An Epidemiological Perspective on the COVID-19 Pandemic: COVID-19 Vaccines and Their Use

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Other Known Coronavirus-related Human Illnesses

• Upper respiratory infections (229E, N63, OC43, and HKU1)
• SARS (2002) (SARS-CoV-1)
• MERS (2012) (MERS-CoV)
## SARS, November 1, 2002 - August 7, 2003

<table>
<thead>
<tr>
<th>Total Cases:</th>
<th>8,422 (1,725 healthcare workers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths:</td>
<td>916</td>
</tr>
<tr>
<td>CFR:</td>
<td>11%</td>
</tr>
<tr>
<td>Number of Countries with Cases:</td>
<td>32</td>
</tr>
<tr>
<td>U.S. Cases:</td>
<td>33</td>
</tr>
</tbody>
</table>

Source: WHO
Cases in U.S. (as of Feb. 6, 2020)

12 confirmed cases

• California:
  – 6 (LA-1, Orange Co.-1; San Benito-2; Santa Clara-2)
• Illinois:
  – 2
• Arizona, Massachusetts,
  Washington, Wisconsin:
  – 1 each
Coronavirus in the U.S.: Latest Map and Case Count

Updated January 25, 2021, 7:54 A.M. E.T.

Leer en español

<table>
<thead>
<tr>
<th></th>
<th>TOTAL REPORTED</th>
<th>ON JAN. 21</th>
<th>14-DAY CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>25.1 million†</td>
<td>129,527</td>
<td>-33%</td>
</tr>
<tr>
<td>Deaths</td>
<td>419,207</td>
<td>1,815</td>
<td>-5%</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>110,628</td>
<td></td>
<td>-9%</td>
</tr>
</tbody>
</table>

† Day with reporting anomaly. Hospitalization data from the Covid Tracking Project; 14-day change trends use 7-day averages.
Covid-19 Live Updates: In 5 U.S. States, Crushing Numbers And Hospitals At Capacity
### Rate of COVID Deaths in Selected States, U.S.*

<table>
<thead>
<tr>
<th>State</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>126</td>
</tr>
<tr>
<td>New York</td>
<td>215</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>205</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>197</td>
</tr>
<tr>
<td>Mississippi</td>
<td>194</td>
</tr>
<tr>
<td>Louisiana</td>
<td>184</td>
</tr>
<tr>
<td>Arizona</td>
<td>168</td>
</tr>
<tr>
<td>California</td>
<td>95</td>
</tr>
<tr>
<td>Washington</td>
<td>55</td>
</tr>
<tr>
<td>Utah</td>
<td>50</td>
</tr>
<tr>
<td>Oregon</td>
<td>45</td>
</tr>
<tr>
<td>Maine</td>
<td>40</td>
</tr>
<tr>
<td>Vermont</td>
<td>27</td>
</tr>
<tr>
<td>Hawaii</td>
<td>24</td>
</tr>
</tbody>
</table>

*per 100,000
# Rate of COVID Deaths in Selected Countries*

<table>
<thead>
<tr>
<th>Country</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>182</td>
</tr>
<tr>
<td>Slovenia</td>
<td>163</td>
</tr>
<tr>
<td>UK</td>
<td>148</td>
</tr>
<tr>
<td>U.S.</td>
<td>126</td>
</tr>
<tr>
<td>Mexico</td>
<td>119</td>
</tr>
<tr>
<td>Brazil</td>
<td>104</td>
</tr>
<tr>
<td>Germany</td>
<td>63</td>
</tr>
<tr>
<td>Denmark</td>
<td>35</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>7</td>
</tr>
<tr>
<td>Botswana</td>
<td>6</td>
</tr>
<tr>
<td>Japan</td>
<td>4</td>
</tr>
</tbody>
</table>

*per 100,000
The Pandemic’s Hidden Toll: Half a Million Deaths

By Jan Wu, Allison McCargo, Josh Katz, Glen Bethel and Karen Depp-South
Updated Jan 18, 2021

Note: Bolivia’s Civil Registry recorded almost no deaths in April due to the closure of government offices during a lockdown. Officially, at least some of the deaths that occurred in April could have been registered in later months.
Prevention/Control Methods Being Employed

- Isolation of cases and protective gear for HCWs
- Quarantine of exposed individuals
- Cordon Sanitaire and Protective Sequestration
- Masks and Face coverings
- Travel restrictions and border closings
- Social distancing (e.g. closing schools, canceling sporting events)
- Handwashing
- Environmental decontamination
- Closing of Live Animal Markets
Impact/Effectiveness of Social Distancing and Other Measures

- If implemented and followed, should reduce person-to-person transmission of SARS CoV-2
- Evidence of “flattening the curve” in countries, states, and counties
Social/Societal Impacts

- Reduced travel and trade
- Economic impacts (e.g. stock prices)
- Hoarding
- Stigma
- Reduced trust in authority
- Political ramifications
Alarmed by student suicides during the pandemic, Las Vegas is reopening its schools.
Impacts on Other Health Outcomes and Medical Care

- Reduced prevention (e.g. vaccination)
- Reduced/delayed care (e.g. surgery)
The Great Barrington Declaration

The Great Barrington Declaration – As infectious disease epidemiologists and public health scientists we have grave concerns about the damaging physical and mental health impacts of the prevailing COVID-19 policies, and recommend an approach we call Focused Protection.

Coming from both the left and right, and around the world, we have devoted our careers to protecting people. Current lockdown policies are producing devastating effects on short and long-term public health. The results (to name a few) include lower childhood vaccination rates, worsening cardiovascular disease outcomes, fewer cancer screenings and deteriorating mental health – leading to greater excess mortality in years to come, with the working class and younger members of society carrying the heaviest burden. Keeping students out of school is a grave injustice.
Risk Factors for SARS-CoV-2 Infection and Severe COVID-19

<table>
<thead>
<tr>
<th>Infection</th>
<th>Severe COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Factors</td>
<td>Age</td>
</tr>
<tr>
<td>Household Crowding</td>
<td>Underlying Conditions (e.g. obesity, pulmonary disease, etc.)</td>
</tr>
<tr>
<td>Multi-generational household</td>
<td></td>
</tr>
<tr>
<td>Latinx Ethnicity</td>
<td></td>
</tr>
<tr>
<td>Black, Native American Race</td>
<td></td>
</tr>
</tbody>
</table>
Nurses Are at High Risk for Covid Among Health Workers, C.D.C. Says

A new study looked at the high numbers of health care workers hospitalized during the early months of the pandemic.
### Coronavirus Vaccine Tracker

By Carl Zimmer, Jonathan Corum and Sui-Lee Wee  Updated Jan. 12, 2021

<table>
<thead>
<tr>
<th>PHASE 1</th>
<th>PHASE 2</th>
<th>PHASE 3</th>
<th>LIMITED</th>
<th>APPROVED</th>
<th>ABANDONED</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>21</td>
<td>20</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

- Vaccines testing safety and dosage
- Vaccines in expanded safety trials
- Vaccines in large-scale efficacy tests
- Vaccines in early or limited use
- Vaccines approved for full use
- Vaccines abandoned after trials

Vaccines typically require years of research and testing before reaching the clinic, but in 2020, scientists embarked on a race to produce safe and effective coronavirus vaccines in record time. Researchers are currently testing **65 vaccines** in clinical trials on humans, and 20 have reached the final stages of testing. At least 85 preclinical vaccines are under active investigation in animals.
Examples of Things We’d Like to Know

• Efficacy against disease
• Efficacy against transmission
• Efficacy in subgroups (e.g. by age, sex, presence of underlying illness, prior coronavirus infection, etc.)
• Efficacy against emerging variants of SARS-CoV-2
• Short term safety
• Long term safety
• Co-administration with other vaccines
Sequence for a successful candidate...

• Phase III Data submitted to HHS
  – FDA, CDC, Advisory Committees review
• FDA VRBPAC meeting, vote to recommend
• FDA authorizes use of vaccine
• ACIP meeting, vote to recommend
• CDC standing by to allocate available doses nationwide
• Western States Committee convenes...
Phase 1

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Phase 1a “Jumpstart Phase”
- High-risk health workers
- First responders

Phase 1b
- People of all ages with comorbid and underlying conditions that put them at significantly higher risk
- Older adults living in congregate or overcrowded settings

Phase 2

- K-12 teachers and school staff and child care workers
- Critical workers in high-risk settings—workers who are in industries essential to the functioning of society and at substantially higher risk of exposure
- People of all ages with comorbid and underlying conditions that put them at moderately higher risk
- People in homeless shelters or group homes for individuals with disabilities, including serious mental illness, developmental and intellectual disabilities, and physical disabilities or in recovery, and staff who work in such settings
- People in prisons, jails, detention centers, and similar facilities, and staff who work in such settings
- All older adults not included in Phase 1

Phase 3

- Young adults
- Children
- Workers in industries and occupations important to the functioning of society and at increased risk of exposure not included in Phase 1 or 2

Phase 4

- Everyone residing in the United States who did not have access to the vaccine in previous phases

Equity is a crosscutting consideration: In each population group, vaccine access should be prioritized for geographic areas identified through CDC’s Social Vulnerability Index or another more specific index.
The Elderly vs. Essential Workers: Who Should Get the Coronavirus Vaccine First?

The C.D.C. will soon decide which group to recommend next, and the debate over the trade-offs is growing heated. Ultimately, states will determine whom to include.
Health Agency Halts Coronavirus Ad Campaign, Leaving Santa Claus in the Cold

The $250 million federally funded effort had aimed to ‘defeat despair, inspire hope’ on pandemic
Hospital Workers Start to ‘Turn Against Each Other’ to Get Vaccine

“I am so disappointed and saddened that this happened,” a New York hospital executive wrote to his staff after workers who did not have priority cut the line for the vaccine.
COVID-19 Latest: US asking states to vaccinate everyone older than 65; not hold back 2nd dose
States across the U.S. scramble to meet the skyrocketing demand for vaccines.
As Americans jostle for vaccinations, a Rhode Island state lawmaker wants to punish those who cut the line.
‘I Won’t Be Used as a Guinea Pig for White People’

by Jan Hoffman and Chang W. Lee

Mistrust of vaccines runs deep in African-American communities. Against formidable odds, Father Paul Abernathy and his teams are trying to convince residents of Pittsburgh’s historic Black neighborhoods to volunteer for trials testing a Covid-19 shot.
Brazilian President Bolsonaro claims COVID vaccine could turn people into alligators
Access to COVID Tools—Accelerator (Act-A)

April 1, 2020: Call to action, WHO and European Commission

Goal: “speed up an end to the pandemic by supporting the development and equitable distribution of tests, treatments, and vaccines...”

Vaccine Pillar (Covax): $18.1 billion over 18 months to secure 2 billion doses of vaccine for use by end of 2021
For Covid-19 Vaccines, Some Are Too Rich — and Too Poor

Global inequality is shaping which countries get vaccines first. In South Africa, people’s best chance for vaccines anytime soon is to join an experimental trial.
Summary

• A global pandemic that continues to evolve
• Severe economic and other impacts
• Vaccines are a work in progress