#94150: The 2019–2020 Novel Coronavirus Outbreak

Overview

Widespread outbreaks of novel (new) coronavirus infection have occurred in each of the past two decades, and the current Wuhan, China, outbreak poses the third threat of a severe novel coronavirus epidemic on a global scale. The rapid accumulation of many new cases in Wuhan City during the months of December 2019 and January and February 2020, combined with evidence of spread to persons from other nearby provinces in central China and reports of acute infection in healthcare workers, point to facile human-to-human transmission of COVID-19 as the key factor responsible for continued propagation of the outbreak.

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Course Objective

The purpose of this course is to provide physicians, nurses, and other healthcare professionals an overview of the emerging human coronavirus (SARS-CoV-2) outbreak, including background epidemiology, clinical features, mode of transmission, epidemic potential, and the clinical and public health measures recommended to limit the spread of infection and control the outbreak.

Learning Objectives

Upon completion of this course, you should be able to:

1. Differentiate between the common, ubiquitous strains of human coronavirus and novel (outbreak) strains with respect to epidemiology, modes of transmission, spectrum of illness, and public health implications.
2. Characterize the clinical and public health experience gained from the two prior novel human coronavirus epidemics, SARS and MERS, and how that informs our understanding and response to the current outbreak.
3. Provide current health precautions and travel advice to the elderly and to persons returning from or needing to travel to countries with heavy COVID-19 disease activity.
4. Access and implement guideline recommendations for clinical assessment, diagnostic testing, appropriate isolation precautions, and monitoring of a patient with recent exposure to, suspected infection with, or newly diagnosed COVID-19.

Faculty

John M. Leonard, MD, Professor of Medicine Emeritus, Vanderbilt University School of Medicine, completed his post-graduate clinical training at the Yale and Vanderbilt University Medical Centers before joining the Vanderbilt faculty in 1974. He is a clinician-educator and for many years served as director of residency training and student educational programs for the Vanderbilt University Department of Medicine. Over a career span of 40 years, Dr. Leonard conducted an active practice of general internal medicine and an inpatient consulting practice of infectious diseases.

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BACKGROUND

CORONAVIRUS

Coronaviruses (a subfamily of Coronaviridae) are enveloped, single-stranded RNA viruses that are broadly distributed among humans, other mammals, and birds. Under electron microscopy, the outer envelope of the virion shows club-like surface projections that confer a crown-like appearance to the virus, which accounts for the name given to this family of viruses. The nucleocapsid is a long, folded strand that tends to spontaneous mutations and frequent recombination of the genome, which may account, in part, for changes in transmissibility and pathogenicity that permit novel coronavirus infection in humans.

In addition to four specific subtypes of coronavirus commonly found in humans, other strains have been detected in many different species of animals, including bats, cats, camels, and cattle. On rare occasions, an animal coronavirus is responsible for zoonotic infection in humans, meaning that a novel coronavirus is transmitted from an animal host to one or more humans, producing clinical illness that may result in secondary spread among persons in close contact. The wide distribution, genetic diversity, and frequent shifts in the genome, combined with unique human-animal interface activities, are considered important factors in the periodic emergence of new coronavirus outbreaks in human populations [1,2].

HUMAN CORONAVIRUS INFECTION

Common Strains

Human coronavirus (HCoV) was first identified in 1965, isolated from a patient with what was described as the common cold [3]. Subsequently, four types of HCoV have been detected commonly in respiratory secretions of children and adults in scattered regions of the globe, labeled HCoV-229E, -NL63,-OC43, and -HKU1. These agents are a common cause of mild-to-moderate upper respiratory illness, such as the common cold, bronchitis, bronchiolitis in infants and children, and asthma exacerbation. On occasion, as with influenza, HCoVs can cause serious lower respiratory tract infection (viral pneumonia), a complication more common to persons with underlying cardiopulmonary disease or weakened immune systems.

Novel Coronavirus Outbreaks

In addition to the seasonal infections caused by the ambient, adaptive HCoVs described, widespread outbreaks of novel (new) coronavirus infection have occurred in each of the past two decades, and the 2019–2020 Wuhan, China, outbreak poses the third threat of a severe novel coronavirus epidemic on a global scale [1,4]. The common epidemiologic feature of these outbreaks is an initial point source cluster of zoonotic infection followed by secondary spread of the virus via human-to-human transmission. Among the factors thought to be conducive to the emergence of such outbreaks are the following: genomic recombination in an animal CoV capsid that renders the virus better adapted to human infection (and

perhaps more virulent); and dietary practices and cultural determinants that bring humans into close contact with livestock or raw meat and carcasses of wild animals and birds, thereby facilitating transmission from an infected animal host to humans. After infection is established, secondary viral transmission occurs through close person-to-person contact by way of droplet nuclei propelled into the air during coughing and sneezing. The first two known novel coronavirus outbreaks, severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012, are considered to be zoonotic in origin and were associated with serious, sometimes fatal illness.

Severe Acute Respiratory Syndrome (SARS-CoV)

Infection with SARS-CoV was first recognized in China in November 2002, and signs of an outbreak in Asia were evident by February 2003 [3]. Epidemiologic investigation found that early cases of SARS-CoV represented zoonotic infection involving transmission from civet cats to humans. Over the next several months, SARS-CoV spread to countries in North America, South America, Europe, and other parts of Asia before the global outbreak was contained later in the same year.

SARS-CoV infection began with fever, headache, malaise, and arthralgia/myalgia followed in two to seven days by cough, shortness of breath, and in most patients, signs of pneumonia [3].

According to the World Health Organization (WHO), the 2002–2003 outbreak caused 8,098 probable cases of SARS worldwide and 774 deaths. Just eight cases were identified in the United States. Since 2004, there have been no additional known cases of SARS-CoV infection reported anywhere in the world [3].

In response to the 2003 global SARS outbreak, the Centers for Disease Control and Prevention (CDC), working in concert with the WHO, developed a strategy for controlling the epidemic that included the following elements [3]:

- Activated the Emergency Operations Center to provide around-the-clock coordination and response.
- Committed more than 800 medical experts and support staff to work on the SARS response.
- Deployed medical officers, epidemiologists, and other specialists to assist with on-site investigations around the world.
- Provided assistance to state and local health departments in investigating possible cases of SARS in the United States.
- Conducted extensive laboratory testing of clinical specimens from patients with SARS to identify the cause of the disease.
- Initiated a system for distributing health alert notices to travelers who may have been exposed to cases of SARS.

This experience provides a blueprint for responding to the 2019–2020 coronavirus outbreak in China.

Middle East Respiratory Syndrome (MERS-CoV)

MERS-CoV was first reported in Saudi Arabia in 2012, and all cases to date have been linked to countries in or near the Arabian Peninsula. Travel-associated MERS-CoV infection has been reported from many countries around the world, including two imported cases diagnosed in the United States in 2014 involving unlinked healthcare providers who had recently lived and worked in Saudi Arabia. There is epidemiologic evidence for two modes of transmission: zoonotic infection from an animal reservoir to humans (with camels acting as the intermediate host), and person-to-person transmission via close contact with an index case, as described in association with a family case cluster and a nosocomial outbreak [5,6,7].

Most persons with confirmed MERS-CoV infection have had moderately severe respiratory illness manifest by fever, cough, and shortness of breath, often complicated by pneumonia and respiratory failure. The case-fatality rate approaches 40%. Most deaths have been in patients with pre-existing chronic conditions such as diabetes, cancer, or heart, lung, or renal disease. Sporadic cases of MERS-CoV continue to appear in various parts of the Middle East [3].

THE WUHAN, CHINA, NOVEL CORONAVIRUS OUTBREAK: A GLOBAL THREAT

In December 2019, Chinese physicians in Hubei Province, China, began an investigation of a cluster of cases of severe viral pneumonia in area hospitals linked to exposure to a large seafood and live animal wholesale market in Wuhan City.

In the weeks following, it became evident that a large outbreak of respiratory illness was rapidly emerging within Wuhan City and nearby communities, reaching the thousands by mid-January.

On January 24, Chinese scientists reported the results of viral diagnostic studies conducted on bronchoalveolar lavage specimens obtained from three Wuhan City patients hospitalized in December with severe bilateral interstitial, alveolar pneumonia [2]. The investigation identified a viral genome matched to lineage B of the genus betacoronavirus, showing more than 85% match with a SARS-like CoV genome previously described in bats. Ultrathin sections of infected human airway epithelial cells showed inclusion bodies filled with virus particles in membrane-bound vesicles in the cytoplasm. On electron microscopy, the observed morphology of the virion is consistent with the Coronaviridae family.

This newly identified coronavirus is now known to be the etiologic agent responsible for the Wuhan, China, outbreak and is named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The resultant disease is referred to as COVID-19. Like SARS-CoV and MERS-CoV, SARS-CoV-2 is a betacoronavirus that likely has its origin in bats, with one or more animals serving as the intermediate host for zoonotic infection in humans. According to CDC reports, virus sequences from imported cases in this country are similar to the one initially posted by China, suggesting a likely single, recent emergence of this virus from an animal reservoir [12].

The rapid accumulation of many new cases in Wuhan City during the months of December 2019 and January and February 2020, combined with evidence of spread to persons from other nearby provinces in central China and reports of acute infection in healthcare workers, point to facile human-to-human transmission of SARS-CoV-2 as the key factor responsible for continued propagation of the outbreak.

CLINICAL MANIFESTATIONS OF SARS-CoV-2 INFECTION

As of March 2020, there is limited data upon which to draw definitive conclusions about the full clinical features of the disease. Extrapolating from limited epidemiologic information and what is known from previous novel coronavirus outbreaks (SARS and MERS), the incubation period of SARS-CoV-2 is estimated to be 5 to 7 days on average, with a range of 2 to 14 days. The spectrum of illness appears to range from mild upper respiratory infection to fever, cough, and shortness of breath, with substantial risk of developing bilateral pneumonia complicated by respiratory failure and death. Based on official case reports through the month of January 2020, the mortality rate for cases of COVID-19 reported from China is approximately 3%.

A report describing the clinical features of hospitalized patients with COVID-19-related pneumonia in Wuhan City was published online January 24, 2020 [9]. As of January 2, 41 admitted patients had been identified as having laboratory-confirmed 2019-nCoV infection; 30 (73%) were men and 27 (66%) had been exposed to the Huanan seafood, open-air market. The median age was 49 years, and less than half of the patients had a history of underlying chronic disease. Common symptoms at onset of illness were fever (98%), cough (76%), and myalgia or fatigue (44%). Dyspnea developed in 22 patients (55%), with a median time from illness onset to dyspnea of eight days. Common laboratory abnormalities included leukopenia, lymphopenia, and mild hepatic enzyme elevations. All 41 patients were reported to have pneumonia, and all save one had radiographic evidence of bilateral involvement. The typical findings on chest computed tomography (CT) images of intensive care unit (ICU) patients were bilateral multilobar and segmental areas of consolidation. Acute respiratory distress syndrome developed in 12 (32%) patients, 13 (32%) were admitted to an ICU, and 6 died (15%).

A larger report of disease characteristics involving 1,099 Chinese cases found that the most common symptoms were fever (43.8% on admission, 88.7% during hospitalization), cough (67.8%), and fatigue (38.1%) [17]. Ground-glass opacification was the most common radiologic finding on chest CT at admission (56.4%). Lymphocytopenia was present in 83.2% of the patients on admission [17].

DIAGNOSTIC TESTING FOR SARS-CoV-2

A real-time reverse transcription-polymerase chain reaction (rRT-PCR) test, based on genomic sequencing of the virus in China and at the CDC, can be used to diagnose SARS-CoV-2 in respiratory and serum samples from clinical specimens. On January 24, 2020, the CDC publicly posted the assay protocol for this test. As of March 2020, testing for this virus in the United States can be done at state public health laboratories and the CDC [16].

TREATMENT OPTIONS AND VACCINE DEVELOPMENT

There is at present no vaccine and no established antiviral regimen available for prevention and treatment of SARS-CoV-2 infections; care is supportive and, for the purposes of limiting spread, should be carried out in a controlled environment under Isolation Precautions.

According to a National Institutes of Health briefing reported by the Infectious Disease Society of America, research efforts are underway to develop better diagnostics, treatments, and vaccines [10]. As noted, the CDC has already developed a diagnostic test based on genetic sequencing of the virus shared by Chinese investigators. Two antiviral agents—remdesivir, a drug tried unsuccessfully in the Ebola outbreak, and lopinavir/ritonavir (Kaletra), a combination antiviral used for treatment of human immunodeficiency virus (HIV)—are being offered on a compassionate use basis in China.

In anticipation of a possible "worst-case scenario" wherein the SARS-CoV-2 outbreak becomes a persisting or recurring epidemic, an effort is already underway to develop a coronavirus vaccine utilizing the genetic sequencing shared by China [10]. A preliminary trial to assess safety is planned in the first quarter of 2020, followed by trials to determine vaccine effectiveness, which would require additional months for completion.

TRANSMISSION: PUBLIC HEALTH IMPLICATIONS

The rapidity with which the SARS-CoV-2 outbreak has spread locally in China and the growing accumulation of cases in foreign travelers returning from recent visits to central China suggest that human-to-human transmission is occurring from close contact with persons having mild, nonspecific symptoms. This has important public health implications. The number of cases developing in travelers en route or recently returned from China to their respective countries will likely continue to grow for some time yet, and asymptomatic returning travelers who may have been exposed to SARS-CoV-2 are at risk for developing symptoms, and possibly exposing close contacts, anytime up to 14 days after return. Therefore, healthcare providers are encouraged to be vigilant, prepared, and cognizant of public health (i.e., CDC) recommendations for evaluation of a "person of interest" or a patient with compatible symptoms and travel history.

GLOBAL PUBLIC HEALTH CONCERNS AND WHO RESPONSE

WHO Daily Situation Report

Beginning in January 2020, and in association with travel to and from China, cases of confirmed SARS-CoV-2 infection are now being reported from multiple countries around the world. The WHO is monitoring developments and tracking the progress of the epidemic [8]. As of March 2, there were 88,948 confirmed cases globally, of which 80,174 were in China. There have been 2,915 deaths in China. Outside of China, there have been 8,774 confirmed cases reported from 64 countries and 128 deaths.

With few exceptions, cases reported in countries outside China have primarily occurred in returning travelers who had visited Wuhan City or nearby locales in central China. The extent of person-to-person spread outside of China is unclear at this time, and public health efforts are aimed at limiting further transmission in countries with imported cases.

On January 30, 2020, the WHO declared the COVID-19 epidemic a Public Health Emergency of International Concern, thereby invoking the powers of the 2005 International Health Regulations (IHR). In response to a potential pandemic, the IHR require all countries to develop a national preparedness program, conduct surveillance, exercise public health measures, and report any internationally significant event. This decision fosters a strong international collaborative effort and strengthens support for countries with limited health system resources.

In an effort to curb the spread of infection and limit the risk of a pandemic, the WHO and national agencies are developing clinical criteria to guide the evaluation and management of persons with significant exposure and/or compatible illness. The CDC has implemented a U.S. port of entry surveillance program at 20 major airports receiving returning travelers from China in order to identify those with a history of significant exposure or symptoms that merit additional health assessment. As of March 2020, entry of foreign nationals from China and Iran has been suspended, and the CDC has recommended that travelers avoid all nonessential travel to these destinations as well as South Korea and Italy. In

addition, the CDC recommends that older adults or those who have chronic medical conditions consider postponing travel to Japan [18].

WHO Advice to the Public

The WHO has posted standard recommendations for the general public (residing in or traveling to endemic regions) designed to reduce exposure to, and transmission of, a range of infectious illnesses [11]:

- Frequently clean hands by using alcohol-based hand rub or soap and water.
- When coughing and sneezing, cover mouth and nose with flexed elbow or tissue—throw tissue away immediately and wash hands.
- Avoid close contact with anyone who has fever and cough.
- If you have fever, cough, and difficulty breathing, seek medical care early and share previous travel history with your healthcare provider.
- When visiting live markets in areas currently experiencing cases of novel coronavirus, avoid direct unprotected contact with live animals and surfaces in contact with animals.
- The consumption of raw or undercooked animal products should be avoided. Raw meat, milk, or animal organs should be handled with care to avoid cross-contamination with uncooked foods, as per good food safety practices.

CDC MONITORING AND GUIDANCE FOR HEALTHCARE PROFESSIONALS

The CDC is closely monitoring the COVID-19 outbreak and is providing updated epidemiologic data and clinical guidance for healthcare providers, laboratories, health facilities, and public health professionals [12]. Included are recommendations for the evaluation of persons/patients under investigation, laboratory specimen transport, and protection of healthcare workers. Recommendations for patient assessment and care in hospitals and other healthcare facilities emphasize the importance of strict adherence to patient isolation and barrier precautions, including the proper use of personal protective equipment (PPE).

The CDC website includes a COVID-19 Situation Summary regarding the number of persons under investigation in the United States, updated regularly on Mondays, Wednesdays, and Fridays. As of March 2, there were 43 confirmed or presumed positive cases; thousands of other persons were being monitored or tested for COVID-19. Of the 43 known SARS-CoV-2 infections, 17 were travel-related and 26 were the result of person-to-person transmission [12]. While the CDC considers the COVID-19 outbreak to be a very serious public health threat, the immediate health risk to the general American public is judged to be low as of March 2020, based on current information.

Selected materials from the CDC website, including recommendations for travelers, interim guidance for healthcare professionals, infection control, and healthcare worker safety, are reproduced in the following sections. Please note that language and/or cultural barriers may impede assessment and education on the topic, and interpreters and translated materials are recommended, when appropriate.

CDC Travel Notice

The CDC recommends that travelers avoid all nonessential travel to China. In response to the COVID-19 outbreak, Chinese officials have closed transport within and out of Wuhan and other cities in Hubei province, including buses, subways, trains, and the international airport. Additional restrictions and cancellations of public gatherings and events may occur.

The CDC travel notice is updated regularly in response to new developments. The present recommendations for those who must travel to, or have recently returned from, China or other country with sustained (ongoing) community transmission (e.g., Iran, Italy, South Korea) are outlined in this section [13].

Individuals who must travel should [13]:

- Avoid contact with sick people.
- Discuss travel with your healthcare provider. Older adults and travelers with underlying health issues may be at risk for more severe disease.
- Avoid animals (alive or dead), animal markets, and products that come from animals (such as uncooked meat).

- Wash hands often with soap and water for at least 20 seconds. Use an alcohol-based hand sanitizer if soap and water are not available.

Individuals who were in China (or other affected area) in the last 14 days and feel sick with fever, cough, or difficulty breathing should:

- Seek medical care right away. Before visiting a physician's office or emergency room, call ahead and tell them about your recent travel and your symptoms.
- Avoid contact with others.
- Do not travel while sick.
- Cover your mouth and nose with a tissue or your sleeve (not your hands) when coughing or sneezing.
- Wash hands often with soap and water for at least 20 seconds. Use an alcohol-based hand sanitizer if soap and water are not available.

Recommended Criteria to Guide Evaluation of Patients Under Investigation for COVID-19

Healthcare providers should obtain a detailed travel history from patients being evaluated for fever and acute respiratory illness. The CDC has developed clinical criteria and a report form for the assessment of a potential COVID-19 patient under investigation (PUI) based on what is known about MERS-CoV and SARS-CoV, subject to change as additional information becomes available [14].

Healthcare providers in the United States should evaluate any person, including healthcare workers, for COVID-19 who has fever or signs/symptoms of respiratory illness (e.g., cough, shortness of breath) and a history of travel from an affected area (China, Iran, Italy, South Korea, or Japan) within 14 days before symptom onset OR has within the past 14 days had close contact with a person with laboratory-confirmed COVID-19 [14]. Close contact is defined as one of the following:

- Being within approximately 6 feet (2 meters), or within the room or care area, of a novel coronavirus case for a prolonged period of time while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, certified disposable N95 respirator, eye protection); close contact can include caring for, living with, visiting, or sharing a healthcare waiting area or room with a novel coronavirus case.
- Having direct contact with infectious secretions of a novel coronavirus case (e.g., being coughed on) while not wearing recommended personal protective equipment.

In addition, any patient with fever and severe acute lower respiratory illness (e.g., pneumonia, ARDS) requiring hospitalization and without alternative explanatory diagnosis (e.g., influenza) should be evaluated, even if no source of exposure has been identified [14].

These criteria are also available at https://www.cdc.gov/coronavirus/2019-nCoV/hcp/clinical-criteria.html. The criteria are intended to serve as guidance for evaluation. Patients should be evaluated and discussed with public health departments on a case-by-case basis if their clinical presentation or exposure history is equivocal.

A symptomatic patient who meets the criteria above should be provided a surgical mask and placed on respiratory isolation, preferably in an airborne isolation negative pressure room. Caregivers should observe enhanced precautions (i.e., wear gloves, gown, eye protection device [other than prescription eye glasses], and N95 respirator).

Reporting, Testing, and Specimen Collection

The CDC recommends that healthcare providers should immediately notify both infection control personnel at their healthcare facility and their local or state health department in the event of a PUI for COVID-19. State health departments that have identified a PUI should immediately contact the CDC's Emergency Operations Center at 770-488-7100 and complete a PUI case investigation form (available at https://www.cdc.gov/coronavirus/2019-ncov/downloads/pui-form.pdf).

The CDC provides assistance to local/state health departments for collection, storage, and shipment of specimens appropriately, including during afterhours or on weekends/holidays. As noted, at this time, diagnostic testing for COVID-19 can be conducted at the CDC or state public health laboratories.

Diagnostic Testing

Confirmation of COVID-19 is performed using the rRT-PCR assay for SARS-CoV-2 on respiratory specimens (which can include nasopharyngeal or oropharyngeal aspirates or washes, nasopharyngeal or oropharyngeal swabs, bronchoalveolar lavage, tracheal aspirates, or sputum) and serum. Information on specimen collection, handling, and storage is available at https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinical-specimens.html. After initial confirmation of COVID-19, additional testing of clinical specimens can help inform clinical management, including discharge planning. Specimens should be collected as soon as possible after a PUI is identified, regardless of time of symptom onset. Additional guidance for collection, handling, and testing of clinical specimens is available at the CDC website [12].

Testing for other respiratory pathogens should not delay SARS-CoV-2 testing. If a PUI tests positive for another respiratory pathogen, and after clinical evaluation and consultation with public health authorities, the patient may no longer be considered a PUI. This approach may evolve as more information becomes available on possible SARS-CoV-2 co-infections.

For biosafety reasons, it is not recommended to perform virus isolation in cell culture or initial characterization of viral agents recovered in cultures of specimens from a PUI for COVID-19.

Interim Clinical Guidance for Management of Patients with Confirmed COVID-19

Interim clinical guidance and additional resources for clinicians caring for patients with COVID-19 is provided and updated at the CDC website, selected aspects of which are reproduced in this section [14].

The clinical presentation of patients with confirmed COVID-19 has not as yet been fully characterized, as most clinical descriptions are from series of patients hospitalized with pneumonia. The expected symptoms and signs at onset of illness include fever, malaise, myalgia, and cough. Risk factors for severe illness are not yet totally clear, but older patients and those with chronic medical conditions appear to be at higher risk. From observations made in connection with reported cases of COVID-19, the clinical course varies from asymptomatic infection or mild illness to severe or fatal illness.

No specific treatment for COVID-19 is currently available. Clinical management includes prompt implementation of recommended infection prevention and control measures and supportive management of complications, including advanced organ support if indicated [15]. Corticosteroids should be avoided unless indicated for other reasons (e.g., chronic obstructive pulmonary disease exacerbation or septic shock) because of the potential for prolonging viral replication, as observed in patients with MERS-CoV.

Healthcare personnel should care for patients in an airborne infection isolation room. Standard Precautions, Contact Precautions, and Airborne Precautions and eye protection should be used when caring for the patient. For more detailed recommendations, see the CDC's Interim Infection Prevention and Control Recommendations for Patients Under Investigation for 2019 Novel Coronavirus in a Healthcare Setting at https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control.

Patients with a mild clinical presentation may not initially require hospitalization [15]. However, clinical signs and symptoms may worsen with progression to lower respiratory tract disease in the second week of illness; all patients should be monitored closely. As noted, possible risk factors for progressing to severe illness may include, but are not limited to, older age and underlying chronic medical conditions (e.g., lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, diabetes, immunocompromising conditions, pregnancy).

The CDC advises that the decision to monitor a patient in the inpatient or outpatient setting should be made on a case-by-case basis. This decision will depend not only on the clinical presentation, but also on the patient's ability to engage in monitoring and the risk of transmission in the patient's home environment. For more information, see the CDC's Criteria to Guide Evaluation of Patients Under Investigation (PUI) for COVID-19 at https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-criteria.html.

Summary of the CDC Response to the COVID-19 Outbreak

The CDC is closely monitoring this situation and is working with the WHO and state and local public health partners to respond to this emerging public health threat. The goal of the ongoing U.S. public health response is to contain this outbreak and prevent sustained spread of COVID-19 in this country.

The CDC established a COVID-19 Incident Management Structure on January 7, 2020. On January 21, 2020, the CDC activated its Emergency Response System to better provide ongoing support to the COVID-19 response. On January 27,

2020, the CDC issued updated travel guidance for China, recommending that travelers avoid all nonessential travel to all of the country (a Level 3 Travel Health Notice).

The CDC and Customs and Border Protection (CBP) are continuing to conduct enhanced entry screening of passengers who have been in an affected area within the past 14 days at 20 designated U.S. airports. Going forward, CBP officials will monitor for travelers with symptoms compatible with COVID-19 and a travel connection with an affected area and will refer them to CDC staff for evaluation at all U.S. quarantine stations. At the same time, all travelers from an affected area will be given the CDC's Travel Health Alert Notice, educating those travelers about what to do if they get sick with certain symptoms within 14 days after arriving in the United States.

The CDC issued an updated interim Health Alert Notice Advisory to inform state and local health departments and healthcare providers about this outbreak on January 17, 2020. The CDC has also deployed multidisciplinary teams to states with reported cases to assist health departments with clinical management, contact tracing, and communications.

The CDC has developed an rRT-PCR test that can diagnose COVID-19 in respiratory and serum samples from clinical specimens. On January 24, 2020, the CDC publicly posted the assay protocol for this test. The CDC has shared these tests with domestic and international partners through the agency's International Reagent Resource. The CDC uploaded the entire genome of the virus from five reported cases in the United States to GenBank. The CDC is also growing the virus in cell culture, which is necessary for further studies, including for additional genetic characterization.

As of March 2020, the CDC has produced more than 23 guidance documents on infection control, hospital preparedness assessments, PPE supply planning, and clinical evaluation and management for the outbreak.

OTHER AVAILABLE RESOURCES

CDC Travelers' Health: Novel Coronavirus in China
https://wwwnc.cdc.gov/travel/notices/warning/novel-coronavirus-china
CDC Coronavirus Disease 2019 (COVID-19) Information for Healthcare Professionals
https://www.cdc.gov/coronavirus/2019-nCoV/hcp/index.html
CDC Coronavirus Disease 2019 (COVID-19) Resources for State, Local, Territorial and Tribal Health Departments
https://www.cdc.gov/coronavirus/2019-ncov/php/index.html
World Health Organization Coronavirus Disease 2019 (COVID-19) Outbreak
https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Complete for Cred

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