## COVID-19 aka 2019-nCoV aka SARS-CoV-2

Shawn Gibbs, PhD, MBA, CIH Dean, School of Public Health Professor of Environmental & Occupational Health Texas A&M University sgibbs@tamu.edu

Slides Adapted From: Colonel (Ret.) Ted Cieslak MD MPH University of Nebraska Medical Center Omaha, Nebraska



## Biosafety and Infectious Disease Training Initiative (BIDTI)

### A National Institute of Environmental Health Sciences (NIEHS) Worker Training Program (WTP)

5UH4 ES027055 (Ebola Biosafety and Infectious Disease Response)





### A Consortium Of:



SCHOOL OF PUBLIC HEALTH Emergency Preparedness Research, Evaluation and Practice Program

Funded by:



National Institute of Environmental Health Sciences



### Los Angeles Times



How can you grieve without a funeral? As coronavirus restrictions become more strict, families make heartbreaking choices



f

À

 FREE FOR ALL READERS

 Coronavirus Thursday: California cracks down

 Thursday's major developments

 Live updates on the coronavirus pandemic

 Spread of COVID-19 in California »



## **The Human Coronaviruses**

=





## **History of the Coronaviruses**

Coronaviruses first described in 1960s as a cause of the 'Common Cold'

"Novel" Coronaviruses:

2002- SARS outbreak in China2003- SARS virus discovered2004- SARS disappearsDue to banned sale of civets?



2012- First MERS case in Kingdom of Saudi Arabia 2012- MERS virus discovered

2019- 2019-CoV outbreak begins 2020- Epidemic continues to escalate



🗑 Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE



## **COVID-19 Global**

### Updated May 13, 2020 at 8:00AM EST

🐨 COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (...



### As of March 9, 2020 at 1:00PM EST



## COVID-19 US

### Updated May 13, 2020 at 8:00AM EST

🐨 COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (...



## **Understanding an Infectious Disease**

How Infectious is it?How Contagious is it?How Hazardous is it?How is it spread?How do we protect ourselves from it?

## **Pathogens of Concern**

Infectious, Communicable, Highly Hazardous





### **Comparative Features** of Coronavirus Disease

	SARS	MERS	COVID-19
Status	No cases since 2004	Ongoing epidemic in Middle East	Escalating epidemic in China and beyond
Reservoir	Bats + Civet Cats	Bats + Camels	Bats + Pangolins?
ID <sub>50</sub>	No Data	No Data	No Data
R <sub>0</sub>	2.2-3.6	0.6-11.5	2.5-6.6 ??
Mortality	774/8098 (9.6%)	866/2519* (34.4%)	284,124/4,148,034 (6.85%)
Treatment	Supportive	Supportive	Supportive
Transmission	Droplets (Droplet nuclei?)	Droplets (Droplet nuclei?)	Droplets (Droplet nuclei?)

\*as of Jan 20; \*\*as of May 11, 20

## **Coronavirus Transmission**





### What are the symptoms?



## Additional symptoms have been identified as there have been more cases



### NIEHS COVID-19 Response Training Tool

Protecting Yourself from COVID-19 in the Workplace // Safety and Health Awareness for Responders to the Coronavirus

### Transmission

NIH

COVID-19 is spread from person to person mainly through coughing, sneezing, and possibly talking, and breathing.



- <u>Droplet</u> respiratory secretions from coughing or sneezing landing on mucosal surfaces (nose, mouth, and eyes)
  - <u>Aerosol</u> a solid particle or liquid droplet suspended in air
- <u>Contact</u> -Touching something with SARS-2 virus on it and then touching mouth, nose or eyes
- Other possible routes: Though fecal matter



12

# Diseases that are Contagious before they are Symptomatic

### **Going Viral: What to Watch For**

Viruses can be contagious during the incubation period, before symptoms start.

	COLD	FLU	NOROVIRUS	COVID-19*
Incubation period	1-3 days	1-4 days	A few hours	2-14 days
Symptom onset	Gradual	Abrupt	Abrupt	Gradual
Typical illness duration	7-10 days	3-7 days	1-2 days	Undetermined
SYMPTOMS				
Sore throat	Common	Sometimes	Rare	Undetermined
Sneezing	Common	Sometimes	Rare	Undetermined
Stuffy, runny nose	Common	Sometimes	Rare	Undetermined
Cough, chest discomfort	Sometimes	Common	Rare	Common
Fatigue, weakness	Sometimes	Common	Sometimes	Undetermined
Fever	Rare	Common	Sometimes	Common
Aches	Rare	Common	Sometimes	Undetermined
Chills	Rare	Common	Sometimes	Undetermined
Headache	Rare	Common	Sometimes	Undetermined
Shortness of breath	Rare	Rare	Rare	Common
Nausea	Rare	Rare	Common	Undetermined
Vomiting	Rare	Rare	Common	Undetermined
Diarrhea	Rare	Rare	Common	Undetermined
Stomach pain	Rare	Rare	Common	Undetermined

\*See below for emerging information on COVID-19 coronavirus symptoms. NOTE: Rare symptoms can occur in some cases with any of these diseases.



SOURCES: CDC; Merck Manual; University of Michigan

## What We Don't Know cont.

1. The true mortality rate

death reporting lags behind case reporting the proportion of mild and asymptomatic cases is unknown

- 2. The secondary reservoir (Pangolins?)
- 3. The  $R_0$



initial estimate is a crude approximation reason for paucity of pediatric cases
4. The route of transmission (hence the optimal PPE)

droplet vs droplet nuclei



## What We Don't Know cont.

5. Whether transmission can really occur before symptoms

impacts quarantine strategy

- 6. Role of 'Superspreaders'
- 7. Efficacy of various antiviral therapies
- 8. Many, many other factors relevant to the epidemic



### **Best Guess Epidemiology**

- Ro = 2.5; Doubling time 7-10 days
- Community attack rate = 30-40%
- Cases requiring hospitalization = 5%
- Cases requiring ICU care = 1-2%
- Cases requiring ventilatory support = 1%
- CFR = 0.5%

- Community epi wave 2 months
- US: 96 million cases
- US: 4.8 million admissions
- US: 1.9 million ICU
- US: 1 PPV
- US: 480,000 deaths
- PREPARE FOR DISEASE BURDEN ROUGHLY 10X SEVERE FLU SEASON





Slide from James Lawler, MD, MPH Director, Global Center for Healthy Security Director, Clinical and Biodefense Research, National Strategic Research Institute University of Nebraska Medical Center



## **Health Care Worker Protection**

### **Precautions**

Early Recognition ("Identify, Isolate, Inform")

Standard Precautions Movement of PUIs to private rooms upon identification Placement of procedural masks on PUIs

Contact + Airborne Precautions Single room (Ideally an airborne infection isolation rooms) N-95 Respirator + Eye Protection (Goggles or Face Shield) Gown Gloves Boots, Coveralls, Aprons are <u>not</u> needed for routine care



## **Travel Considerations**





## **Airport Screening in the US**



11 Air Gateways:

### JFK, ORD, SFO, SEA, HNL, LAX, ATL, IAD, EWR, DFW, DTW







#### Flowchart to Identify and Assess 2019 Novel Coronavirus

For the evaluation of patients who may be ill with or who may have been exposed to 2019 Novel Coronavirus (2019-nCoV)





• If reevaluation is needed call ahead and wear facemask

Documentation of laboratory-confirmation of 2019-nCoV may not be possible for travelers or persons caring for patients in other countries. For more clarification on the definition for close contact see CDC's Interim Guidance for Healthcare Professionals: <u>www.cdc.gov/coronavirus/2019-nCoV/hcp/ clinical-criteria.html</u>. Community Spread is Occurring throughout the United States



## Prevention

- Social distancing
- Avoiding unnecessary air travel
  - Do not travel when sick
- Staying home when sick
  - Seek medical care right away, telehealth options
- Frequently disinfecting surfaces using EPAregistered products
- Hand hygiene and covering coughs/sneezes
- Avoid touching the transmission zone (eyes, nose, mouth)
- PPE, as available



## Treatment

- Oxygenation as needed
- Ventilation as needed
- Monitored fluid administration
- Nutrition
- Antibiotics in event of bacterial superinfection
- Therapeutic trials:
  - Remdesivir
  - Lopinavir/Ritonavir





# **Current Testing**

### As of May 5, 2020

PCR tests

- Tells if someone current has disease
- Most widely available
- Pretty Reliable
- Still supply chain issues

Antibody tests or Serology tests

- Tells if someone has antibodies or they previously had disease.
   Practical value if the possession of antibodies makes them immune to re-infection, which we don't know at this time.
- More and More available
- Currently Very Unreliable
- Still supply chain issues

Antigen test

- The value of an antigen is that it is easier and quicker than the PCR. But it tells me if they currently have the virus, not if they previously did.
- Currently Very Unreliable

V

### The New Coronavirus Can Live On Surfaces For 2-3 Days — Here's How To Clean Them

March 14, 2020 · 7:01 AM ET





When an infected person touches a surface, like a door handle, there's a risk they leave viruses stuck there that can live on for two to three days. Andrew Harrer/Bloomberg via Getty Images

Estimated porous surfaces (i.e. cardboard) 24 hours, non-porous surfaces (i.e. plastic, stainless steel) up to 72 hours under certain temperature and humidity conditions



# American Chemistry Council and Center for Biocide Chemistries

### https://www.americanchemistry.com/Novel-Coronavirus-Fighting-Products-List.pdf

Ready to Use Products					
Commercially Available Product Name	Company/Distributor	EPA REG No.			
Accel Tb	Virox Technologies, Inc.	74559-1			
Advantage	Wechem, Inc.	1839-83-34370			
AERO TB FRESH	AERO CHEMICAL CO	1839-83-13103			
Af Ultra Acid Free Total Bathroom Cleaner	Ultra Chem	1839-83-57839			
All Purpose Virex	Diversey, Inc.	1839-83-70627			
Aviation RTU Cleaner	Zep	6836-152-1270			
Avistat-D RTU Spray Disinfectant Cleaner	National Chemical Laboratories, Inc.	1839-83-2296			
Bioesque Solutions Botanical Disinfectant Solution 12/1 qt	Bioesque Solutions/Natureal, LLC	87742-1-92595			
Bioesque Solutions Botanical Disinfectant Solution 4/1 gal	Bioesque Solutions/Natureal, LLC	87742-1-92595			
Bioesque Solutions Botanical Disinfectant Solution 5 gal	Bioesque Solutions/Natureal, LLC	87742-1-92595			
Bioesque Solutions Botanical Disinfectant Solution 55 gal	Bioesque Solutions/Natureal, LLC	87742-1-92595			
BioSentry 904 Disinfectant	Hacco, Inc.	6836-78-61282			
BLEACH DISINFECTANT CLEANER	Ecolab Inc	1677-235			
Bright Solutions Lemon Zip Disinfectant RTU	Bright Solutions	1839-83-75473			
Bright Solutions RTU Bathroom Cleaner Non-Acid Bowl and Restroom Disinfectant	Bright Solutions	1839-83-75473			
BS & H	NATIONAL AMERICAN SALES CORP.	1839-83-50718			

## **Other Items**

- Waste Handling: Handle in normal waste streams (medical, MSW)
  - No national capacity to treat as Cat B
  - Talk to SLTT about requirements
- **Risk Communication**: Transparency, dispelling misinformation, quelling public panic



# For Mortuary Workers

- 1) How long does the virus lives in human remains, once death had occurred?
- 2) <u>https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-postmortem-specimens.html</u>

Interim Guidance for Collection and Submission of Postmortem Specimens from Deceased Persons Under Investigation (PUI) for COVID-19, February 2020

CDC has updated its guidance on what specimens to collect when testing for COVID-19. The latest guidance is available online at <u>Evaluating and Testing Persons for Coronavirus Disease 2019 (COVID-19)</u>.

The following factors should be considered when determining if an autopsy will be performed for a deceased PUI: medicolegal jurisdiction, facility environmental controls, availability of recommended personal protective equipment (PPE), and family and cultural wishes.

If an autopsy is performed, collection of the following postmortem specimens is recommended:

- Postmortem clinical specimens for testing for SARS-CoV-2, the virus that causes COVID-19:
  - Upper respiratory tract swabs: Nasopharyngeal Swab <u>AND</u> Oropharyngeal Swab (NP swab and OP swab)
  - Lower respiratory tract swab: Lung swab from each lung
- Separate clinical specimens for testing of other respiratory pathogens and other postmortem testing as indicated
- Formalin-fixed autopsy tissues from lung, upper airway, and other major organs

If an autopsy is NOT performed, collection of the following postmortem specimens is recommended:

- Postmortem clinical specimens for testing for SARS-CoV-2, the virus that causes COVID-19, to include only upper respiratory tract swabs: Nasopharyngeal Swab <u>AND</u> Oropharyngeal Swab (NP swab and OP swab)
- Separate NP swab and OP swab specimens for testing of other respiratory pathogens

Detailed guidance for postmortem specimen collection can be found in the section: <u>Collection of Postmortem Clinical and</u> <u>Pathologic Specimens</u>.

In addition to postmortem specimens, submission of any remaining clinical specimens (e.g., NP swab, OP swab, sputum, serum, stool) that may have been collected prior to death is recommended. Please refer to <u>Interim Guidelines for Collecting</u>, <u>Handling</u>, and <u>Testing Clinical Specimens from Persons Under Investigation (PUIs) for Coronavirus Disease 2019 (COVID-19)</u> for more information.

### https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinicalspecimens.html



# **Global PPE Supply Chain**

- Global shortage caused by: rising demand, panic buying, hoarding, misuse
  - WHO working with Pandemic Supply Chain Network (PSCN)
- Need to use PPE properly and responsibly: donning and doffing, storage, maintenance, use
- Those at most risk should be the ones getting it (i.e., HCW, first responders)
- We might have to ration PPE
  - CDC encouraging healthcare systems to implement strategies to conserve supplies
  - Shortfalls next 3-4 months
  - National stockpile integrity just checked (2003-2013)
  - Extended use and limited reuse of respirators





## OSHA Memo – Temporary Enforcement Guidance Annual Fit-Testing for N95s

https://www.osha.gov/memos/2020-03-14/temporaryenforcement-guidance-healthcare-respiratory-protectionannual-fit

 Video also currently being made with UNMC HEROES on extended use and re-use of N95s and other disposable respirators



### **Understanding the Difference**

	Surgical Mask	N95 Respirator
Testing and Approval	Cleared by the U.S. Food and Drug Administration (FDA)	Evaluated, tested, and approved by NIOSH as per the requirements in 42 CFR Part 84
Intended Use and Purpose	Fluid resistant and provides the wearer protection against large droplets, splashes, or sprays of bodily or other hazardous fluids. Protects the patient from the wearer's respiratory emissions.	Reduces wearer's exposure to particles including small particle aerosols and large droplets (only non-oil aerosols).
Face Seal Fit	Loose-fitting	Tight-fitting
Fit Testing Requirement	No	Yes
User Seal Check Requirement	No	Yes. Required each time the respirator is donned (put on)
Filtration	Does NOT provide the wearer with a reliable level of protection from inhaling smaller airborne particles and is not considered respiratory protection	Filters out at least 95% of airborne particles including large and small particles
Leakage	Leakage occurs around the edge of the mask when user inhales	When properly fitted and donned, minimal leakage occurs around edges of the respirator when user inhales
Use Limitations	Disposable. Discard after each patient encounter.	Ideally should be discarded after each patient encounter and after aerosol- generating procedures. It should also be discarded when it becomes damaged or deformed; no longer forms an effective seal to the face; becomes wet or visibly dirty; breathing becomes difficult; or if it becomes contaminated with blood, respiratory or nasal secretions, or other bodily fluids from nations.



Centers for Disease Control and Prevention National Institute for Occupational Safety and Health

...additionally lots of discussion and use about cloth facial coverings



# Image: The Washington Post Get 1 year for Democracy Dies in Darkness Get 1 year for Health Hospital workers battling coronavirus turn to bandannas, sports goggles and homemade face shields amid shortages

President Trump invokes war-scale manufacturing - but some worry about consequences of delays





## Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies

https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternatestrategies.html

Personal Protective Equipment and Respiratory Protection

- Use of respirators beyond the manufacturer-designated shelf life for healthcare delivery
- Use of respirators approved under standards used in other countries that are similar to NIOSH-approved N95 respirators
- Limited re-use of N95 respirators for COVID-19 patients
- Use of additional respirators beyond the manufacturerdesignated shelf life for healthcare delivery
- Prioritize the use of N95 respirators and facemasks by activity type



## Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies

https://www.cdc.gov/coronavirus/2019-ncov/hcp/respirators-strategy/crisis-alternatestrategies.html

When No Respirators are Left

- Administrative Controls
- Engineering Controls

Personal Protective Equipment and Respiratory Protection

HCP use of non-NIOSH approved masks or homemade masks

In settings where N95 respirators are so limited that routinely practiced standards of care for wearing N95 respirators and equivalent or higher level of protection respirators are no longer possible, and surgical masks are not available, as a last resort, it may be necessary for HCP to use masks that have never been evaluated or approved by NIOSH or homemade masks. It may be considered to use these masks for care of patients with COVID-19, tuberculosis, measles, and varicella. However, caution should be exercised when considering this option.<sup>1,2</sup>





N95 Respirator Limited Reuse - Healthcare Professionals Providing Clinical Care

### N95 Respirator Limited Reuse

Healthcare Professionals Providing Clinical Care

unmcheroes.org

Share



Nebraska Medical Center

## Social Distancing & Infection Control Precautions

- Family Consultation
- Funeral Ceremony
  - Decontamination between services
- Graveside Service
- Memorial Service
- Viewing/Visitation
- Wake



# NFDA

### https://www.nfda.org/covid-19/practical-guidancewebinars

### Practical Guidance Webinars

Frequently Asked Questions

Practical Guidance Webinars

OSHA Alert & Guidance

Sourcing Masks

Key Informational Resources

Covid-19 News

Supporting You: NFDA Work/Life Resource Program

NFDA: We've Got Your Back

#### DELL Technologies



UP TO 45% OFF HIGH-PERFORMANCE TECHNOLOGY Plus, Members Save an Extra 8%

FOR SMALL BUSINESSES



Shop Now

### Practical Guidance Webinars & Videos for Funeral Directors

### A Conversation with the CDC



### CDC COVID-19 Response Update

National Funeral Directors Association March 16, 2020

> CAPT Jill M. Shugart Dr. Sarah Reagan-Steiner **Dr. David Berendes**





For more information: www.cdc.gov/COVID19

### Handling Families with COVID-19

# NFDA

https://www.nfda.org/covid-19/frequently-asked-questions

### **COVID-19: Frequently Asked Questions**

Funeral professionals have had many questions about how they can safely continue to serve families during the COVID-19 pandemic. NFDA has compiled a list of the frequently asked questions, which cover issues related to business operations, liability, funerals and visitation, technical questions, and more.

Please click on the button below or use the side bar navigation to navigate between topics.

If you do not find an answer to your question, please use the form below and an NFDA staff member will respond to you as soon as we can.

Please note: Because this is a rapidly evolving situation, NFDA will be updating the Frequently Asked Questions sections as new information becomes available. We will also add questions and answers should new issues emerge.

Legal Questions

Personal Protective Equipment (PPE)

**Technical Questions** 

**Funerals and Visitations** 

Other Frequently Asked Questions



# **Additional Resources**

- UNMC HEROES
  - <u>https://app1.unmc.edu/nursing/heroes/</u>
  - PPE donning and doffing videos, hospital decontamination, biological preparedness and response, etc.
- Pathogen Safety Data Sheets from the Government of Canada
  - <u>https://www.canada.ca/en/public-</u> <u>health/services/laboratory-biosafety-biosecurity/pathogen-</u> <u>safety-data-sheets-risk-assessment.html</u>
  - Human coronavirus listed
  - For each pathogen has infectious agent, hazard identification, stability and viability, first aid/medical
- Nebraska Medicine COVID-19 Resources for Providers
  - <u>https://www.nebraskamed.com/for-providers/covid19</u>
  - PPE, protocols and checklists, specimen collection protocols



# **Questions?**

