



COVID 19 Update

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Jorge Mera, MD
Whitney Essex, APRN

Transmission

Transmission Routes:

- **Person-to-person** through respiratory droplets in air or on deposited on surfaces, and possibly by the fecal-oral route
- **Vertical transmission** cannot be ruled out
 - No live virus had been detected in breast milk and the known benefits of breast milk outweigh any theoretical risks.
- **Shedding in stool** was detected in up to 41% of infected
- **Detectable in semen** from men who were acutely ill or in recovery
 - Viability not assessed and no reported cases of sexual transmission to date.
- **Has been detected in cats**, their relevance as a reservoir is uncertain

Viability: remain viable and infectious in

- Aerosols for hours (median half-life 1.1 hours)
- Surfaces up to days.
 - 5.6 hours on stainless steel, 6.8 hours on plastic and cardboard up to 24 hours

Incubation period:

- Median incubation period to be 5.1 -5.2 days
- 97.5% of those who develop symptoms will do so within 11.5 days (CI, 8.2 to 15.6 days)
- 14 day period for monitoring after potential exposure is generally recommended

Asymptomatic transmission

- 40-45% of those infected remain asymptomatic
- Asymptomatic persons can transmit SARS-CoV-2 longer than 14 days.
- Transmission may occur during the incubation period, and viral shedding has been calculated to peak on or before symptom onset
- Calculated infectiousness begins 2.3 days before symptom onset and peaks 0.7 days before symptoms begin, with pre-symptomatic transmission accounting for 44% of secondary cases.
- An attack rate of 0.7% for exclusive pre-symptomatic exposures has been documented

The Reproductive Number (R_0) is the number of cases, on average, an infected person will cause during their infectious period to individuals who do not have immunity.

- The WHO R_0 for non mitigated reproduction as between 2.0 and 2.5, double that of influenza

Transmission

Quarantine to Reduce Transmission

- The WHO determined that quarantine was important in reducing incidence and mortality during the COVID-19 pandemic

Avoidance of Close Personal Contact

- Respiratory droplets from human respiration, speech, and other routine behaviors generally fall within a couple meters of the person who generates them
- Smaller droplets produced during sneezing or coughing may project 6 to 8 meters away.

The CDC defines close contact as:

- 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**
- Having direct contact with infectious secretions of a novel coronavirus case (e.g., being coughed on) while not wearing recommended PPE

Clinical Risk Factors

- As of May 30, 2020, US case surveillance data revealed the most common underlying health conditions were: **cardiovascular disease** (32%), **diabetes** (30%), and **chronic lung disease** (18%).
- Hospitalizations were six times higher and deaths 12 times higher among those with reported underlying conditions compared with those with none reported
- Higher risk has been found associated with **blood group A** and lower risk in blood group O

Transmission

Black Race, Latino Ethnicity, increases risk for Covid-19

Duration of Viral Shedding

- The CDC reports negligible risk of recovering replication-competent virus from someone with Covid-19 illness at 10 days after onset of illness and this is based on two studies.
- Whether the severity of symptoms affects duration of viral shedding remains uncertain

Implications of positive serology, including potential for reinfection by the same or a different strain, also remain uncertain.

Re-infection Potential

- Risk for repeat SARS-CoV-2 infection, with either substantially the same or a substantially mutated virus, is unknown.

Transmission

Clinical Manifestations

Asymptomatic Infection (40-45%)

Influenza-Like Illness Symptoms (40-45%)

- **Fever** (87-98%) but only 30.7% of patients were febrile at triage. **Cough Shortness of breath myalgias, fatigue, sore throat, and headache**
- Upper respiratory symptoms and **conjunctivitis**

Gastrointestinal Symptoms (12%) diarrhea and nausea prior to other symptoms

Neurological symptoms (36.4%) including headache, AMS, dizziness, and seizure

- **Acute cerebrovascular diseases** can present as initial manifestation

Anosmia 74%-87%, dysgeusia in 56-69%, and both symptoms in 68%, both occurred on average at day 4

- But it can occur on presentation and as the sole presenting symptom.
- 2/3 have objective signs of dysfunction
- Consider COVID 19 if Anosmia, hyposmia, and dysgeusia in the absence of allergic rhinitis, acute rhinosinusitis, or chronic rhinosinusitis

Pediatric Multi-System Inflammatory Syndrome Temporally Associated with SARS-CoV-2")

- Features overlap with Kawasaki Disease.
- **Bilateral bulbar conjunctival injection** was the most common pediatric symptom in a French study.
- **Fever and abdominal/GI symptoms** are prominent, may predate other symptoms
- **Polymorphous rash** may be present, including changes to the **lips and oral cavity**
- **Irritability** and **headache** may be present
- **Myocarditis**

Clinical Manifestations

Physical Examination

- **Vital signs:** fever, increased respiratory rate, and reduced oxygen saturation
- **Lungs:** relatively benign/quiet auscultation relative to dyspnea and hypoxia

Laboratory Findings

- Lymphopenia (90%)of patients in a series of persons hospitalized with Covid-19, Thrombocytopenia, LFT elevations, CRP elevation, hypo-albuminemia, LDH elevation, D-dimer elevation, Ferritin elevation

Prognostic Laboratory Testing associated with mortality:

- **D-dimer:** A level $>1 \mu\text{g/mL}$ or $> 2.0 \mu\text{g/mL}$, **Absolute Neutrophil to lymphocyte ratio** , **Troponin T** and **proBNP**

Clinical Course

- The acute respiratory disease of Covid-19 may progress to bilateral **pneumonia**, acute respiratory distress syndrome (**ARDS**), or death.
- Diffuse alveolar damage has been identified on postmortem histopathology
- 14-33% of hospitalized patients requiring intensive care with a high mortality for those requiring critical care
- In New York Overall (n=2634)
 - 14.2% were treated in the intensive care unit
 - 12.2% received invasive mechanical ventilation
 - 3.2% were treated with kidney replacement therapy
 - Mortality was 88% for those requiring mechanical ventilation

Pathology

- **Lung Injury**
 - Extensive alveolar damage as well as microthrombi in pulmonary vasculature. Histology of lung found severe endothelial injury associated with intracellular virus, widespread microangiopathy and alveolar capillary microthrombi, and vascular angiogenesis
 - Inflammation may lead to permanent lung damage. Damage may be severe enough to necessitate consideration for lung transplantation
- **Thrombosis, Thromboembolism, and Ischemic Stroke**
 - **Elevated d-dimer** and **thrombosis** have been reported as part of the acute illness spectrum of Covid-19
 - Case reports demonstrate development of **antiphospholipid antibodies** as well as prolonged aPTT
 - Multiple studies, including autopsy series have confirmed the high prevalence of **venous and arterial thrombosis** and **thromboembolism** in Covid-19 with Vein thrombosis rates from 27% to 79%
- **CNS**
 - No signs of encephalitis, only hypoxemic damage

Imaging

- **Routine chest radiography -**
 - Chest X-ray does not affect clinical outcomes in persons presenting to a hospital with lower respiratory tract infection
 - 58.3% of plain chest radiographs have been observed to be normal in COVID 19 patients
 - 24.7% of patients in a New York City case series of persons hospitalized with Covid-19 did not demonstrate infiltrates on chest radiography at the time of emergency room presentation
- **Chest CT**
 - A negative chest CT does not rule out Covid-19, and an abnormal CT is not specific
 - Imaging may be of use when worsening respiratory status requires radiologic assessment
 - Chest CT findings, though not specific for COVID-19, may be more sensitive for diagnosis than a nasopharyngeal RT-PCR viral test at a single point in time.
- **Chest Imaging Guidance Statements**
- The American College of Radiology
 - *"A normal chest CT does not mean a person does not have COVID-19 infection - and an abnormal CT is not specific for COVID-19 diagnosis. A normal CT should not dissuade a patient from being quarantined or provided other clinically indicated treatment when otherwise medically appropriate. Clearly, locally constrained resources may be a factor in such decision making."*
- **A multinational consensus statement** also recognized the role of chest imaging in situations where diagnostic testing is constrained, stating that
 - *"In a resource-constrained environment, imaging is indicated for medical triage of patients with suspected COVID-19 who present with moderate-severe clinical features and a high pre-test probability of disease."*

Chest Imaging Infection Control Guidance

- It is important to note that **chest imaging challenges infection control protocols, uses PPE, and causes disinfection down time for imaging machines**
- The ACR therefore advises use of portable radiography units if possible when chest imaging is considered medically necessary; surfaces of these machines can be more easily cleaned.
- **Recommendations for use of fixed equipment**
 - Use fixed radiology equipment only if necessary for patient care; use portable imaging if available and appropriate.
 - Staff must wear PPE if coming into patient contact.
 - Patients should wear surgical masks.
 - Cover patient mattresses with sheets (reusable).
 - Ventilate the imaging room, waiting time verified for air exchange between patients.
 - Remove all accessories and devices from the exam room
 - If possible, group cases of COVID-19 patients at the end of the day.
 - Clean every surface of the CT scanner or fixed radiology equipment between patients with the manufacturer-specified cleaning protocol; ensure all surfaces remain wet for the contact time specified on the