Covid-19: What to Expect this Winter

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Tufts University School of Medicine
Overview

- Epidemiology & Natural History
- Modes of transmission
- Clinical course and therapeutics
- Testing, prevention and control
- What does this mean for the coming months?
Number of Covid-19 Cases in United States

Source: New York Times 11-9-20
Mortality from Covid-19 United States 2020

New reported deaths by day in the United States

Source: New York Times 11-9-20
Places with highest daily reported cases per capita
Seven-day average of daily new reported cases per 100,000 residents

U.S. overall

North Dakota 176

South Dakota 132

Wisconsin 98

Iowa 98

Montana 84

Track the spread: Across the U.S. ◆ Worldwide

Source: Washington Post 11-9-20
Incident Cases of Covid-19 Vermont

Covid new cases per day, rolling average:

Based on the latest Department of Health data, with a seven-day rolling average:

Chart: Erin Petenko • Source: VTDOH via Vermont Center for Geographic Information • Get the data • Created with Datawrapper
<table>
<thead>
<tr>
<th>Place</th>
<th>Total reported cases per 100k</th>
<th>New cases in last 7 days per 100k</th>
<th>Change in daily cases in last 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>577</td>
<td>67</td>
<td>▲ 79%</td>
</tr>
<tr>
<td>Minnesota</td>
<td>3,272</td>
<td>493</td>
<td>▲ 65%</td>
</tr>
<tr>
<td>Washington</td>
<td>1,590</td>
<td>106</td>
<td>▲ 58%</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>3,475</td>
<td>280</td>
<td>▲ 55%</td>
</tr>
<tr>
<td>Idaho</td>
<td>4,284</td>
<td>428</td>
<td>▲ 53%</td>
</tr>
<tr>
<td>Nebraska</td>
<td>4,326</td>
<td>563</td>
<td>▲ 48%</td>
</tr>
<tr>
<td>Iowa</td>
<td>4,878</td>
<td>673</td>
<td>▲ 48%</td>
</tr>
<tr>
<td>Vermont</td>
<td>383</td>
<td>28</td>
<td>▲ 47%</td>
</tr>
<tr>
<td>Ohio</td>
<td>2,150</td>
<td>244</td>
<td>▲ 44%</td>
</tr>
<tr>
<td>Nevada</td>
<td>3,764</td>
<td>271</td>
<td>▲ 44%</td>
</tr>
</tbody>
</table>

Source: Washington Post 11-9-20
Racial Disparities Covid-19 Death Rates

Race gaps in COVID-19 death rates

<table>
<thead>
<tr>
<th>Age Range</th>
<th>White</th>
<th>Black</th>
<th>Hispanic/ Latino</th>
</tr>
</thead>
<tbody>
<tr>
<td>35-44 years</td>
<td></td>
<td>10.0</td>
<td>8.0</td>
</tr>
<tr>
<td>45-54 years</td>
<td>1.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>55-64 years</td>
<td>1.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>65-74 years</td>
<td>1.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>75-84 years</td>
<td>1.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>85 years and over</td>
<td>1.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: CDC data from 2/1/20-6/6/20 and 2018 Census Population Estimates for USA
Case fatality rate of the ongoing COVID-19 pandemic, Nov 3, 2020

The Case Fatality Rate (CFR) is the ratio between confirmed deaths and confirmed cases. During an outbreak of a pandemic the CFR is a poor measure of the mortality risk of the disease. We explain this in detail at OurWorldInData.org/Coronavirus

- Sweden: 4.8% (Oct 30, 2020)
- United Kingdom: 4.4%
- Canada: 4.2%
- France: 2.6%
- United States: 2.5%
- Germany: 1.9%
- South Korea: 1.8%
- New Zealand: 1.6%
- India: 1.5%
- Taiwan: 1.2%

Source: European CDC - Situation Update Worldwide - Last updated 3 November, 10:36 (London time)
Modes of Transmission
Possible Modes of Transmission

- **Droplet & Airborne**: person to person

- **Tactile & Fomites**: deposited by droplets, touching surfaces, other contamination etc.

- **Body fluids**: not yet known whether other non-respiratory body fluids from an infected person including vomit, urine, breast milk, or semen can contain viable, infectious SARS-CoV-2

- **Food**: there is no evidence that the virus that causes COVID-19 spreads to people through food.
The difference between droplet and airborne transmission

Droplet transmission
Coughs and sneezes can spread droplets of saliva and mucus

Airborne transmission
Tiny particles, possibly produced by talking, are suspended in the air for longer and travel further

Droplets
Human hair: 60 - 120 microns wide

Source: WHO
Droplet and aerosol dispersion
Ebola, Coronavirus and Measles

Covid-19 Coronavirus???

EBOLA
3 feet

6 feet
MEASLES
Sars CoV-2 Prevention and Control
Natural History of Covid-19

4-5 days
Shedding commences

danger period

Latent period

Infectious period

Time

Exposed

Onset of clinical signs

Resolution/death

Incubation period

Sub-clinical

Clinical

NOTE: 40% asymptomatic

Source: Emergency Animal Disease Surveillance
Prevention & Control

- Physical distancing > 6 feet
- Masks, eye and face protection
- Hand washing and disinfection
- Quarantine
- Testing
- Contact tracing
- Isolation
SARS CoV-2 Testing
Testing

- **Viral tests-PCR molecular test**
  - Nasal or throat swab
  - Searches for SARS-CoV-2 virus directly
  - Many different variations
  - Quick (<20 min) long (hours)
  - Limitations: accuracy, timing (4-6 days after exposure)
    Interpretation: currently infected with virus-long term immunity ???

- **Antibody test**
  - Finger prick blood sample
  - Over 150 different manufacturers
  - Highly variable accuracy-false positive and false negatives
  - Limitations: timing (10-14 days after exposure to develop detectable antibodies)
  - Meaning: at some point in past you were possibly infected-long term immunity ???

- **Antigen test**
  - Nasal or throat swab
  - Searches for proteins associated with virus but NOT the virus itself
  - Meaning current infection detected
  - Susceptible to high FP and FN rates
  - Not yet authorized for use by FDA
Coronavirus Therapeutics
Case Flow***

**Test (+)**
- N=100

**asymptomatic**
- N=40

**Symptomatic**
- N=60

**Tx @ home**
- N=48
  - recover: N=47
  - deceased: N=3

**Tx @ Hospital**
- N=12
  - recover: N=8

N=40

*** Based on early studies of patient outcome
Therapeutics
(treat symptoms & provide supportive care)

- **Supportive care** *(fever reducers, oxygen, rest, vitamin D etc.)*
- Remdesivir *(antiviral)*
- Regeneron *(antibodies)*
- Dexamethasone *(anti inflammatory)*
- ??Covalescent Plasma??
- Hydroxychloroquin
Clinical Consequences
(risk factor dependent: age, sex, co-morbid condx etc.)

- Fatigue
- Confusion, mental stress
- Headache
- Cardiovascular complications
- Kidney failure
- “Long haul” neurological effects
- ???. Etc.
Vaccine Development
What you need to know
Vaccine Development

- Many different vaccines in development > 53
- Number of doses, timing, efficacy rates different
- Challenges include: completing clinical trials, manufacturing, distribution, cost
- Wide scale distribution not until 3rd Quarter 2021
- On going PPE and universal precautions will be required for a long time to come
- Immunity may not be long lived
- Vaccines not likely to be a silver bullet

See McGill University vaccine tracker for up-to-date information
https://covid19.trackvaccines.org/
BioNTech: BNT162b2
Developers: BioNTech, Pfizer

About Trial Phases

PHASE 1
- 3 Trials
  - EudraCT 2020-001038-36, NCT04380701
    - Germany
  - NCT04368728
    - Argentina, Brazil, Germany, South Africa, Turkey, United States of America
  - NCT04588480
    - Japan

PHASE 2
- 3 Trials
  - EudraCT 2020-001038-36, NCT04380701
    - Germany
  - NCT04368728
    - Argentina, Brazil, Germany, South Africa, Turkey, United States of America
  - NCT04588480
    - Japan

PHASE 3
- 1 Trial
  - NCT04368728
    - Argentina, Brazil, Germany, South Africa, Turkey, United States of America

APPROVED

Awaiting Approval
This vaccine is not yet approved.
Tips for winter living in a Covid-19 World

- Get a seasonal flu shot ASAP
- Be aware of the level of risk in your environment
- Be wary of holiday events Thanksgiving and Christmas
- Keep number of close contacts small
- Spend as little time in indoor confined spaces & high risk activities as possible
- Consider joining a “pod” or “quaranteam”
- Practice universal precautions and routine pandemic preventive behaviors***
- Keep a log or diary

***The odds don’t remember. It doesn’t matter what you did in the past.
Email me for slides and handouts at james.hyde@tufts.edu

Questions and Comments?
Possible Scenarios of Future Virus Activity

Source: STATNews 5-1-2020