• The COVID-19 Crisis Things to know (Prof. Ariel Anbar)
• SESE Community Conversation (Director Meenakshi Wadhwa)
The COVID-19 Crisis

Things to know
CAVEAT!
I am not THAT kind of doctor.
I study rocks.

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Credit: Some slides borrowed from a presentation by Eric J. Simon, Ph.D. Professor, Department of Biology & Health Science, New England College, Henniker, NH
This virus is: **SARS-CoV-2** for severe acute respiratory syndrome coronavirus 2

The disease caused by this virus is called: **COVID-19**

More at the WHO site: [http://who.int](http://who.int)
What is a coronavirus?

Coronaviruses are a group of viruses that cause several diseases in mammals and birds.

In humans, coronaviruses cause respiratory infections that are usually mild, including some cases of the common cold.

Some coronaviruses cause serious diseases in humans.

Computer-generated model
Source: Coronavirus page on Wikipedia.org, accessed 3/14/2020
The Initial Outbreak

The symptoms of coronavirus disease [COVID-19]

The most common signs and symptoms of 55,924 laboratory confirmed cases of COVID-19. Reported from China in the period up to February 22, 2020

- Fever: 87.9%
- Dry cough: 67.7%
- Fatigue: 38.1%
- Sputum production: 33.4%
- Shortness of breath: 18.6%
- Muscle pain or joint pain: 14.8%
- Sore throat: 13.9%
- Headache: 13.6%
- Chills: 11.4%
- Nausea or vomiting: 5%
- Nasal congestion: 4.8%
- Diarrhoea: 3.7%

Many of the most common symptoms are shared with those of the flu or cold. So it is also good to know which common symptoms of the flu or the common cold are not symptoms of COVID-19. COVID-19 infection seems to rarely cause a runny nose.

Most ok even if infected

But some will NOT be ok

Who is at higher risk?

- Older adults (see next slide)
- Those with chronic conditions:
  - Heart disease
  - Diabetes
  - Lung disease
  - Other?

Source: cdc.gov
COVID-19 fatality vs. age


“Fatality Rate”:
\[
\frac{\text{deaths from disease}}{\text{diagnosed disease cases}} \times 100
\]

So it may decrease as we find non-critical cases.
COVID-19 is not like seasonal flu!
How does COVID-19 spread?

• The infection spreads from person to person via respiratory droplets, usually through coughing and sneezing.

• Besides direct person-to-person transmission, virus particles from one person can land on a surface and later be picked up by another person.
We estimate that 86% of all infections were undocumented… (prior to 1/23/2020 Wuhan lockdown)

Infection by asymptomatic or pre-symptomatic “silent spreaders” is a major challenge...

“We estimate that 86% of all infections were undocumented…”

(prior to 1/23/2020 Wuhan lockdown)

“Undocumented infections were the infection source for 79% of documented cases”
Coronavirus COVID-19 Global Cases by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Total Confirmed: 212,616

Confirmed Cases by Country/Region/Severegnty:
- 61,102 China
- 35,713 Italy
- 17,361 Iran
- 13,910 Spain
- 11,973 Germany
- 8,413 Korea, South
- 7,661 France
- 7,323 US
- 3,028 Switzerland
- 2,642 United Kingdom
- 2,056 Netherlands
- 1,446 Austria
- 1,559 Norway
- 1,486 Belgium
- 1,279 Sweden
- 1,115 Denmark
- 889 Japan
- 790 Malaysia
- 712 Cruise Ship

Total Deaths: 8,727
- 3,122 deaths Hubei, China
- 2,978 deaths Italy
- 1,135 deaths Iran
- 623 deaths Spain
- 148 deaths France
- 84 deaths Korea, South
- 71 deaths United Kingdom
- 58 deaths Netherlands
- 55 deaths Washington US
- 29 deaths

Total Recovered: 83,207
- 56,337 recovered Hubei, China
- 5,389 recovered Iran
- 4,025 recovered Spain
- 1,549 recovered Korea, South
- 1,313 recovered Guangdong China
- 1,256 recovered Henan China
- 1,216 recovered Zhejiang China
- 1,081 recovered United Kingdom
- 1,051 recovered Netherlands
- 996 recovered

Last Updated at (M/D/YYYY): 3/18/2020, 10:53:03 AM

https://coronavirus.jhu.edu/map.html
The situation in Arizona… today

But we know that we are severely undersampling
There is a large number of “known unknown” cases

Source: azdhs.gov
The national situation – today and beyond

- Growth in most countries is exponential
- U.S. is doubling every ~ 3 days; like most countries
- Extrapolates to (in the U.S.):
  - $10^4$ cases by this weekend
  - $10^5$ cases by the end of next week
  - $10^6$ cases by the end of the month
  - $10^7$ cases by mid-April
- Context:
  - **Total** U.S. hospital capacity: ca. $10^6$ beds
  - **Total** U.S. ICU capacity: ca. $10^5$ beds

**Scenario:** If 10% of cases require extended hospital care, then we exceed national ICU capacity by the end of the month, and all hospital capacity two weeks later, just with COVID-19 cases. And this is based only on known infections. **This is the reason for extreme concern.**
In the outbreak of an epidemic early counter measures are important. Their intention is to ‘flatten the curve’: to lower the rate of infection to spread out the epidemic. This way the number of people who are sick at the same time does not exceed the capacity of the healthcare system.

Development of the pandemic without measures that slow the rate of infection.

Goal: Flatten the Curve!

The capacity is determined by the number of doctors, nurses, hospital beds, intensive care units and more.

The capacity can change during an epidemic, for example when healthcare workers might be sick or in quarantine or more resources become available.

Capacity of the healthcare system

Development of the pandemic with measures that slow the rate of infection early after the outbreak.
Japanese flu drug 'clearly effective' in treating coronavirus, says China

Shares in Fujifilm Toyama Chemical, which developed favipiravir, surged after praise by Chinese official following clinical trials

- Coronavirus - latest updates
- See all our coronavirus coverage

Medical authorities in China have said a drug used in Japan to treat new strains of influenza appeared to be effective in coronavirus patients, Japanese media said on Wednesday.
Strategy: “Social Distancing”

The sooner, the better:

- Stay home
  - Except for essentials (e.g., food)
  - Especially if sick!
- No gatherings
- Self-isolation and quarantine
- Follow good prevention practices, for yourself and others

How it works (interactive visualizations)...

- For most of us:
  www.washingtonpost.com/graphics/2020/world/corona-simulator/
- For modeling junkies:
  http://gabgoh.github.io/COVID/
Flatten the Curve

It can be done...

South Korea

Total confirmed cases of COVID-19
The starting point for each country is the day that country had reached 100 confirmed cases. This allows us to compare the trajectory of confirmed cases between countries. Because of limited testing the number of confirmed cases is lower than the number of total cases.

Source: WHO COVID-2019 Situation Reports

China

Total confirmed cases of COVID-19
The starting point for each country is the day that country had reached 100 confirmed cases. This allows us to compare the trajectory of confirmed cases between countries. Because of limited testing the number of confirmed cases is lower than the number of total cases.

Source: WHO COVID-2019 Situation Reports
Heartening: The speed of our response
Now that we are responding, despite confusion in DC...

Alexis de Tocqueville (Democracy in America, 1835):
The strength of America lies in its civic institutions; we don’t wait for the monarch to tell us what to do.

Winston Churchill (perhaps apocryphal):
“You can always count on Americans to do the right thing after they’ve tried everything else.”
Our grandparents were asked to go to war. We are being asked to sit on the couch. We can do this!
Helpful resources

- Centers for Disease Control and Prevention’s Coronavirus (COVID-19) page
- World Health Organization’s Coronavirus disease (COVID-19) outbreak page
- American Society for Microbiology’s Novel Coronavirus (COVID-19) Resources page
- Primary research articles from The Lancet
- Johns Hopkins University’s Coronavirus Resource Center.
- NSTA (National Science Teachers Association) blog “Coronavirus: What’s the Real Story?”
- Dr. Vanessa Monique’s Youtube Video “Coronavirus disease COVID-19” (9:51)
- Osmosis.org Youtube video “COVID-19 (Coronavirus Disease 19) - causes, symptoms, diagnosis, treatment, pathology” (12:20)
- Gretel von Bargen’s extensive Google document with 208 slides on coronavirus.
- Our World in Data’s Coronavirus Disease statistics page.
- NIH NIAID Flickr account of COVID-19-related photos
Helpful articles (should be freely available)

- Washington Post 3/14/2020: Why outbreaks like coronavirus spread exponentially, and how to “flatten the curve”
SESE Community Conversation: 18 March 2020

Panelists:

Mini Wadhwa, Director
Ramon Arrowsmith, Deputy Director
Chris Groppi, AD Undergrad Studies
Hilairy Hartnett, AD Grad Studies and Inclusive Community
Patrick Young, AD Community Outreach and Inclusive Community
Teresa Robinette, Director of Research and Operations
Becca Dial, Manager Academic Programs
Debbie Garcia, HR Manager
Karin Valentine, Media Relations and Marketing Manager
Marc Biren & Chris Skiba, Facilities & Bldg Safety and Operations
Current Status at ASU/SESE

• “Telework is now the first choice and priority for as many employees as possible.” – Provost Searle, March 17, 2020

• Only those personnel on campus “that are essential for running the unit, and people conducting essential research or doing essential tasks related to research (such as managing reactants, equipment, animal care, etc.) that must be done and cannot be postponed because not doing so at this time would jeopardize a major project...” – Dean Gonzales (March 17, 2020)
Current Status at ASU/SESE

We have transitioned almost completely to telework and remote operations

- Teaching (no in-person components/labs/field work)
- Student advising
- Graduate defenses
- Colloquia
- Faculty candidate interviews
- Friday office hours!
- All in-person events are cancelled for the time being
Current Status at ASU/SESE

- Building access is to be minimized for all academic and university business, so only keycard or key access for personnel who are approved for after-hours access.
- Housing, Health Services and food service locations are still open.
- All travel is suspended for grant-funded and university business (even though it may have been previously authorized).
- Anyone traveling from a Level 3 country must self-isolate for 14 days.
Discover how our planet works

Welcome to the School of Earth and Space Exploration
SESE “Core” Team

- Daily 9 AM huddles with SESE core team (SESE leadership & senior staff) to address any pain points, emerging issues
In case of suspected exposure

• Self-quarantine immediately.

• Inform your supervisor/advisor and let them know if you were on campus within last 4 days of exposure (max. duration that virus survives on surfaces) & where.

• Develop a list to the best of your ability of individuals who may be affected (those in close contact with the person with flu symptoms within incubation period, ~14 days) and contact those persons, so they can self-isolate and monitor; inform supervisor/advisor).

• If experiencing symptoms, please call ASU Health Services (if you are a student) at 480-965-3349 or your primary care physician; call the AZ COVID-19 hotline at 1-844-542-8201.

• If tested for COVID-19, please let advisor/supervisor know of the outcome.

• Advisors/supervisors should let me (wadhwa@asu.edu, with cc to ramon.arrowsmith@asu.edu) know of the results of any COVID-19 tests.
Let’s Support Each Other & Thrive Together!

• We, at ASU and SESE, are better prepared for this transition to remote work than most others!

• The COG team is looking into making SESE educational resources available (esp. to parents of K-12 kids who are now home!)

• Let’s try to minimize email traffic on our community list serves – the SESE Leadership team will keep you posted with any updates

• Take care of yourself, for your physical and mental well-being, & look out for others in your community

  • ASU Counseling offices are open and available to provide tele-support

  • Support your community with initiating virtual tag ups

  • Check in (phone, email, Zoom) with your friends, colleagues (especially those who may be more vulnerable)
Contact us: We are here to help!

- Mini Wadhwa, Director
- Ramon Arrowsmith, Deputy Director
- Chris Groppi, AD Undergrad Studies
- Hilairy Hartnett, AD Grad Studies & Inclusive Community
- Patrick Young, AD Community Outreach & Inclusive Community
- Teresa Robinette, Director of Research and Operations
- Becky Polley, Manager Academic Programs
- Debbie Garcia, HR Manager
- Karin Valentine, Media Relations and Marketing Manager
- Chris Skiba, Facilities & Bldg Safety and Operations
- Marc Biren, Bldg Lab Safety and Operations
- Matt Wiser, IT and Tech Support