COVID-2019: The Emergence of a Novel Coronavirus

Mary Foote, M.D., M.P.H

Senior Health Security Specialist
Director of Healthcare Systems Support (ICS)
New York City Department of Health & Mental Hygiene (DOHMH)
Office of Emergency Preparedness and Response

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DISCLOSURE

- No financial conflicts of interest

DISCLAIMER

- Our understanding of the novel coronavirus is evolving rapidly
- This presentation is based on our knowledge as of this week

OUTLINE

- BACKGROUND
- CURRENT STATUS OF OUTBREAK
- CLINICAL FEATURES
- HEALTH CARE GUIDANCE
- MANAGEMENT OF CONTACTS WITH COVID-19 EXPOSURE
- EFFORTS TO PREVENT COMMUNITY TRANSMISSION
- GUIDANCE IN ANTICIPATION OF A PANDEMIC
- ADDITIONAL RESOURCES

Live Poll Question 1

- What type of organization do you represent?

a) Hospital
b) Community health center
c) Private physician's office
d) State DOH
e) Local DOH
f) Federal government
g) Corrections/Justice-involved program

BACKGROUND

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- Outbreak of respiratory illness of unknown etiology identified in Wuhan, Hubei Province, China, December 2019
  - ~40 cases with history of exposure to live animal market, suggesting animal to human transmission
  - Chinese scientists rapidly identified a novel coronavirus
- Naming the new virus
  - **SARS-CoV-2:** Coronavirus Study Group of the International Committee on Taxonomy of Viruses name for virus (formerly 2019-nCoV)
  - **COVID-2019:** World Health Organization name for clinical syndrome
  - **SARS-CoV-2** causes **COVID-2019**

BACKGROUND: FAMILY OF CORONAVIRUSES (CoV)

ANIMAL

- Numerous coronaviruses cause disease in animals

HUMAN

- Four types commonly circulate among humans, causing mild to moderate upper-respiratory-tract illnesses (229E, NL63, OC43, and HKU1)

ZOONOTIC

- Three animal coronaviruses have jumped to humans, then been transmitted from person to person:
  - SARS-CoV - emerged 2003, caused >8000 cases; no cases since 2004
  - MERS-CoV - emerged 2012, caused >2400 cases; continues to infect humans
  - SARS-CoV-2 - emerged 2019, outbreak ongoing

CURRENT STATUS OF OUTBREAK

Live Poll Question 2

- Do you have COVID-19 emergency response/preparedness duties within your organization?
  a) Yes
  b) No

*Source: CDC 3/5/2020, https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html

CURRENT STATUS OF OUTBREAK- GLOBAL

- Widespread human-to-human transmission on multiple continents
  - Worldwide, >105,000 cases; >3,500 deaths
  - Most cases (>80,000) in mainland China,
    - daily case counts there are now decreasing
  - 101 countries reporting cases
  - Sustained community transmission is ongoing elsewhere, including: **South Korea, Japan, Italy, Iran**

*Source: CDC 3/5/2020, https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html

CURRENT STATUS OF OUTBREAK- USA

- Cases confirmed in U.S.: >500 (36 linked to travel), 11 deaths*
- States reporting cases: 34
- Likely community transmission: New York, California, Oregon, and Washington
- 16 confirmed cases in New York City residents

*Source: CDC 3/8/2020, https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html

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CLINICAL FEATURES

CLINICAL FEATURES

- Incubation period: 5.2 days (up to 14 days)
- Median patient age reported in China: between 49 - 56 years
- Transmission
  - Thought to occur mainly from symptomatic individuals
  - Primarily droplet and contact
  - No evidence of airborne transmission to date
  - Fecal oral?
- Risk groups: Age >65 and those with comorbidities
- Nonspecific initial symptoms
  - Most common: **fever** (83-98%) and **dry cough** (76-82%)
  - Less frequent: myalgias, headache, sore throat, diarrhea

Del Rio, et al. "2019 Novel – Important Information for Clinicians." *JAMA Feb 28,*2020.
Report of the WHO-China Joint Mission on COVID-19, 16-24 Feb 2020.

CLINICAL FEATURES

- Severity of laboratory-confirmed cases in China
  - ~80% mild to moderate
  - 14% severe (dyspnea, hypoxia, tachypnea, lung infiltrates)
  - 5-10% critical (respiratory failure, shock, multiple organ dysfunction)
  - Fatality rate = 0.6 –>3%
- Laboratory findings
  - lymphopenia (70%)
  - prolonged prothrombin time (58%)
  - elevated lactate dehydrogenase (40%)
- Radiologic features
  - CXR with bilateral patchy infiltrates
  - Chest CT show ground-glass infiltrates

CHARACTERISICS OF HOSPITALIZED CASES IN CHINA (N=138)

- 54% male
- Median age: 56 years (range 22-92)
- Hospital-associated transmission suspected:
  - 40 health care workers
  - 17 patients
- Chest computed tomographic (CT) scan
  - 100% bilateral ground glass opacities
- Among 36 transferred to ICU:
  - Acute respiratory distress syndrome (ARDS): 61%
  - Median age: 66 years
  - 72% had underlying comorbidities

Signs and symptoms	
Fever	99%
Dry cough	59%
Fatigue	70%

Laboratory findings	
Lymphopenia	70%
Prolonged prothrombin time	58%
Elevated lactate dehydrogenase	40%

Wang, et al. "Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus infected pneumonia in Wuhan, China." *JAMA* (2020).

Characteristics of COVID-19 in China

- 1,099 lab confirmed hospitalized cases
  - 552 hospitals, 30 provinces
- Median age = 47 yrs
- 42% Female
- Outcomes
  - 5% admitted to ICU
  - 2.3% mechanical ventilation
  - 1.4% mortality

Signs and symptoms	
Fever	44% (admit) 89% (inpt)
Cough	68%
Diarrhea	4%

Radiographic findings	
Ground glass opacity (CT)	56%
No changes • Non-severe disease	18%
• Severe disease	3%

Guan, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. NEJM. 2020

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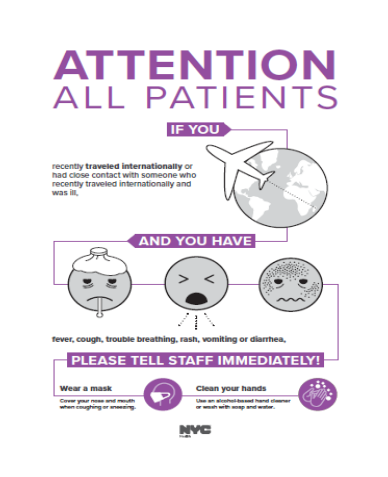
TREATMENT AND PREVENTION

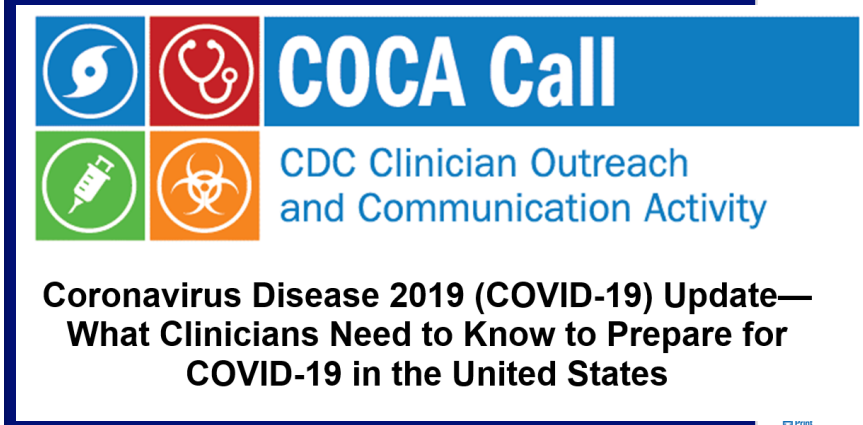
- Vaccines and treatments are being developed
  - Vaccines being developed in the U.S., China and elsewhere; will likely not be ready for at least one year.
- Currently, medical care is supportive
- Remdesivir is being studied as one experimental treatment
- Steroids have not been recommended

CURRENT HEALTH CARE GUIDANCE

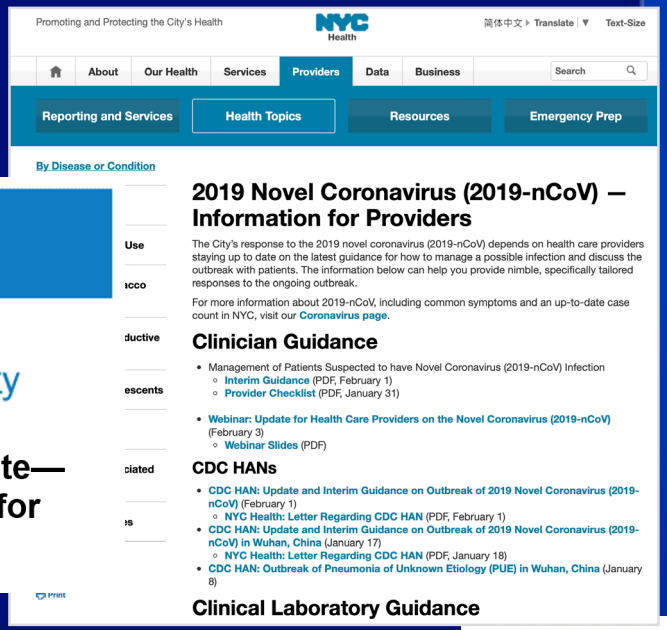
HEALTH DEPARTMENT SUPPORT FOR HEALTH CARE PROVIDERS

- NYC Web page with updated information, posters and other clinical resources:
  - https://www1.nyc.gov/site/doh/providers/health-topics/novel-respiratory-viruses.page
  - https://www.cdc.gov/coronavirus/2019-ncov/index.html
- Clinical consultation via local health department
- Updated guidance via Dear Provider letters and Health Alerts
- Webinars





https://emergency.cdc.gov/coca/index.asp



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GENERAL FACILTY PREPAREDNESS

- Maintain awareness
  - Educate staff regarding current status of outbreak
  - Disseminate Public Health alerts and guidance
- General infection prevention measures
  - Practice hand and respiratory hygiene
  - Review your sick leave policies
  - Encourage staff to stay home if they are unwell
- Initiate risk communication
  - http://www.psandman.com/articles/who-srac.htm#sect1

PILLARS OF COVID-19 PREPAREDNESS

- IDENTIFY
- ISOLATE
- INFORM

IDENTIFY

IDENTIFY persons with potential COVID-19

- Post signs in multiple languages at health care facility entry points directing persons to immediately notify staff of:
  - Recent travel
  - Fever, cough or shortness of breath
  - Exposure to COVID-19
- Consider implementing entry screening for patients and visitors

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ISOLATE

ISOLATE persons with potential COVID-19

- Put face mask on patient during initial evaluation
- Place persons suspected to have COVID-19 in an airborne infection isolation room (AIIR)
- If AIIR is not available, place in single room with door closed
- Minimize number of staff who enter room
- Keep log of staff who enter room
- Use appropriate personal protective equipment while evaluating patient: standard, contact, and airborne precautions, including eye protection

For detailed infection control guidance, visit the CDC website:
https://www.cdc.gov/coronavirus/2019-nCoV/hcp/infection-control.html

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INFORM

- **Have a higher suspicion for symptomatic persons, including healthcare workers who**
  1. Have had close contact with a laboratory-confirmed COVID-19 patient within 14 days of symptom onset, or
  2. Have a history of travel from affected geographic areas* within 14 days of symptom onset.
  3. Have a severe lower respiratory infection of unclear etiology

- **Current guidance**
  - Call your local Health Department to report persons with potential COVID-19 that may need testing

- **When commercial laboratory testing is available**
  - Check with your state and/or local health department for specific guidance on who to report

* https://www.cdc.gov/coronavirus/2019-ncov/travelers/index.html

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INTERIM MANAGEMENT OF CONTACTS

- If a patient or healthcare worker tests positive for COVID-19, public health can assist with
  - Assessing level of exposure that occurred at the facility
  - Monitoring exposed health care workers using CDC guidance
- Public health will also identify, assess, and monitor contacts outside of the health care setting (e.g., family members)
- These strategies will be adapted as the epidemic evolves
  - Emphasis will shift to social distancing, home isolation, routine infection prevention (cough etiquette, hand hygiene)
  - Likely shift to self-monitoring for all healthcare personnel + active monitoring for higher-risk exposures

https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assesment-hcp.html
https://www.cdc.gov/coronavirus/2019-ncov/php/risk-assessment.html

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Live Poll Question 3

- Have you tested a patient(s) for COVID-19?
  a) Yes
  b) No

DIAGNOSTIC TESTING FOR COVID-19

- Real time reverse transcription PCR (rRT-PCR)
  - Serology testing not-yet available
- Many state and local public health laboratories now testing
- U.S. Food and Drug Administration removed many restrictions to approving new laboratory testing on 2/29/2020
  - Commercial laboratory testing now rolling out

SPECIMENS FOR COVID-19 TESTING

Specimen type	Number needed
ALL PATIENTS	
Nasopharyngeal swab	1
Oropharyngeal swab (OP)	1
Lower respiratory sample*	1

- Recommend first testing for common respiratory pathogens
  - Multiplex respiratory viral panel (RVP), including influenza
  - Alternative diagnosis lowers index of suspicion for COVID-19
- *Lower respiratory specimens (induced sputum, bronchoalveolar lavage, tracheal aspirates) may also be submitted for hospitalized patients

Detailed laboratory guidance can be found online at:
https://www.cdc.gov/coronavirus/2019-nCoV/lab/index.html

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Infection Control Considerations

Current CDC guidance

- Standard, Contact, and Airborne Precautions, Including the Use of Eye Protection
- If negative pressure room not available → place in private room with door closed

- This approach poses significant challenges to many outpatient facilities
- N95s not in stock and unable to purchase
  - Lack fit testing programs
- To date, no evidence of airborne transmission
- Many moving towards droplet precautions with contact and eye protection (WHO standards)

LIVE POLL QUESTION 4

- Has your facility been experiencing PPE supply shortages?
  a) Yes
  b) No

Supply Shortages

- Personal protective equipment
  - Decrease in exports
  - Increase in demand
- Now utilizing existing stockpiles
  - Local, State, Federal
  - Check with trade associations or healthcare coalitions for requests
- Prepare for potential for shortages of drugs and other supplies
  - Contingency and crisis planning

https://www.cdc.gov/coronavirus/2019-ncov/hcp/healthcare-supply-ppe-index.html

ENVIRONMENTAL CLEANING

- Clean and disinfect room before returning to routine use
  - Use EPA-registered, hospital-grade disinfectants effective against coronaviruses in accordance with manufacturer's instructions
  - Clean all areas, with focus on high-touch surfaces
  - Treat contaminated waste as routinely regulated medical waste
  - Follow standard operating procedures for containing and reprocessing used linens

EFFORTS TO PREVENT COMMUNITY TRANSMISSION IN THE U.S.

Containment to Mitigation

TRAVEL RESTRICTIONS AND PROCEDURES

January 31, 2020:

Health and Human Services declared the coronavirus a public health emergency in the United States and announced the following travel restrictions, effective February 2, 2020:

1. Foreign nationals who visited China in past 14 days may not enter the U.S.
2. American citizens, permanent residents, and their families arriving from:
   - Hubei Province within previous 14 days – quarantine for 14 days
   - Rest of mainland China in previous 14 days – self-monitoring and social distancing for up to 14 days

February 29, 2020:

Foreign nationals who visited **Iran** in past 14 days may not enter the U.S.

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CDC TRAVEL WARNINGS*

- Level 3 health notice
  - CDC recommends avoiding all nonessential travel
  - **China, Iran, South Korea, Italy**
- Level 2 health notice
  - Older adults and those with chronic medical conditions should consider postponing nonessential travel
  - **Japan**
- Check CDC website for updates
  - https://www.cdc.gov/coronavirus/2019-ncov/travelers/index.html

*As of 3/5/2020

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CURRENT RESPONSE TO COVID-19

Current strategy: containment

- Quarantine of travelers from high-risk countries
- Identify cases and contacts; isolate them
- Handwashing, routine influenza precautions

But at some point containment becomes impossible…

RESPONSE WILL SHIFT TO MITIGATION

Goal – minimize spread, mitigate impact

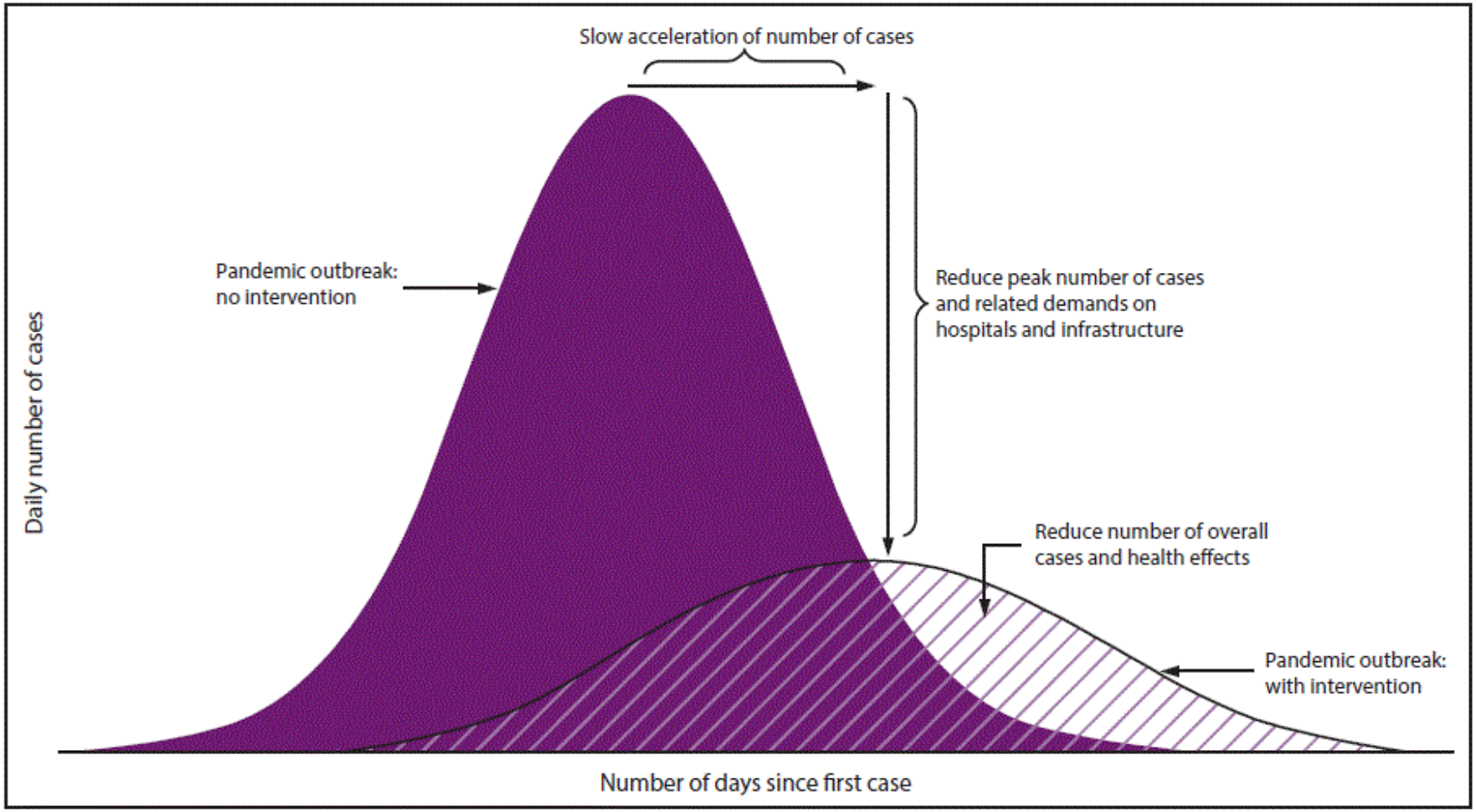
Measures to decrease population-wide impact

- Individual– cough etiquette, hand washing
- Community– Social distancing
  - Work from home/telework
  - Limit use of health care for worried well/mildly ill
  - Avoid unnecessary social gatherings
  - Extreme, not currently recommended: school closures, cancel large gatherings, etc.
- Environmental

Thresholds

- All surveillance and laboratory data are taken into account
- Decisions made based on spread and severity of COVID-19

GOALS OF COMMUNITY MITIGATION



https://www.cdc.gov/nonpharmaceutical-interventions/tools-resources/planning-guidance-checklists.html

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HOW DOES PUBLIC HEALTH DETECT COMMUNITY TRANSMISSION- THE NYC EXPERIENCE

- Given international trends and apparent community transmission in several U.S. locations, it is likely that the infection is already circulating in NYC
- Syndromic surveillance
  - Emergency department visits are monitored electronically for respiratory syndrome visits to detect new trends or clusters
- Early Detection System is being launched
  - Lowering of threshold for testing hospitalized cases with pneumonia with less clear exposures
  - Sentinel surveillance → Retrospective testing of samples

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LIVE POLL QUESTION 5

- Does your facility have a pandemic plan?
  a) Yes
  b) No

GUIDANCE IN ANTICIPATION OF A PANDEMIC

IF THIS BECOMES A PANDEMIC, GUIDANCE WILL EVOLVE

- Quarantine will stop
- Individual measures
  - Hand hygiene
  - Cover your cough
  - Self-isolation at home if sick
- Social distancing will begin
  - Closure of schools and large public events
- PPE recommendations will change
- Testing recommendations may become more restrictive

PANDEMIC PREPAREDNESS

Plan for patient surge and preventing healthcare transmission of COVID-19

- Identification and monitoring of staff with possible exposures
- Patient placement and staffing plans
  - waiting areas, exam rooms, inpatient, ICU
- Expanding airborne isolation and critical care capacity
- Visitor management
- Handling staff shortages- contingency staffing; cross training
- Crisis care in resource limited settings
- Communication plans

https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/index.html

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STEPS TO TAKE NOW

- Review pandemic plans
- Review CDC and other public health guidance
- Implement triage protocols
  - Assess for symptoms and risk factors
  - Options to evaluate patients remotely
- Assess PPE supplies and take steps to conserve
- Environmental protocols and supplies
- Just in time trainings – infection control and PPE
- Risk communication to patients, staff, families/visitors

https://www.cdc.gov/coronavirus/2019-ncov/downloads/hospital-preparedness-checklist.pdf

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COMMUNITY TRANSMISSION SCENARIO

- Early detection system identifies community transmission
- Syndromic surveillance shows increasing influenza-like illness signals, despite less circulating influenza virus in community
- PPE supplies decreasing
- Medical and other staff calling out because of ILI

COMMUNITY TRASNMISSION SCENARIO

Response: move to MITIGATION strategies

- Community level: initiate social distancing
- Health care facility level:
  - Prevent, identify, and contain spread in health care facilities
  - Consider triaging patients remotely or in alternative sites
  - Implement plans for staff monitoring, cross coverage
  - Conserve PPE; watch for new recommendations on its use

CHECK GUIDANCE AND RESOURCES OFTEN

- NYC Health Department COVID-19 Information for Providers:
  https://www1.nyc.gov/site/doh/providers/health-topics/novel-respiratory-viruses.page
- CDC Novel Coronavirus Webpage
  https://www.cdc.gov/coronavirus/2019-ncov/index.html
- COVID-19 Situation reports
  http://www.centerforhealthsecurity.org/resources/COVID-19/
  https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/
- Risk communication resources
  http://www.psandman.com/index-infec.htm#corona

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Thank you

Questions?

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ADDITIONAL INFORMATION

www.CDNetwork.org/Library

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CHARACTERISTICS OF HOSPITALIZED CASES IN CHINA, I (N=41)

- 73% male
- Median age: 49 years (range 25-64)
- Comorbid medical conditions: 32%
- Median days, symptom onset to admission: 7 (range 4-8)
- Most (63%) had lymphopenia
- Radiographic findings:
  - Non-ICU cases: bilateral ground glass opacities & areas of consolidation
  - ICU cases: bilateral multilobe consolidation

Signs and symptoms	
Fever	98%
Cough	76%
Myalgia or fatigue	44%
Sputum production	28%

Course of illnesses	
Pneumonia	100%
Bilateral pneumonia	98%
Dyspnea	55%
Acute respiratory distress syndrome (ARDS)	29%
Admitted to ICU for oxygen support	32%
Secondary infection	10%
Death	15%

Huang, et al. "Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China." *The Lancet* (2020).