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Review

Art of Prevention: Life in the Time of Coronavirus

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Title: Art of Prevention: Life in the Time of Coronavirus

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Abstract:

The novel Coronavirus disease 2019 (COVID-19) has continued to progress since its discovery in December of 2019. A cluster of atypical pneumonia identified in Wuhan, China served as the epicenter of this recent epidemic. This family of viruses is responsible for the common cold along with the infamous Severe Acute Respiratory Syndrome (SARS) epidemic in 2002 and Middle East Respiratory Syndrome (MERS) in 2012. The Southern China Wholesale Market reportedly has connections to the original 27 cases in Wuhan, China. The worldwide confirmed case total has eclipsed 650,000, with over 30,300 deaths (WHO, 2020). Patient presentation ranges from mild respiratory illness to acute respiratory distress syndrome (ARDS) and subsequent death. Early epidemiologic studies of viral spread support the hypothesis that COVID-19 can remain latent with an extended and infectious incubation period. The United States Government has issued level 3 precautions for most international travel along with prohibiting entry to foreign nationals traveling from China, Iran, United Kingdom, Republic of Ireland and the European Schengen area (e.g. France, Italy, Germany). Prevention remains the mainstay in treating and defeating the COVID-19 epidemic. Anyone infected or suspected of being infected should self-quarantine at home or admit themselves to a specified hospital with infrastructure to handle the situation. The combination of prevention and containment provides the best opportunity to stall the COVID-19 spread.

Key words: coronavirus, prevention, epidemic, infection control

Abbreviations: Severe acute respiratory syndrome variant 2- SARS-V2, Acute respiratory distress syndrome- ARDS, Coronavirus disease 2019- COVID-19

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Manuscript:

The Coronavirus (CoV) is a single stranded positive sense ribonucleic acid (RNA) virus that has an envelope, which confers it the ability to replicate in the cytoplasm of infected cells and remain infectious even when its capsid is compromised. This family of viruses is responsible for the common cold along with the infamous Severe Acute Respiratory Syndrome (SARS) epidemic in 2002 and Middle East Respiratory Syndrome (MERS) in 2012 (Brian et al., 2005). These enzootic viruses have a propensity to infect birds, bats and other mammals (Shoeman et al., 2019). Traditionally most human infections by CoVs were thought to be zoonotic in nature, however recent literature has identified CoVs that primarily infect human hosts.

In late December of 2019, Dr Lee Wenliang and colleagues identified a cluster of patients in Wuhan, Hubei Province, China with atypical pneumonia with severe features (ECDC, 2020). The original four cases identified outside Wuhan, China were in Thailand, Japan and South Korea. Two of those four cases reportedly had no contact with the hospital or market, suggesting that the infection can remain latent with an extended but infectious incubation period (Rothe et al., 2020). Dr Wenliang himself contracted the virus and suffered from severe respiratory distress that eventually took his life. The original cases in Wuhan Central Hospital had sputum, blood, stool and bronchoalveolar lavage fluid cultures sent to the lab for diagnostics with reverse transcriptase polymerase chain reaction (RT-PCR) and next generation sequencing (Wu F et al., 2020). The bronchoalveolar lavage studies led to the novel coronavirus discovery, which is now known as SARS CoV-2.

To date, the original source of the viral outbreak remains unknown (ECDC, 2020). The Southern China Wholesale Market reportedly has connections to the original 27 cases in Wuhan, China. The facility is said to house many live wildlife ready to be sold for consumption. Bats are understood to be the main host of this beta-coronavirus, however the identification of an intermediate host has not been elucidated.

One of the devastating abilities of the virus is to remain in a latent state within human hosts. Researchers suspect this is the case after investigating the early cases discovered in other countries. By the end of January 2020, a total of 614 cases of the 2019 coronavirus disease (COVID-19) had been confirmed in Wuhan, China with laboratory testing. To date, over 190 countries spanning 6 continents have confirmed cases of COVID-19 (WHO, 2020). The worldwide confirmed case total as of March 27, 2020 eclipsed 650,000, with over 30,300 deaths (Dong et al., 2020). On March 26, the United States surpassed China in total cases at over 100,000, including a death toll surpassing 1,300 (CDC, 2020). The current case fatality rate is calculated at approximately 2%. (Fauci et al., 2020).

Patient presentation ranges from mild respiratory illness to acute respiratory distress syndrome (ARDS) and subsequent death. Most of the patients identified early in this epidemic did not present with rhinorrhea, pharyngitis or sinusitis. Researchers believe this can be a product of the virus homing in on lower respiratory epithelium for attachment and infection (Huang et al., 2020). Chest CT is often normal in patients with early (0-2 days) symptoms but may demonstrate characteristic findings in later (6-12 days) presentations. These include bilateral lung involvement with linear opacities, a “crazy-paving” pattern, and “reverse halo” sign. (Bernheim et al., 2020). The gold standard diagnostic testing of COVID-19 remains the Real-

Time Reverse Transcriptase (RT)-PCR Diagnostic Panel, which amplifies RNA and allows for detection of specific viral genes (WHO, 2020).

Literature at this point cannot confirm if COVID-19 is transmitted vertically in pregnant mothers. A study of 10 newborns born to mothers with COVID-19 showed a less dramatic presentation compared to the CoV SARS-1 epidemic. Neonates and pregnant women are still considered high risk and should avoid public spaces and implement extra precautions. At this time it is recommended that infected pregnant mothers avoid breastfeeding until cleared of infection (Qiao, 2020).

Current treatment remains supportive care primarily for respiratory distress. Limited information is available regarding effective treatment for the COVID-19 infection. Researchers have looked to the treatment strategies of MERS and SARS to get an understanding on possible therapeutic regimens. Previous trials of corticosteroids to address the high cytokine load did not improve mortality and instead caused a delay in viral clearance (Stockman et al., and Arabi et al., 2018). This has not discouraged a Chinese based pharmaceutical group from starting a new clinical trial of methylprednisolone for COVID-19 (Harrison, 2020). Some officials suggest a trial of antiviral medications. Both ritonavir and lopinavir are currently in clinical trials as potential therapeutics (Shionogi, Toyama Chemical, Osaka, Japan). In recent news hydroxychloroquine, a disease modifying antirheumatic drug is being reviewed for its potential to decrease the host response in those infected with COVID-19 (Schrezenmeier et al., 2020). A non-randomized clinical trial combining azithromycin and hydroxychloroquine showed promising therapeutic benefit (Gautret et al., 2020). Another company is exploring the novel use of a monoclonal antibody to IL-6 known as Tocilizumab, in hopes of attenuating severe

respiratory distress through cytokine inhibition (Chugai Pharma, Tokyo, Japan). No vaccine has yet been created to prevent infection.

The top priority of prevention remains containment (Table 1). The United States Government has issued level 3 precautions for most international travel and effectively prohibited entry to foreign nationals traveling from China, Iran, United Kingdom, Republic of Ireland and the European Schengen area (eg. France, Italy, Germany) in efforts to reduce the globally growing rate of infection. The news has reported multiple instances of cruise-lines and other tourist activities being held for quarantine after determining a single individual is positive for the virus. These precautions are justified and deemed necessary to reduce widespread disease and contain within an isolated and controlled area.

Practical Intervention Pearl:

Prevention remains the mainstay in treating and defeating the COVID-19 epidemic (Table 1). Prior to understanding the cause of illness, clinicians in Wuhan, China isolated suspected patients with respiratory precautions and fit-tested N-95 masks (Huang et al., 2020). These N95 masks are known to prevent up to 95% of small particles including viruses from entering the respiratory tract (Kirby, 2020). All health care personnel working with infected patients should have their serum tested before and after exposure to ensure there is no asymptomatic infection that can increase transmission to others. Protocols are being implemented to establish (when possible) serum pre-testing and post-testing in personnel working with known infected patients.

Prevention begins with frequent handwashing with soap and warm water (US FDA, 2020). Hand sanitizer is an effective alternative if soap and water is not readily available such as in public events. Next is avoidance of touching the mouth, nose or eyes to prevent spread of viral particles to at-risk areas of the body (Figure 1). Given that the average person touches their face

up to 2,000 times per day, guidelines recommend judicious handwashing to prevent self-inoculation (Kwok et al., 2015). Commonly used household areas should be cleaned and disinfected with 70% alcohol or chloride containing wipes. This is true for doorknobs, taps, and children's toys that can easily be placed in their mouth. Avoiding crowded locations such as amusement parks and hospitals can help reduce the risk of transmission (Figure 2). This is especially true for areas with high tourism such as airports and cruise ships.

Many citizens have taken to purchasing surgical masks to help reduce transmission risk while outside (Figure 3). It is unknown exactly how effective surgical masks are, but at minimum they provide a direct barrier and should be worn by COVID-19 positive individuals to reduce spread to others. Current guidelines do not recommend use of any surgical masks for healthy persons greater than 6 feet from an infected individual, as social distancing is the best defense against infection (CDC, 2020). Following these guidelines saves personal protective equipment (PPE) for healthcare workers and caregivers. For caregivers, a surgical mask is required if within 3 to 6 feet of an infected individual (CDC, 2020). An N95 respirator should be utilized if there is a need to be within 3 feet of an infected person, or in a room during a procedure such as intubation that can cause aerosolization of the virus (WHO, 2020).

Anyone infected or suspected of being infected should self-quarantine at home or admit themselves to a specified hospital with infrastructure to handle the situation (Shen et al., 2020). Appropriate hospital infrastructure includes negative pressure rooms, planned routes to evaluation areas and properly staffed facilities with infectious disease and critical care support (AMA, 2020). Individuals suspected of illness are to make contact with the hospital prior to entry into facility. The designated health care official then guides the patient to a contained triage area to have non-induced sputum or nasopharyngeal swab collected for COVID-19 diagnostic

testing. This reduces the chance of infecting those already critically ill in the hospital. Similar precautions are performed for suspected measles cases (CDC Measles, 2019).

Quarantine can be emotionally and mentally taxing, especially in the adolescent population who are accustomed to socializing at school and outdoors. CDC guidelines suggest keeping a watchful eye for signs of stress in youths, which can present as excessive sadness, agitation or disruptive behavior (CDC, 2020). Addressing the current COVID-19 situation in an age-appropriate supportive manner may alleviate anxiety. Brief periods of outdoor exercise, such as walks can help reduce stress and are encouraged, as long as physical social distancing rules are followed (CDC, 2020).

Health care providers need to remain cognizant that many adults on home quarantine are potentially facing social isolation, the burden of unemployment, and/or home schooling of children, adding further strain to an already overwhelming situation. Simply reducing daily news exposure can help with coping and improve mental health (CDC, 2020). If significant mental distress is identified, including thoughts of self-harm or harm to others, intervention is warranted. Community referral 24hour/7day a week hotlines such as the Disaster Distress Helpline at 1-800-985-5990 are also available.

The Center for Disease Control and Prevention recommends maintaining household plans in case of emergency. This includes preparation in case of school and work cancellations. The combination of prevention and containment provides the best opportunity to stall the COVID-19 spread.

Figure Legends:

Figure 1:

Do the 5 to help stop COVID-19.

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Figure 2:

Ultraviolet protection scarves being used as masks during a sporting event.

Figure 3:

Empty shelves after consumers purchase all masks for protection against coronavirus.

Tables:

Table 1: Standard precautions and recommendations to prevent COVID-19

Adapted from CDC

Table 2: Risk assessment questions to ask

Adapted from Dr. Michael Ing lecture slides, Loma Linda University. (CDC Risk Assessment, March 13, 2020, Professor, Department of Infectious Diseases, Loma Linda University and Veterans Health Administration)

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References:

- Arabi YM, Mandourah Y, Al-Hameed F, et al. Corticosteroid therapy for critically ill patients with Middle East respiratory syndrome. *Am J Respir Crit Care Med* 2018; 197: 757–67.
- Bernheim A, Mei X, Huang M, et al. Chest CT Findings in Coronavirus Disease-19 (COVID-19): Relationship to Duration of Infection [published online ahead of print, 2020 Feb 20]. *Radiology*. 2020;200463. doi:10.1148/radiol.2020200463
- Brian DA, Baric RS. Coronavirus genome structure and replication. *Curr Top Microbiol Immunol*. 2005;287:1–30. doi:10.1007/3-540-26765-4_1.
- Center For Disease Control and Prevention. Coronavirus Disease 2019 Situation Summary. Last updated: February 29, 2020. Accessed on March 1, 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html>.
- Center For Disease Control and Prevention. Measles (Rubeola). Last updated: October 4, 2019. Accessed on March 10, 2020. Available from: <https://www.cdc.gov/measles/index.html>.
- Center For Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19). Caring for someone at home. Last updated: March 18, 2020. Accessed on March 27, 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/care-for-someone.html>.
- Center For Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19): Stress and coping. Last updated: March 23, 2020. Accessed on March 27, 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prepare/managing-stress-anxiety.html>.
- Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time [published online ahead of print, 2020 Feb 19]. *Lancet Infect Dis*. 2020;S1473-3099(20)30120-1. doi:10.1016/S1473-3099(20)30120-1.
- European Centre for Disease Prevention and Control (ECDC). Risk assessment: Outbreak of acute respiratory syndrome associated with a novel coronavirus, Wuhan, China; first update. Stockholm: ECDC; 22 Jan 2020.
- Fauci AS, Lane HC, Redfield RR. Covid-19 - Navigating the Uncharted. *N Engl J Med*. 2020;382(13):1268–1269. doi:10.1056/NEJMe2002387
- Gautret P, Lagier JC, Parola P, et al. Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial [published online ahead of print, 2020 Mar 20]. *Int J Antimicrob Agents*. 2020;105949. doi:10.1016/j.ijantimicag.2020.105949.
- Harrison, Charlotte. Coronavirus puts drug repurposing on the fast track. *Nature biotechnology*, 2020. ISSN 1546-1696 (online). doi: 10.1038/d41587-020-00003-1.
- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China [published correction appears in *Lancet*. 2020 Jan 30;:]. *Lancet*. 2020;395(10223):497–506. doi:10.1016/S0140-6736(20)30183-5.
- Kirby T. Australian Government releases face masks to protect against coronavirus [published online ahead of print, 2020 Feb 7]. *Lancet Respir Med*. 2020;S2213-2600(20)30064-3. doi:10.1016/S2213-2600(20)30064-3
- Kwok YL, Gralton J, McLaws ML. Face touching: a frequent habit that has implications for hand hygiene. *Am J Infect Control*. 2015;43(2):112–114. doi:10.1016/j.ajic.2014.10.015
- Qiao J. What are the risks of COVID-19 infection in pregnant women? *The Lancet*. February 12, 2020. DOI: [https://doi.org/10.1016/S0140-6736\(20\)30365-2](https://doi.org/10.1016/S0140-6736(20)30365-2).
- Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV Infection from an

- Asymptomatic Contact in Germany [published online ahead of print, 2020 Jan 30]. *N Engl J Med.* 2020;10.1056/NEJMc2001468. doi:10.1056/NEJMc2001468
- Schoeman D, Fielding BC. Coronavirus envelope protein: current knowledge. *Virology*. 2019;16(1):69. Published 2019 May 27. doi:10.1186/s12985-019-1182-0.
- Schrezenmeier, E., Dörner, T. Mechanisms of action of hydroxychloroquine and chloroquine: implications for rheumatology. *Nat Rev Rheumatol* 16, 155–166 (2020).
<https://doi.org/10.1038/s41584-020-0372-x>
- Shen K, Yang Y, Wang T, et al. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement [published online ahead of print, 2020 Feb 7]. *World J Pediatr.* 2020;10.1007/s12519-020-00343-7. doi:10.1007/s12519-020-00343-7
- Stockman LJ, Bellamy R, Garner P. SARS: systematic review of treatment effects. *PLoS Med* 2006; 3: e343
- The US Centers for Disease Control and Prevention. Interim Guidance for Preventing 2019 Novel Coronavirus (2019-nCoV) from Spreading to Others in Homes and Communities. <https://www.cdc.gov/coronavirus/2019-ncov/guidance-prevent-spread-chinese.html>. Access 20 Jan 2020.
- World Health Organization. (2020). Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance, 27 February 2020 (No. WHO/2019-nCov/IPCPPE_use/2020.1). World Health Organization.
- World Health Organization. (2020). Laboratory testing for coronavirus disease 2019 (COVID-19) in suspected human cases: interim guidance, 2 March 2020 (No. WHO/COVID-19/laboratory/2020.4). World Health Organization.
- Wu F, Zhao S, Yu B, et al. A new coronavirus associated with human respiratory disease in China [published online ahead of print, 2020 Feb 3]. *Nature.* 2020;10.1038/s41586-020-2008-3. doi:10.1038/s41586-020-2008-3

Table 1: Standard precautions and recommendations to prevent COVID-19

Adapted from CDC:

- * Avoid close contact with ill persons (recommend >6ft) when possible
- * Wear personnel protective equipment (face shield, mask, gown, gloves, and closed toed shoes) when evaluating persons at risk
- * Avoid well persons when you are ill
- * Cover all coughs/sneezes with a tissue, then throw the tissue away (req original kleenex ad)
- * Routinely clean-disinfect frequently touched objects and surfaces with household cleaning spray and use a wipe or tissue when handling (eg: door knobs, sink taps, water fountain handles, elevator buttons, cross-walk buttons, shopping carts).
- * Wear mask at all times if taking care of persons with respiratory illness (patient, child, partner, parent)
- * Use paper towel to turn on tap, then wash hands with soap and water for at least 30 seconds after going to the bathroom, before eating, and after a cough/sneeze/or nose blow.
- * Carry travel size hand sanitizer on your person whenever in a public venue
- * Activate community-based interventions (eg: cancel sporting events, dismiss from school, practice social distancing, create employee plans to work remotely)
- * Create household ready plan
- * Containment in travel (cancel any non essential travel from an area with no index cases to an area with index cases)

Table 2: Risk assessment questions to ask

Adapted from Dr. Michael Ing Lecture Slides, Loma Linda University

1. Have you had any recent travel to any of the following countries: China, Italy, South Korea, Iran and Japan.
2. Have you had any recent travel to an international airport?
3. Have you recently been exposed to anyone with diagnosed or suspected COVID-19?
4. Have you had any recent unexplained fever?
5. Have you had any recent unexplained and worsening cough?
6. Have you had any recent shortness of breath?
7. Do you have a medical condition that suppresses your immune system?
8. Do you currently live in, or work in a confined and populated area such as a military barracks, nursing home, or hospital?



Public Service Announcement

Google



DO THE FIVE

Help stop coronavirus

- 1 HANDS** Wash them often
- 2 ELBOW** Cough into it
- 3 FACE** Don't touch it
- 4 FEET** Stay more than 3ft apart
- 5 FEEL** sick? Stay home



