



Investigation of COVID-19 Outbreaks in Acute Care Hospitals

Background

The CDPH Healthcare-Associated Infections (HAI) Program developed the following guidance on identification and response to COVID-19 acute care hospital (ACH) outbreaks to facilitate implementation of CDC guidance on [Responding to SARS-CoV-2 Infections in Acute Care Facilities¹](#)

Through *routine* hospital surveillance processes, identification of a healthcare provider or patient with a new SARS-CoV-2 infection should prompt an investigation to determine if others in the facility were exposed, and measures to limit transmission. A cluster of COVID-19 cases meeting the investigation and reporting thresholds in [AFL 20-75](#) suggests a breach or lapse in infection prevention practice leading to person-to-person transmission within the facility and should be promptly investigated by the hospital and reported to the local health department (LHD) and Licensing & Certification District Office (L&C DO). Early recognition and reporting of clusters as required by Title 17 and Title 22 will facilitate timely intervention to limit transmission and protect patients and healthcare personnel (HCP).

Routine Surveillance for COVID-19

Employee Health (EH) responsibilities²: HCP case finding, exposure risk assessment, and work restrictions

- a. Establish a process for [daily symptom](#) screening and prompt [testing of symptomatic HCP](#), including those with new mild symptoms.
- b. Oversee implementation and tracking of any routine screening testing of HCP ([AFL 20-88.1](#)).
- c. Interview HCP with newly identified COVID-19 to gather key details: date of symptom onset, if the HCP worked while infectious (including the 48h prior to symptoms onset), what department, and whether there were known community or work exposures, including carpooling, and social activities with co-workers at work or outside of work.
- d. Review all HCP with newly identified COVID-19 for epi-links* with other positive HCP (e.g. worked on same unit, same shift, within 14 days of each other), and alert the infection preventionist (IP) if cases are epi-linked.
- e. Confidentially notify supervisors and the IP of potential exposures to other HCP or patients.
- f. Manage exposed HCP according to CDC's HCP [risk assessment and work restrictions](#) and [AFL 21-08.3](#) taking into account their vaccination status and staffing levels.
 - Symptomatic HCP who initially test negative should continue to be restricted from work and evaluated for alternative etiologies such as influenza; retest for COVID -19 infection in 24-48 hours even if the influenza test is positive.
- g. Maintain [frequent and regular communication](#) with the infection prevention & control (IPC) program. Meet at a minimum weekly to review cases until the pandemic subsides.

*Note: the determination of epi-linkage should generally be made irrespective of whether HCP were wearing a respirator or facemask

Infection Prevention and Control (IPC) responsibilities: surveillance and investigation of potentially hospital-acquired cases in HCP or patients per [CDC guidance](#) and [AFL 20-75](#):

- Onset or diagnosis of SARS-CoV-2 infection in a patient occurring ≥ 7 days after admission (late-Dx COVID-19). Of note, onset of SARS-CoV-2 infection after a shorter period (e.g., ≥ 2 days) could still indicate hospital-associated transmission.
 - Two or more SARS-CoV-2 infections identified among epidemiologically linked HCP or patients (e.g., those working or residing on the same unit).
- a. Ensure all patients are tested upon admission ([AFL 20-88.1](#)).
 - b. Promptly test any newly symptomatic patients and patients who are exposed to a suspected or confirmed case during their hospital stay ([AFL 20-88.1](#)).
 - c. Ensure that all inpatients with known exposure to an individual with known or suspected COVID-19 are placed in transmission-based precautions (quarantined) and tested, regardless of vaccination status.
 - d. Establish a surveillance mechanism for identification of late-Dx COVID-19 cases in patients, e.g., automatic notification of confirmed COVID-19 cases in patients ≥ 7 days post-admission for a non-COVID-19 condition or daily review of COVID-19 test results, and active reporting of newly diagnosed cases by ID consultants, hospitalists, and unit supervisors.
 - e. Promptly review any late-Dx COVID-19 cases in patients to determine if the case could be hospital-acquired based on clinical history and potential exposure to COVID-19 positive HCP or patients; consult with the hospital epidemiologist or chair of the Infection Control Committee as needed.
 - f. If a newly positive COVID-19 patient was not in transmission-based precautions during hospitalization, identify possible exposures to other patients and HCP and ensure prompt isolation and testing.
 - g. If two or more SARS-CoV-2 infections are identified among epidemiologically linked HCP or patients (e.g., those working or residing on the same unit), alert Employee Health and assemble an investigation team.
 - h. Maintain frequent and regular communication with Employee Health. Meet at a minimum weekly to review cases until the pandemic subsides.

Hospital Response after Identification of a Cluster or Nosocomial Transmission

Assemble a hospital team responsible for further action once reporting thresholds are met, including the hospital IP, Director of Employee Health, Director of Quality/Patient Safety, and manager of the clinical unit(s) involved.

Additional team members to consider: Laboratory Director, Director of Environmental Services, Director of Facilities Services/Engineering, Director of Respiratory Therapy, and representative from Administration, depending on the circumstances of the outbreak. Consider an incident command structure for investigation of larger outbreaks. Hospital investigations can be complex, rapidly evolving and resource intensive.

Initial actions:

- a. Identify the hospital's primary contact (lead) for this investigation. The primary contact will be responsible for coordinating regular meetings and communications internally and reporting to the LHD and L&C DO per [AFL 20-75](#).
- b. Prepare a summary of the situation including potential route(s) and extent of transmission. Include what has been planned or implemented to reduce risk of transmission
- c. Promptly report to the LHD (within 24 hours) and establish a plan for ongoing communication and collaboration with the LHD. LHDs determine if the cases constitute an outbreak. The hospital should report outbreaks to their L&C DO.
- d. Alert laboratory to save all positive COVID-19 specimens associated with the outbreak for at least 1 month (freeze @ -20 °C) while outbreak is being investigated in case confirmatory testing and/or whole genome sequencing will be pursued.

Request that the laboratory director verify the [accuracy of laboratory results](#) to ensure the results are true positives and not false positives.

Collaboration with the Local Health Department

- a. Plan the investigation jointly, including the timeline and mechanism for data sharing and division of responsibilities during the initial discussions.
- b. Collaborate with LHD to determine any resource needs (for either the hospital or LHD) and ensure timely communication to the MHOAC.
- c. With LHD, determine when patient notification of exposure is indicated and determine criteria to conclude that the outbreak is over.
- d. Provide the LHD with timely notification of additional cases.
- e. Additional LHD responsibilities may include: tracing of community contacts of positive HCP, coordinating prompt notification of other facilities if the positive HCP worked elsewhere when infectious, epidemiologic analysis that could link an outbreak in one facility to outbreaks in other facilities, testing for variants of concern, and providing or facilitating whole genome sequencing

Perform Investigation

Identify, notify, quarantine, and test exposed patients, visitors, and HCP. Assess IPC practices and implement control measures in parallel with case finding.

Investigation tools

- Review the literature for similar outbreaks.⁴⁻⁸
- Develop a line list of cases and construct an epi curve (Appendix A for line list template). Note the job classifications of positive HCP to look for potential patterns of transmission.
- Obtain map of area(s) of concern, including locations (units or wards) where HCP and patient cases were identified, and location(s) of dedicated COVID unit(s).
- Interview staff members familiar with the processes who work in the location of the outbreak about standard workflow, breakroom practices, observations of adherence to IPC measures and PPE.

Case investigation, contact tracing, risk assessment, testing, quarantine and work restriction

- a. Determine period of exposure risk, e.g., starting 14 days prior to symptom onset or positive test of earliest case through the date of the last known exposure when all involved HCP had been excluded and patients with COVID-19 appropriately isolated.
- b. For HCP, an exposure is defined as being within 6 feet of an infectious individual for **a cumulative time period of 15 or more minutes during a 24-hour period while not using recommended personal protective equipment (PPE)**. Performance of an [aerosol generating procedure](#) on a patient *while not using recommended PPE for any duration of time* should be considered an exposure. HCP to HCP exposures at work occur when unmasked, unable to physically distance, or in poorly ventilated spaces (e.g. during breaks/meals, and in crowded charting areas). Interview HCP for potential exposures to other HCP in formal work settings and for other types of exposures, such as carpooling, meal breaks, and social activities with co-workers at work (potlucks) or outside of work. Note the job classifications of positive HCP to look for potential patterns of transmission.
- c. [HCP testing strategy](#): Ideally, test as soon as the outbreak is identified and test serially, e.g., at 3-7 days. Use a gradually escalating (or ring) approach to testing, to increase the likelihood of identifying all cases associated with the outbreak
 - **Tier 1:** Once the threshold for a HCP cluster is met, initiate testing of HCP who work on the same unit and same shift as known COVID-19 positive HCP in cluster. Prioritize HCP exposed within the past 7 day for testing to quickly inform additional contact tracing.
 - **Tier 2:** If additional positive HCP are identified, expand testing of HCP and patients. Consider exposures during staff hand-off, floating to other units, and ancillary staff, residents, and attending physicians.
 - **Tier 3** If positive HCP are subsequently identified in other units or in other staff groups, consider broadening the testing approach to include those units or staff groups.
 - Continue ongoing monitoring, such as weekly surveillance testing to ensure the outbreak is over. Testing and symptom monitoring should continue for minimum of 14 days after the last known contact among HCP or patients test positive. In large outbreaks, consider surveillance for 28 days (two incubation periods) in consultation with the LHD.
 - Manage exposed HCP according to [AFL 21-08.3](#) taking into account their vaccination status and staffing levels. [Strategies to Mitigating HCP Staffing Shortages](#) include allowance of asymptomatic exposed staff who test negative to continue to work, or shortened quarantine and work exclusion options, however these are not a preferred option during an outbreak.
- d. For patients [exposure risk](#) mirrors the HCP risk assessment. Because patients may not always wear source control properly while in their hospital room, patients exposed (such as to a positive roommate or a positive HCP) should be placed in transmission-based precautions and tested.
 - **Tier 1:** Prioritize for testing patients currently hospitalized in same unit within 7 days of last exposure to HCP or late-dx-COVID-19 case in a patient. Place in transmission-based precautions and test upon identification, test if COVID symptoms develop, and if asymptomatic, test again at 5-7 days. Quarantine for 14 days.

- **Tier 2:** Patients transferred to other units but still hospitalized. Prioritize those patients who received direct care from a positive HCP or who had a COVID positive roommate. Coordinate with LHD to notify and provide testing for discharged patients within 7 days of last known exposure. Prioritize patients discharged to high risk congregate settings or who receive outpatient hemodialysis, and severely immunocompromised.
- **Tier 3:** Patients >7-14 days since last exposure, and who are discharged home. Consider letter of notification, and alert SNF or high-risk congregate settings. Testing may be considered as directed by the LHD.

Assess for lapses in IPC practices that may lead to hospital transmission

Conduct assessment in parallel with contact tracing and testing.

SARS-CoV-2 is transmitted by droplet, small particle aerosol inhalation, and direct or indirect contact routes.

Focus on gaps between IPC policy and practice. Elements to assess include:

- a. Staff behavior, universal source control adherence, physical distancing in work areas and breakrooms, movement between units (e.g. floating), symptom screening (self-attestation or external screener), HCP screening testing protocols.
- b. Lapses or delays in identification of COVID status of patients or lapses in implementation of appropriate transmission-based precautions.
- c. Access to supplies including ABHR for hand hygiene and PPE.
- d. Staff use of proper PPE, donning and doffing.
- e. Presence of a respiratory protection program including fit-tested N95 respirators or higher level of respirators for suspect or confirmed COVID-19 infection. PAPRs are preferred for aerosol-generating procedures in COVID-19 patients, per Cal/OSHA Aerosol Transmissible Diseases Regulation ([8 CCR 5199](#)).
- f. Implementation of dedicated staffing on COVID-19 unit (such as nursing, housekeeping, respiratory therapy).
- g. Adequacy of workspaces and break areas to allow for physical distancing
- h. Cleaning/disinfection of high touch surfaces and re-usable equipment.

Ventilation system review with facilities engineers (including AIIRs, HVAC system, monitoring/preventive maintenance).

Implement Infection Control Measures to Limit Transmission

- a. Review the preliminary data from the IPC assessment with the investigation team
- b. Depending on the findings of the initial assessment, immediate interventions might include but are not limited to the following:
 - Stagger breaks and rearrange seating in common break areas to maintain at least 6 feet physical distance between workers. Breakrooms should be routinely monitored for correct positioning of limited seating to maintain ≥ 6 feet distance. Ensure supplies for hand hygiene and area for removal of respirators only during actual food and beverage intake, and correct mask and face shield storage during period removed.

- Move or reposition workstations or identify more charting areas to allow for more physical distance.
 - Cohort all COVID positive patients on a dedicated COVID unit and have dedicated nursing staff and environmental services staff. Cohort other ancillary staff (e.g., respiratory therapy, phlebotomy, radiology to the extent possible). Use disposable equipment or dedicate re-usable equipment to the unit and ensure cleaning/ disinfection between patient use.
 - Consider extended use of N95 respirators and face shield for all HCP on the outbreak unit(s) until the outbreak under control.
 - Address any ventilation system concerns identified.
 - **Monitor adherence** to routine infection control practices (e.g., hand hygiene, social distancing, universal source control, proper PPE, environmental cleaning), including during night shift
- c. Continue to monitor until transmission has ceased.

Final Report

Hospital should prepare a report of the outbreak in coordination with the local health department, including lessons learned, areas identified for improvement, and possible solutions.

Resources

1. CDC guidance: [Responding to SARS-CoV-2 Infections in Acute Care Facilities](#)
2. CDC: [Infection Control in Healthcare Personnel: Infrastructure and Routine Practices for Occupational Infection Prevention and Control Services \(2019\)](#)
3. Banach, D., Johnston, B., Al-Zubeidi, D. et al. (2017). [Outbreak Response and Incident Management](#): SHEA Guidance and Resources for Healthcare Epidemiologists in United States Acute-Care Hospitals. *Infection Control & Hospital Epidemiology*, 38(12), 1393-1419. doi:10.1017/ice.2017.212
4. Klompas M, Baker, MA, Rhee, C et al. [A SARS-CoV-2 Cluster in an Acute Care Hospital](#). Ann Intern Med. [Epub ahead of print 9 February 2021]. doi:[10.7326/M20-7567](#)
5. [SHEA Webinar COVID-19 Town Hall Round 17](#), 8/2/2020. Haessler, S. Anatomy of a COVID-19 Outbreak.
6. Kim YJ, Choe JY, Kwon KT, et al. [How to keep patients and staff safe from accidental SARS-CoV-2 exposure in the emergency room](#): Lessons from South Korea's explosive COVID-19 outbreak. Infect Control Hosp Epidemiol. 2021;42(1):18-24
7. Kang, Trish M. Perl. [Déjà Vu: Coronaviruses and Transmission in Health Care Settings](#). Ann Intern Med. [Epub ahead of print 9 February 2021]. doi:[10.7326/M21-0526](#)
8. Rhee C, Baker M, Vaidya V, Tucker R, Resnick A, Morris CA, Klompas M; CDC Prevention Epicenters Program. [Incidence of Nosocomial COVID-19 in Patients Hospitalized at a Large US Academic Medical Center](#). JAMA Netw Open. 2020 Sep 1;3(9):e2020498. doi: 10.1001/jamanetworkopen.2020.20498. remo