2020	In House	Negative	Home	000-007-0007	Unknown	Symptoms not likely COVID-19 (AG/BB)
12/1/2020	Doe, Kojo	MEDICINE	Physician		No	Yes	12/8/2020	In House		Home	000-011-0011	Friend	Does not work until 12/10 (DC)
12/1/2020	Doe, Mavis	NURSING	Nurse	12/01/20 to 12/11/20	No	Yes	12/1/2020	In House	Negative	Work	000-012-0013	Patient	moderate risk exposure (11/29) (AG)
12/1/2020	Doe, Sue	OTHER CLIN	Social worker		No	Yes	12/3/2020	In House		Home	000-014-0014	Family	to be tested 12/3, RTW if negative (CR)
12/1/2020	Doe, Brad	NON-CLIN	Administration		No	Yes	12/1/2020	In House	Positive	Home	000-015-0015	Family	been teleworking for the last month (BS)
12/1/2020	Doe, Mario	NON-CLIN	Housekeeping		Yes	Yes	12/1/2020	Outside	Positive	Home	000-016-0016	Unknown	symptoms started 11/25 (BS/MDC/YOW)
12/1/2020	Doe, Labib	NURSING	Case Manager	12/01/20 to 12/11/20	No	Yes	12/1/2020	In House	Negative	Work	000-017-0017	Family	able to separate from cohabitator (DC)
12/1/2020	Doe, Darryl	NON-CLIN	ICU Nurse		Yes	Yes	12/1/2020	In House		Home	000-019-0019	Patient	test and RTW if negative (YOW)
12/1/2020	Doe, Chante	NURSING	Nurse Assistant		No	Yes	12/1/2020	In House		Home	000-021-0021	Family	family +COVID-19 test on 11/30/21 (MDC)
12/1/2020	Doe, Cesar	OTHER CLIN	Pharmacist		Yes	Yes	12/1/2020	In House		Home	000-023-0023	Unknown	next shift is this evening, 12/01/20 (DC)
12/1/2020	Doe, Linh	OTHER CLIN	IT Specialist		Yes	Yes	12/1/2020	Outside	Negative	Work	000-003-0003	Family	symptoms for three days (AG/CR)
12/2/2020	Doe, Andy	NON-CLIN	Finance		Yes	Yes	12/2/2020	In House		Home	000-025-0025	Family	11/26 +COVID-19 family, retest 12/9 (BS)

FIGURE 3. Mock-up of the Employee Status spreadsheet page. Screenshot of one of the three spreadsheets of the Employee Case Repository populated with fictitious employee data. The color-coding of the row is interpreted as follows: red indicates the provider has ordered rapid testing, blue indicates the provider has ordered standard testing, orange indicates employee's test results is positive for COVID-19, and white indicates employee's test result is negative for COVID-19. +COVID-19, positive for (SARS)-CoV-2. *Abbreviations in parentheses are initials of provider(s) working on employee case. AM, active monitoring; CLIN, clinical; ICU, intensive care unit; IT, information technology; NON-CLIN, non-clinical; OTHER CLIN, other clinical; Phone no, phone number; RTW, return to work; S/S, signs and symptoms; (SARS)-CoV-2, severe acute respiratory syndrome.

employee's information is transferred to the *RTW Positive* spreadsheet and they are managed as a positive case.

Health Chart Documentation

As with any provider-client encounter, the OEM providers and recruited LIPs are expected to individualize documentation in the health record.[26] However, because the recruits are unfamiliar with the COVID-19 workflows in the OEM department, a set of documentation templates is used to ensure consistency in the delivery of care and to serve as memory aids during employee encounters. These simple tools are created using a word processing software program and correspond to the most frequent phone visit scenarios (initial triage, communication of positive or negative COVID-19 testing, and return to work clearance). In the setting of an electronic health record system, providers ''copy and paste'' the template text into the chart where it can be freely edited. This approach allows template content to be easily updated as expert guidance or organizational policies change.

Examples of these templates are displayed in Text, Supplemental Digital Content 3, http://links.lww.com/JOM/A995, and are used as follows: The *Initial triage template* is utilized for the first employee visit. Its contents prompt the provider to gather important details such as home phone and email in case the employee is restricted from working. It also assesses symptomology and gathers work history information to guide workplace contact tracing. The *positive result template* documents a visit when the employee is informed of a positive COVID-19 test result. It triggers the clinician to discuss the return to work protocol and to instruct the employee to seek treatment with their personal PCP. Also documented is the name of the person completing the CDC-mandated person of interest reporting form. Its content also includes the CDC return-to-work criteria. This guides a discussion with the employee regarding the requirements for them to be cleared to work again. The *negative result template* records a visit when the employee is informed of a negative COVID-19 test result. It reminds the provider to inquire about symptomology and to discuss Active Monitoring and Special Unit work limitations, if appropriate. The *RTW template* is related to an employee's recovery from COVID-19 infection and work clearance. It lists the CDC return-to-work criteria and serves as a memory aid for the provider to ensure the criteria have been met.

DISCUSSION

Studies assessing COVID-19 infection risk indicate the proportion of HCP contracting the virus maybe two to three times higher than that of the patient population they serve.[27,28] Consistent with this, the percentage of cumulative cases in our facility's workforce during the first year of the pandemic, was approximately 2.4 times higher than that of the population in our nearby communities. Similarly, reports indicate that trends in the rates at which HCP contract COVID-19 parallel the patterns observed in the surrounding general population.[27,29] In support of this, the pattern of monthly counts of our COVID-19 positive employees closely mirrored that of our local areas.

As the COVID-19 pandemic has advanced, recommendations on how to manage the care and safety of the healthcare workforce have emerged. Several publications offer broad guidance[3,30] or promote the development of facility-wide programs and policies.[2,3,8,9] The third set of reports describe the specific, practical tasks performed by OEM departments and ancillary staff in large healthcare organizations such as Hospital Israelita Albert Einstein,[4] Stanford University,[5] Mayo Clinic,[6] and Monash Health.[7] Unfortunately, application of some of these approaches may not be feasible for small to medium size facilities with limited resources. Our work is similar to the latter group[4–7] in that we focus on specific tasks performed by OEM specialists as it relates to employee work reassignment to assist the OEM team,[3,5] exposure risk assessment, symptom evaluation and testing decisions, work restrictions, and contract tracing.[4–7] But in contrast to these prior reports, the practical OEM strategies and tools described here can be implemented with fewer technological requirements. The three task-supporting tools (ie, decision trees, Employee Case Repository,

and documentation templates) are created using office productivity software programs that can be downloaded for free from open-source internet sites or may already be in use by OEM teams. Furthermore, except for the repository spreadsheet which requires a shared drive platform, the approaches described can be fully implemented in a paper-based format with minimal technical resources (ie, a telephone system with the ability to transfer calls, and one computer/printer to produce hard copies of the algorithms and documentation templates). This means large budgetary expenditures are not required and implementation is feasible in most OEM settings. Additionally, because the tools are easily modified, updates can be readily performed as the landscape of COVID-19 recommendations changes.

We employ a staff reassignment strategy as previously described.[3,5] As the volume of employee calls climbs during surges, LIPs are procured to assist the OEM team. When infection rates decline, the clinicians are returned to their usual duties. We found that a team-based strategy (ie, multiple providers managing one employee case) prevented delays in both the care of the employee and the initiation of workplace contact tracing. This care delivery model is augmented with two customer call centers schemas. The first, next available agent routing, increases the speed at which a call is directed to a provider, leading to shorter caller wait times.[12,13] The second strategy of ''universal agents'' is used by small- to mid-sized businesses to increase the efficiency of communications and customer satisfaction.[13–15] This differs from the ''skill-based agent'' approach utilized by others,[5–7] in which actions are routed to specialized staff trained to manage one or two specific tasks. For example, in the model implemented at Mayo Clinic,[6] four groups manage one aspect of the contact tracing process: exposure triage, data recording, exposure risk assessment, and work status management. At VALLHS, the OEM and LIP clinicians perform all of these tasks.

The ''universal agent'' model has advantages and disadvantages. One benefit is the scheduling of clinicians is simple and flexible. If an LIP needs time away from the OEM department to attend to their usual work duties or for other reasons, their absence is easily covered by the remaining universally trained clinicians. A second advantage is the enhancement of the employee experience. HCP obtain immediate access to a provider who can deliver the desired task. Quickly attending to employee COVID-19 concerns demonstrates the healthcare organization is attentive to employee's needs and values their health. Considering studies reporting increased psychological stress in HCP during the pandemic,[31–34] this support is likely beneficial in maintaining workforce morale. The major disadvantage of the ''universal agent'' model is the time investment for training. Studies in organizational learning suggest that knowledge in an enterprise lies within personnel, tasks, and tools (and the interactions between these components).[35] For example, knowledge embedded in the tools and tasks developed by one shift of workers can significantly increase the speed of learning by new employees on a different shift.[36] Accordingly, our training involves personnel interactions (one-to-one training, ad hoc huddles), task-oriented activities (''shadowing'' OEM providers during task performance), and tools (decision trees, Employee Case Registry, and documentation templates). The ad hoc team huddles are a particularly robust mechanism for recruits to rapidly acquire COVID-19 decision-making skills. These huddles primarily involve discussions of cases between the recruits and experienced providers, followed by a collective decision. It has been demonstrated that shared cognition interactions such as these, significantly enhance trainee learning.[37–39] The huddles also keep the team abreast of new COVID-19 recommendations and changes in local policy. In addition, they led to the collaborative development of the OEM protocols and tools presented here.

Due to the highly contagious nature of the virus, rapid contact tracing is required to prevent infection spread.[40,41] Because conventional contact tracing is time and labor-intensive,[42] digital applications have been developed to automate or partially automate the process, many of which involve self-assessment for COVID-19 symptoms.[6,43] While we advocate for the adoption of these new solutions to improve efficiency, the implementation may not be feasible in settings where extensive technological resources are not available. In the absence of a digital application, we manually conduct contact tracing.[40] However, even with recruited staff, OEM teams may not be able to keep up with the massive workload experienced during surges. Therefore, we delegate notification of exposures to the employees' supervisor with email instructions asking potentially exposed staff to perform self-assessments for symptomology and risk exposure. If either is positive, HCP are instructed to call the OEM department for a formal assessment.

Our Non-cohabitation algorithm shares similarities to strategies reported elsewhere,[6] including use of symptom assessment, exposure risk stratification, and test results to guide decisions. However, at the time of this writing, we are unaware of any published algorithm which differentiates cohabitation exposure from non-cohabitation exposure. Ideally, any worker with significant contact should be restricted from working. However, the risk of HCP shortages must also be taken into consideration.[2] If exposure occurs in the workplace or community, HCP who are asymptomatic, and have a negative initial test, continue to work under increased surveillance. But if exposure is due to cohabitation, work restrictions are imposed. We reason that, assuming availability, HCP wear PPE for most, if not all interactions at work or outside the home. In contrast, adherence to PPE donning, social distancing, and other precautions are likely lower or absent in the cohabitation setting. Estimates of the basic reproductive number (R_0) (ie, transmissibility of the COVID-19 virus), range from 2.68 to 6.49.[44] Loosely defined, R_0 is the number of secondary infections one case would produce in a completely susceptible population.[45] Use of the ''initial test and re-test'' strategy in the Cohabitation algorithm revealed that 32% of our asymptomatic cohabitating HCP became infected between their initial test and the re-test eight days later. This, and the fact that asymptomatic individuals carry and transmit the virus,[46] highlights the importance of work restrictions for HCP exposed by cohabitation, even if they remain asymptomatic.

The Employee Case Repository spreadsheet is another key OEM instrument. The ''coauthoring'' feature allows multiple providers to edit the file simultaneously. This synchronicity is essential during pandemic surges when call volume is high. The color-coding enhances workflow by allowing providers to rapidly deduce an employee's COVID-19 testing status. It has been known for decades that the color-coding of alphanumeric displays enhances the speed at which an observer can locate an object within a visual field.[47] In the setting of our OEM work, row colors trigger the provider to retrieve results today, in 1 to 2 days, or not at all. In other words, check for rapid test results, standard test results, or test results that are already known, respectfully.

The final element of our toolkit is a set of documentation templates produced using word processing software. The templates contain both standardized components and areas intended for customization. This format is useful in clinical settings where workflows focus on multiple specific tasks and the contents of the encounter typically do not widely vary from person to person.[48,49] The design of the structured components is similar to filling out a form or using a checklist. Checklists are particularly beneficial as memory aids to ensure efficient and thorough visits are conducted.[50] For example, standardized text in our initial triage template, reminds clinicians to collect exposure dates and locations, recent work history, symptomology, and date of symptom onset. Other sections such as ''assessment and plan'' are used for free text entry for employee-tailored documentation. However, these customizable sections of the templates do contain optional text to

prompt the LIP recruits to engage in conversations appropriate to the case (eg, instructions for testing, isolation, quarantine, monitoring, and infection prevention). If the optional text is not appropriate it is deleted. Of note, the *positive results template* reminds the OEM clinician to direct the employee to their personal PCP for COVID-19 treatment and to determine the date the employee is recovered. This differs from the approach of other institutions[4,5] wherein the OEM providers determine the recovery date after treating the COVID-19 infection. We accord the recovery decision to the PCP reasoning that the individual's provider has greater knowledge of the employee's general health and comorbidities. However, if an employee does not have an established PCP or cannot be evaluated in a timely manner, the OEM provider determines the recovery date.

One limitation of this study is that the total counts of employee and cohabitation positive cases include both confirmed cases from VALLHS testing and reports of positive PCR tests from other facilities (ie, unconfirmed cases). Thus, the actual number of cases may be lower than reported here. It is possible that a subset of employees provided false information to have work restrictions imposed or for other unknown reasons. However, our experience revealed that HCP frequently expressed embarrassment when reporting positive test results. This appeared to be related to thoughts that they had relaxed their prevention precautions, underestimated their risk of infection, and/or might have exposed their coworkers. Therefore, we believe the number of HCP falsely reporting positive results was relatively low during the first year of the pandemic. We acknowledge that this scenario may change as new COVID-19 surges develop. This anecdotal information along with a desire to avoid adding a new bureaucratic layer to employee case management influenced our decision to forego requiring outside laboratory documentation. We reasoned that mandating proof would create the perception the provider did not believe the employee. Based on reports of stress and the negative psychological impact of the pandemic on healthcare personal,[31–34] we decided provider-client rapport and trust should take precedence over the detection of employees who may be falsely reporting for ulterior motives.

Another limitation relates to the need to tailor the supportive tools to each OEM setting. This customization is necessary because expert recommendations to address COVID-19 vary from country to country and continue to evolve as more is learned about the virus.[2] This means OEM staff must design and regularly update the specific criteria, definitions, and actions within the tools. At our facility, this updating is accomplished with frequent review of emerging COVID-19 guidelines by the OEM and IDP teams, followed by performing edits to the tools.

CONCLUSION

Over the first year of the pandemic, significant surges in infection rates occurred in both our surrounding community and workforce. This led to a significant escalation of front-line OEM tasks to evaluate, test, impose work restrictions, and grant RTW clearances for our employees. These circumstances drove the development of new processes and tools, including a team-based call center strategy, case tracking, and contact tracing. It also resulted in the development of novel decision support tools that address exposures due to cohabitation or non-cohabitation and manage employees who work in hospital units with unique COVID-19 challenges. The worth of these OEM tools does not lie in the specific content of the recommendations and criteria listed within them. Rather, their value is derived from the fact that they can be created and customized by OEM health specialists using commonly available software. Furthermore, they can be implemented in a paper format, if needed. Accordingly, they can be implemented by most OEM departments without prohibitive financial costs.

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