

COVID-19 SIMPLIFIED

Dr. M John Gill
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Basic facts

- The SARS-CoV-2 is the virus causing COVID-19 infection.
- Single strand RNA virus in coronavirus family named from morphology.
- SARS-CoV-2 likely originated from bats into intermediary animal host and then to humans.
- It is a respiratory virus (**contact droplet not airborne transmission**).
- Only a handful of coronaviruses cause human illness (mostly **respiratory** such as colds but include serious respiratory infections SARS and MERS).
- No one is immune. No cross protection.

Virus

- Remember it is a **virus** i.e. can only multiply inside cells.
- While more resilient than other coronaviruses, it dies outside body with limited survival hours to days on inanimate objects.
- Disinfecting door knobs or anything in contact with respiratory secretions very reasonable.
- Disinfecting streets using hazmat suits is good visual for media but irrational.
- **We acquire virus by inhaling respiratory droplets or by transferring them from our hands to our nose, eye, or mouth.**
- Washing hands, not touching face, and social distancing works.
- Avoid aerosolizing respiratory secretions.
- Some virus in stool. Role in transmission unlikely .

Natural history in humans

- Incubation period likely 2-14 days (mean ~5 days).
- Proportion of infected who are completely asymptomatic is unknown, but suspected to be low (BUT important to establish for transmission).
- Progression risk and rate down pathway below is unclear.
- Currently we believe of those diagnosed 80% have self limited respiratory illness probably of ~ 14 Days.
- 20% have more severe illness requiring medical care +/- hospitalization.
- Risk in hospitalized is mainly respiratory then multi organ failure requiring ventilation and high risk of death.
- Recurrence after “recovery” rare.

Diagnosis of infection

- Do not test asymptomatic!
- Currently the only diagnostic test is a molecular test on good respiratory samples i.e. Nasopharyngeal swab (NP) looking for viral genetic sequences. N95 not required for NP swab. BAL seldom indicated.
- Two step process now identifies “e-gene” coronavirus sequences then confirm by SARS-CoV-2 “polymerase gene” sequence.
- As with other tests, sampling and timing issues: too early/bad sample limits sensitivity. Unclear if viral sequences found post recovery mean active infectious virus?
- No serology testing yet meaning we are unable to determine prevalence of past asymptomatic exposures.

Diagnostic Clinical Challenges

- Influenza-like-illness (ILI)

- New or **changed cough**

AND one or more of the following:

- **Fever** (or history of fever in the last 24 hours)
- **Muscle aches**
- **Severe exhaustion/weakness**
- Sore throat
- Joint pain

- COVID-19

- **Fever** (98%)
- **Cough** (76%)
- **Myalgia or fatigue** (44%)
- Sputum production (28%)
- Headache (8%)
- Hemoptysis (5%)
- Diarrhea (3%)
- Travel or other risk exposure

Other tests

- Labs: WBC somewhat down and lymphopenia.
- Infrequent but may be abnormal elevated LFTS LDH CRP ESR.
- Only in critically ill are D Dimer IL6 elevated.
- Radiology: Early small infiltrates and interstitial changes peripherally then in some progression to ground glass and crazy paving.

Why all the concern?

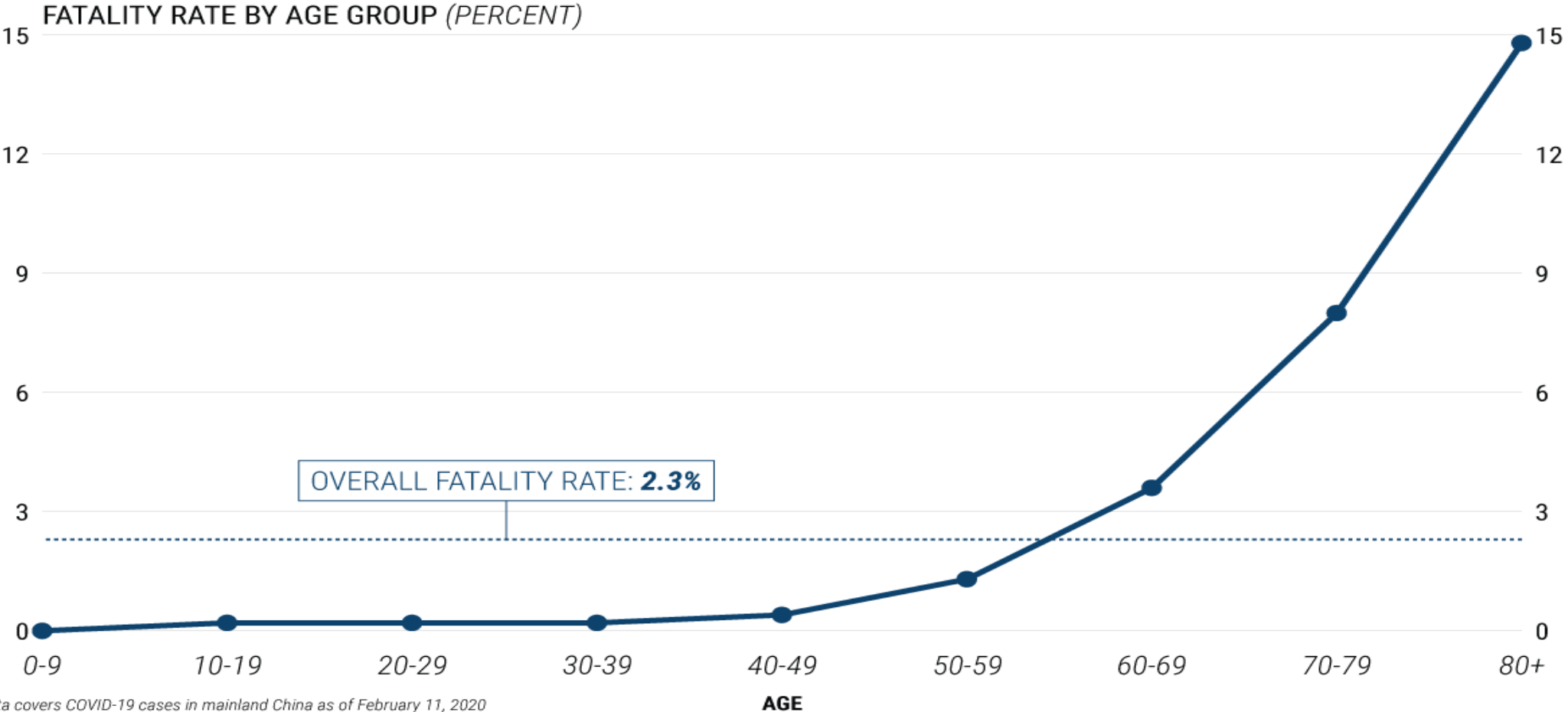
- High transmission risk: R_0 of 2.5 proposed (higher than flu)
- In those known infected mortality rate may be 10 to 35 times higher than flu but precise risk still being calculated.
- Older with more comorbidities such as Hypertension, DM, CVD, and increasing age are at greater risk but it can be life threatening in all age groups (e.g. five young ID MD deaths in China).
- Mechanism for poorer prognosis unclear (ACE2)?

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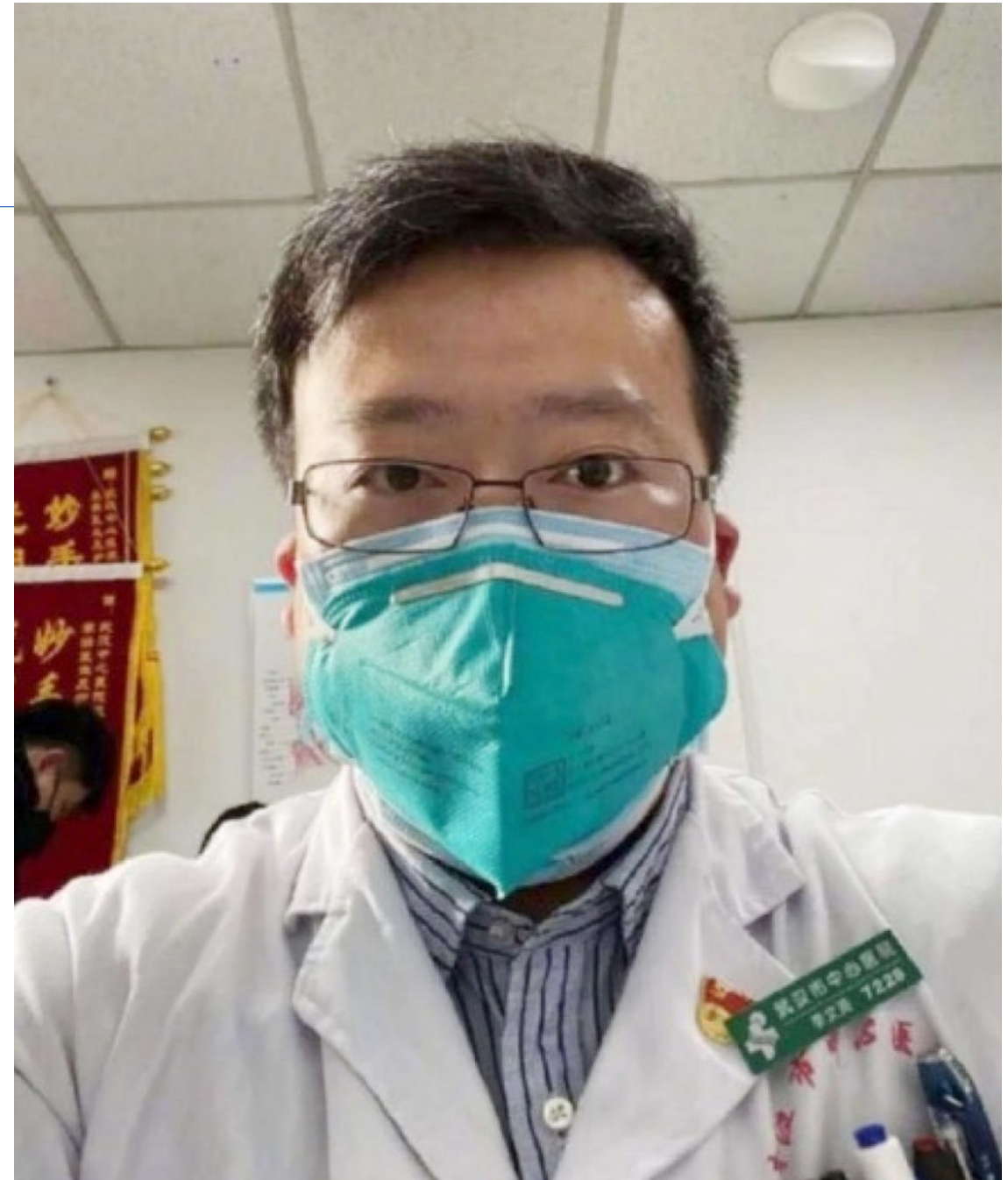
COVID-19: *Fatality Rate*



Note: Data covers COVID-19 cases in mainland China as of February 11, 2020
Source: Chinese Center for Disease Control and Prevention

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Treatment

- Standard supportive management for a severe viral respiratory illness but avoid NSAIDS and steroids.
- Isolate.
- No value for empiric antibacterial agents (unless superinfected), other antiviral agents (all viruses are not the same 😊), and fake remedies which may harm not help.
- For hospitalized, we may try repurposing two drugs in short supply (Hydroxychloroquine and Kaletra) but value, if any, unclear.
- **Good news:** Remdesivir, an unlicensed new drug, seems very promising BUT access controlled from USA and limited drug available.
- Vaccine being developed but not guarantee to be an easy win.

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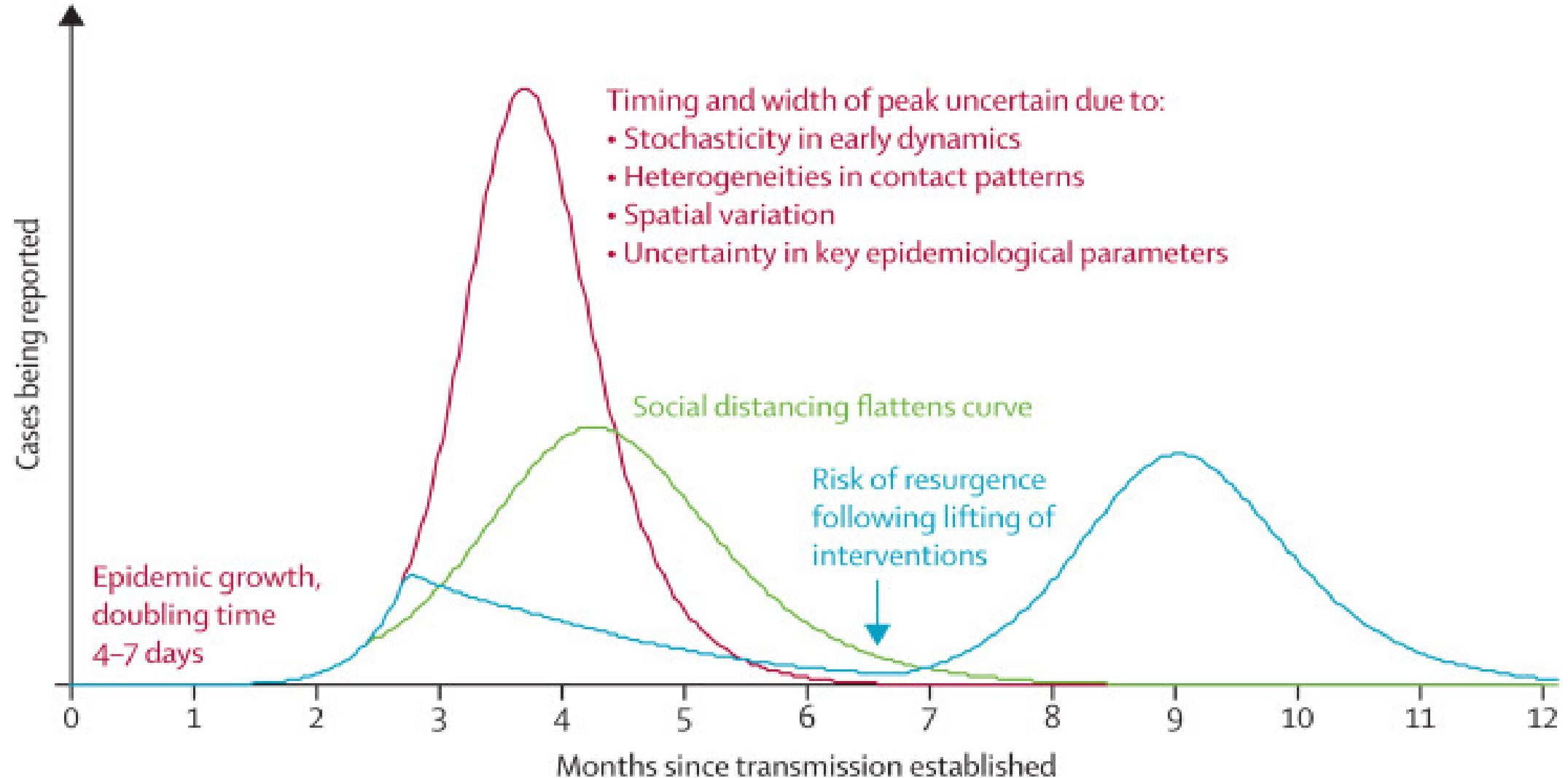


Resources

- <https://myhealth.alberta.ca/Journey/COVID-19/Pages/Assessment.aspx>
- MD specific phone lines access to assessments and triage for swabs:
Calgary: 587-284-5302
Edmonton: 780-910-0385
- <https://coronavirus.jhu.edu/map.html>

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Pathology

- **Lung:** Inclusion bodies in macrophages, viral particles, exudate fibrin, infiltrates/congestions and edema.
- **Spleen:** Fewer Lymphs, hemorrhage and necrosis CD4 and 8
- **Heart:** Degeneration and necrosis thrombosis
- Bacterial infection not common