

Engaging Students during the COVID-19 Health Crisis

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eCOTS 2020: Panel Session

How Do We Engage Students...

...with
a **sensitive topic**
like COVID-19?

...with
COVID-19 data?

...in a **virtual**
environment?

How Do We Engage Students...



...with a
sensitive topic
like COVID-19?

bit.ly/coronavirus-teaching-resources

How Do We Engage Students...



...with a
sensitive topic
like COVID-19?

Should we?

have us on a hell
of a ration. which goes
like this for breakfast
cold, soft boiled egg
with but salt and
pepper and a piece
of cold toast toasted

pretty early
morning and
my temper
gone and
could move
which I did
I went up st
soon and
first best
not good
this evening

What Historians Will See When They Look Back on the Covid-19 Pandemic of 2020

Universities and institutions are inviting the public to share their experiences during the 2020 coronavirus pandemic and its aftermath.

for dinner & supper

EXIT SALIDA

EXIT SALIDA



> Feedback



4 Star reviews





ALERT



How Do We Engage Students...



...with a
sensitive topic
like COVID-19?

How?

Teaching Public Health Will Never Be the Same

Students will likely be flocking to public health courses and programs in upcoming semesters.

coronavirus 2. Many of our students and their families may be affected economically because

benefits of adopting this practice will improve outcomes for all students in the classroom.

students to these concepts with diverse examples will be important both to validate their lived experiences in the COVID-19 pandemic and to help students understand the potential effect of future epidemics.

Nadia N. Abuelezam. Teaching Public Health Will Never Be the Same. American Journal of Public Health.

<https://doi.org/10.2105/AJPH.2020.305710>

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Our pedagogy must be trauma informed

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Consider the data that you're using

- In the early days of this pandemic, many were focusing on *forecasting*



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- Consider addressing other questions in the classroom.



Consider the data that you're using

- In the early days of this pandemic, many were focusing on *forecasting*
- This is a particularly difficult problem, even for experts!
- Consider addressing other questions in the classroom.
- ASA DataFest: Exploring the **societal** impacts of the COVID-19 pandemic **other than its direct health outcomes**, for example the impact on:
 - pollution levels
 - transportation levels
 - working from home



Ten Considerations Before You Create Another Chart About COVID-19

To sum it up — #vizresponsibly; which may mean not publishing your visualizations in the public domain at all



Amanda Makulec

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How Do We Engage Students...

...with a
sensitive topic
like COVID-19?



covid-19



- Emailed IsoStat asking for COVID-19 datasets
- Immediate response: students may not want this!!!
- Thank you to IsoStat: value in discussing with colleagues!
- We shouldn't assume that all students want to talk about it
- We shouldn't assume that students don't want to talk about it
- We shouldn't assume... but let's just ask them!

1.

Would you like to look at COVID-19 from a statistical perspective in this class?

Single Choice Multiple Choice

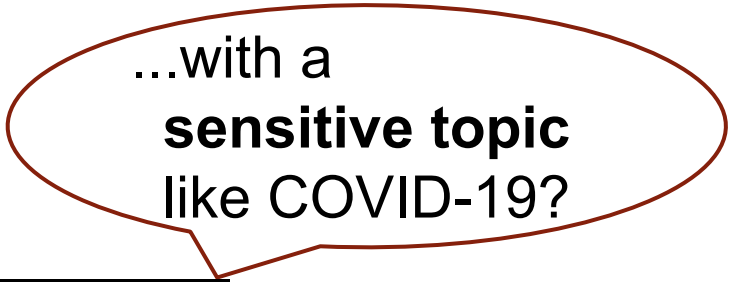
Yes - even if it requires a detour from planned topics **50%**

Yes - but only in the context of planned topics **50%**

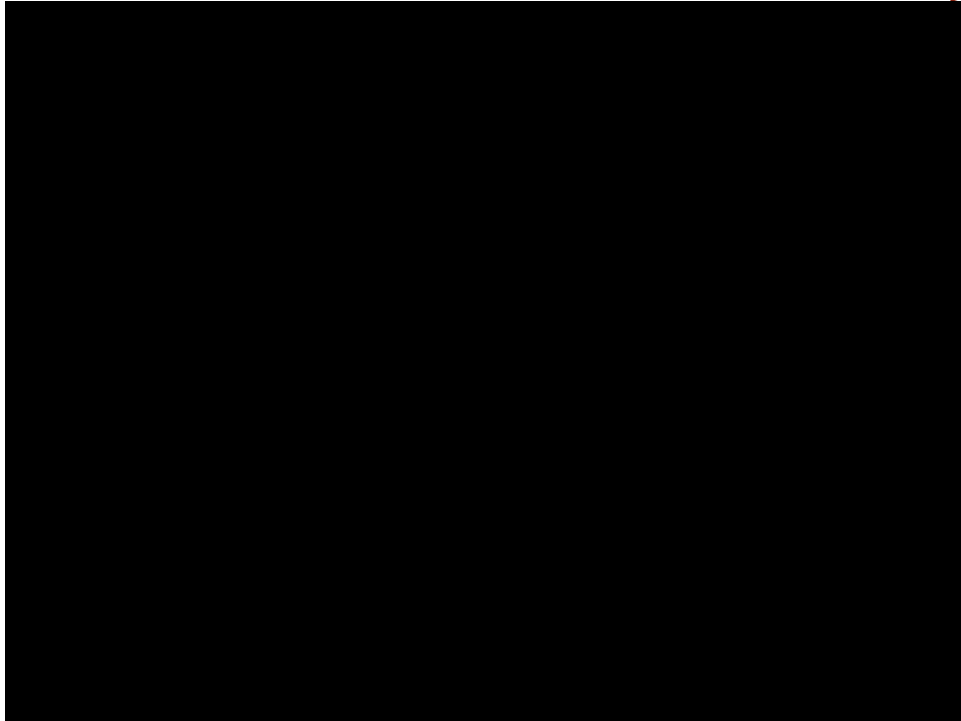
No - I would rather use this class to think about something

No - I find this topic too upsetting to use in class

How Do We Engage Students...



...with a
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like COVID-19?



How Do We Engage Students...

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sensitive topic
like COVID-19?

- Module in *How We Approach Data*: Separating Emotions from Data

Tip #1

Acknowledge the topic as sensitive

Tip #2

Recognize some professions have to learn to “turn off” emotions to do job well

How Do We Engage Students...

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YOUR TURN!

Questions? Comments? Ideas?

- **Raise your hand** to get unmuted and talk
- **Type in Chat** to share comments and ideas
- **Post in Q & A** to ask questions

How Do We Engage Students...

...with **COVID-19**
data?

Causal inference class, so focused on **causal** questions

1. Effect of cloth masks at preventing viral infections
(experiment)
2. Effect of hydroxychloroquine as treatment for COVID-19
(observational)
3. Effect of social distancing on COVID-19 cases or deaths
(model-based)

Cloth Face Masks

...with **COVID-19**
data?

- [MacIntyre CR, Seale H, Dung TC, et al. \(2015\). A cluster randomised trial of cloth masks compared with medical masks in healthcare workers. BMJ Open;5:e006577.](#)
- Health-care workers in Vietnam **randomized** to wear
 - Medical masks
 - Cloth masks
 - Control group (usual practice)
- Asked to wear masks for all shifts for 4 weeks

Cloth Face Masks

...with **COVID-19** data?

Table 2
Intention-to-treat analysis

	CRI N (%)	RR (95% CI)	ILI N (%)	RR (95% CI)	Laboratory- confirmed viruses N (%)	RR (95% CI)
Medical mask*	28/580 (4.83)	Ref	1/580 (0.17)	Ref	19/580 (3.28)	Ref
Cloth masks†	43/569 (7.56)	1.57 (0.99 to 2.48)	13/569 (2.28)	13.25 (1.74 to 100.97)	31/569 (5.45)	1.66 (0.95 to 2.91)
Control‡	32/458 (6.99)	1.45 (0.88 to 2.37)	3/458 (0.66)	3.80 (0.40 to 36.40)	18/458 (3.94)	1.20 (0.64 to 2.26)

Cloth Face Masks

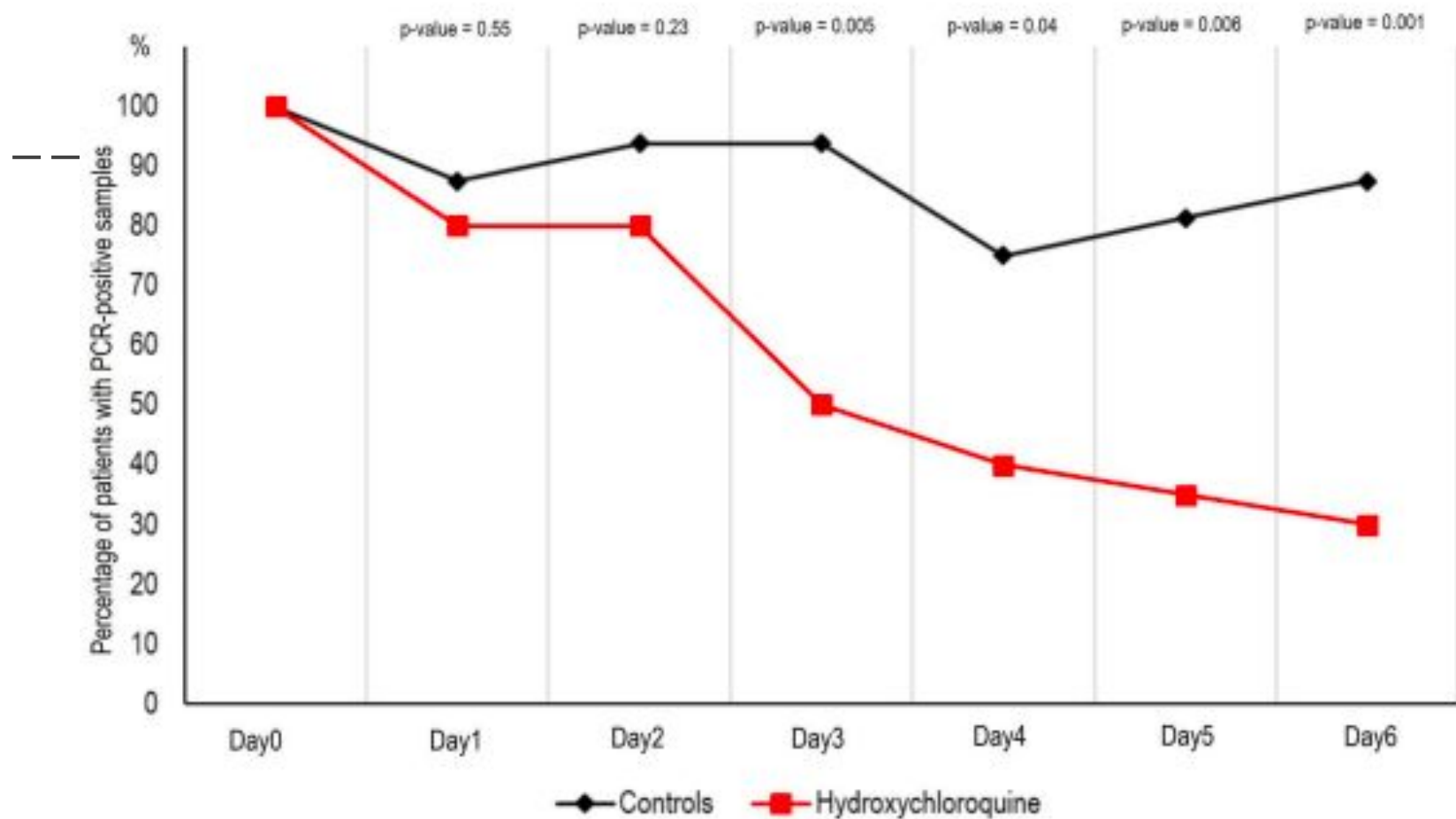
...with **COVID-19**
data?

- Medical masks more effective than cloth masks
- Issues:
 - Cluster randomization
 - Noncompliance
 - Control group included both treatments
- Beyond the data at hand
 - “my mask protects you, your mask protects me”

Hydroxychloroquine

...with **COVID-19**
data?

- [Gautret P, et al \(2020\). “Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial,” *International Journal of Antimicrobial Agents*](#)
- Observational study in France
- Lots of problems - [Bik, E.](#) provides a good critique
 - Good discussion fodder!
- They provided raw data!!!



Hydroxychloroquine

...with **COVID-19**
data?

- Outcome: PCR Test at Days 1 - 6

D0 <fctr>	D1 <fctr>	D2 <fctr>	D3 <fctr>	D4 <fctr>	D5 <fctr>	D6 <fctr>
31	NEG	NEG	NEG	NEG	NEG	NEG
26	ND	33	34	NEG	34	NEG
26	31	23	22	27	NEG	26
24	NEG	33	33	NEG	NEG	32
24	24	24	27	NEG	31	29
POS	ND	POS	ND	POS	ND	POS

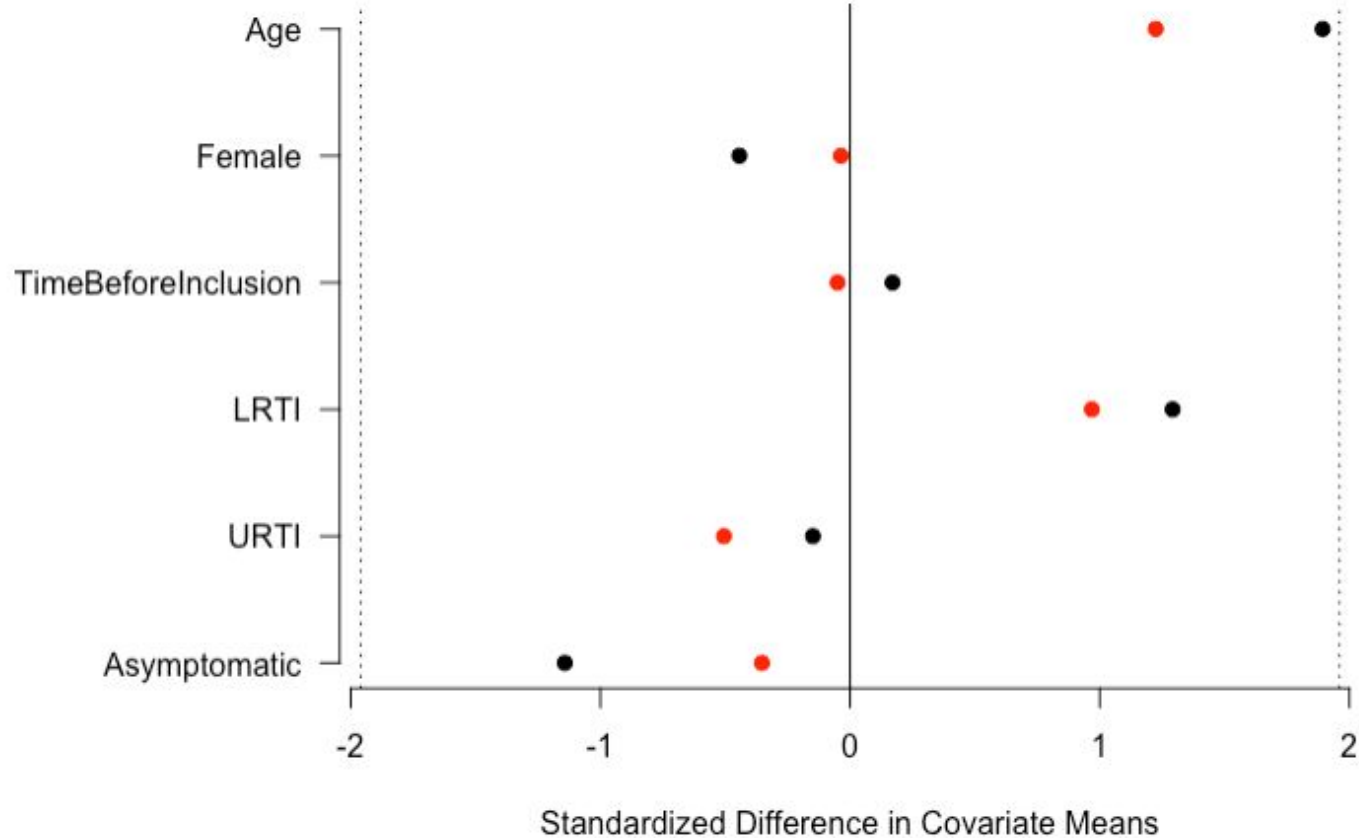
Causal?

- Inference?
- Baseline differences?
- Attrition?
- Peer review?
- Protocol?
- Replication?



...with **COVID-19**
data?

Baseline Differences: Observed Variables



Baseline Differences: Unobserved Variables

- How were the treatment groups decided?
- “Untreated patients from another center and cases refusing the protocol were included as negative controls.”
- LOTS of unobserved differences!!

Attrition

...with **COVID-19**
data?

- “Not determined” test results
 - Control: 2 NEG, 5 ND, 9 POS ($5/16 = 31\%$ ND)
 - Treatment: 13 NEG, 1 ND, 6 POS ($1/20 = 5\%$ ND)
 - Proportion negative vs proportion positive?
- Dropped out of study
 - 6 units lost from treatment group; 0 from control
 - 3 transferred to ICU; 1 died; 1 left hospital, 1 nausea
- [Hulme et. al.](#): results sensitive to handling of attrition

Azithromycin

...with **COVID-19**
data?

- “Depending on their clinical presentation, azithromycin was added to the treatment.”

```
## {r}  
table(dat$Hydroxychloroquine, dat$Azithromycin)  
##
```

	No	Yes
0	16	0
1	14	6

Peer Review

- Peer reviewed
- But...
 - Accepted in <1 day
 - Co-author is editor



...with **COVID-19**
data?

Protocol

...with **COVID-19**
data?

- Initial criteria: age > 12 years
 - Min age = 10
- Registered to look at outcomes Days 1, 4, 7, 14
 - Why Day 6???
- Power calculation: min 24 in each group
 - Total sample size = 42 (even with attrited units)

“Statistics” Section



...with **COVID-19**
data?

2.10. Statistics

Assuming a 50% efficacy of hydroxychloroquine in reducing the viral load at day 7, a 85% power, a type I error rate of 5% and 10% loss to follow-up, we calculated that a total of 48 COVID-19 patients (ie, 24 cases in the hydroxychloroquine group and 24 in the control group) would be required for the analysis (Fleiss with CC).

Statistical differences were evaluated by Pearson's chi-square or Fisher's exact tests as categorical variables, as appropriate. Means of quantitative data were compared using Student's t-test. Analyses were performed in Stata version 14.2.

Replication



...with **COVID-19**
data?

- Summarizes other studies as of early April
- No study yet has found convincing evidence for hydroxychloroquine as an effective treatment for COVID-19

Beyond the Data at Hand

...with **COVID-19**
data?

- Side effects
 - Another study: 30% experienced potentially fatal heart problems (QT prolongation)
 - FDA cautions use due to risk of heart problems
 - Dangerous interaction with Metformin (30% fatality rate in mice)

Social Distancing

-



Social Distancing

...with **COVID-19**
data?

4/1/20 NYT daily briefing:

Scientists offer a grim projection

[As many as 240,000 Americans could die](#) during the coronavirus pandemic, top health officials said on Tuesday, despite the measures that have closed schools, limited travel and forced people to stay home.

Dr. Anthony Fauci, the nation's leading infectious disease expert, and Dr. Deborah Birx, who is coordinating the White House's response, encouraged people to adhere to distancing guidelines, noting that more than 2.2 million Americans could have died if nothing had been done.

Social Distancing

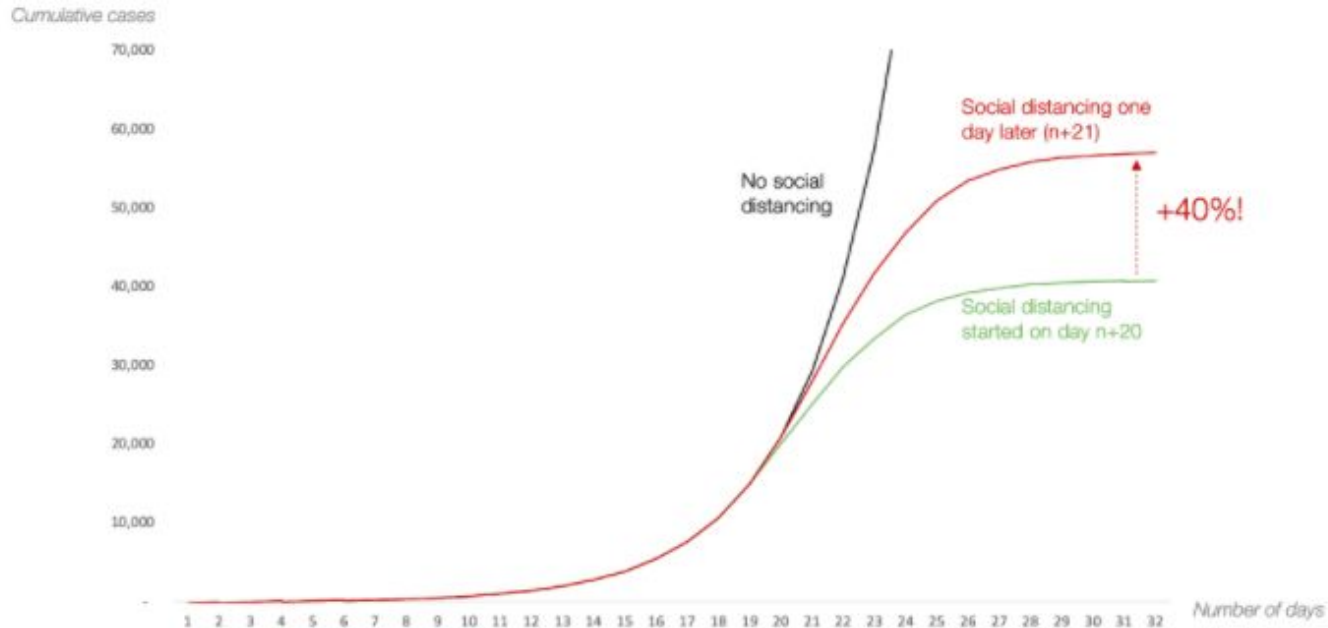
...with **COVID-19**
data?

- Pueyo articles
 - [Coronavirus: Why You Must Act Now](#)
 - [Coronavirus: The Hammer and the Dance](#)
- Lots of great data-based visuals
- Predictions based primarily on differential equation models (SIR, SEIR)

Social Distancing

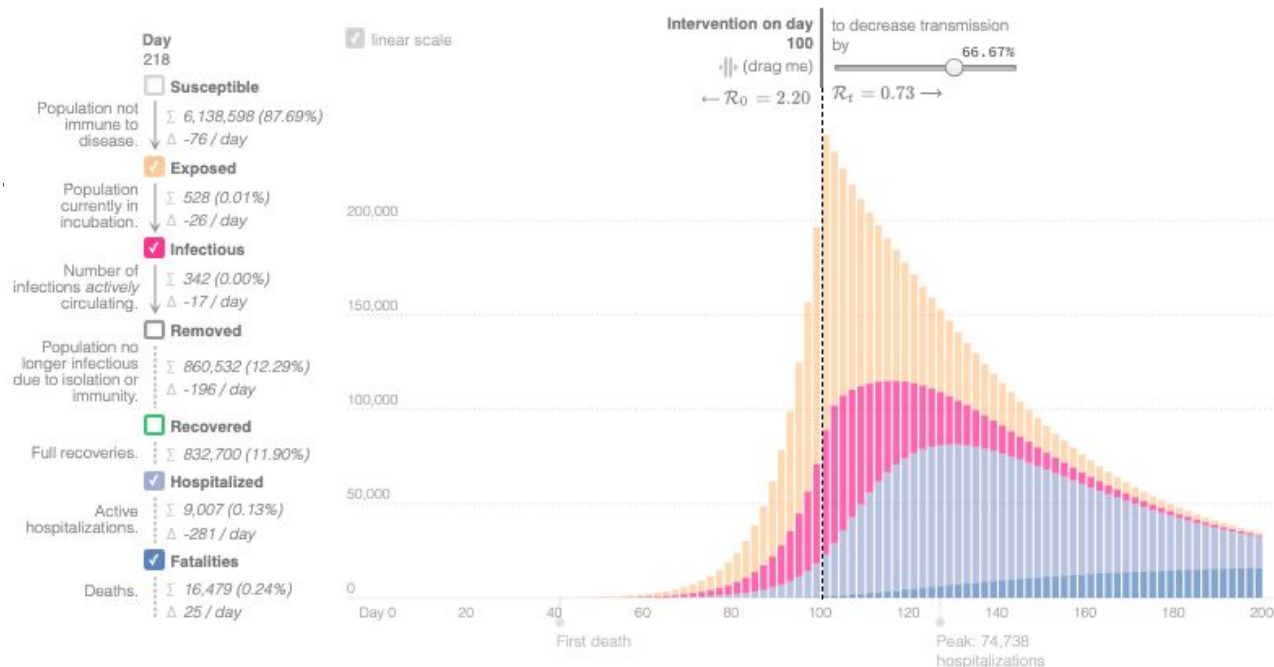
— — —

Chart 23: Model of Cumulative Cases of Coronavirus with Social Distancing Measures Taken One Day Apart



Source: Tomas Pueyo

Epidemic Calculator



Transmission Dynamics

Population Inputs

Size of population.

Number of initial infections.

Basic Reproduction Number \mathcal{R}_0

Measure of contagiousness: the number of secondary infections each infected individual produces.

Transmission Times

Length of incubation period, T_{inc} .

Duration patient is infectious, T_{inf} .

Clinical Dynamics

Mortality Statistics

Case fatality rate.

Time from end of incubation to death.

Recovery Times

Length of hospital stay

Recovery time for mild cases

Care statistics

Hospitalization rate.

Time to hospitalization.

How Do We Engage Students...



...with **COVID-19**
data?

- Include caveats!
 - I am not a medical expert
 - I haven't done an exhaustive literature review
 - I can't vouch for others' models or predictions

How Do We Engage Students...

...with **COVID-19**
data?

- [Top 50 R Resources on Novel COVID-19 Coronavirus](#)
- [Mine Cetinkaya-Rundel's COVID-19 R repo](#)
- My datasets and markdown files are posted on the [website](#) [from this panel](#)...
- ... and yours can be too!!

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How Do We Engage Students...

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Ten Considerations Before You Create Another Chart About COVID-19

To sum it up — #vizresponsibly; which may mean not publishing your visualizations in the public domain at all



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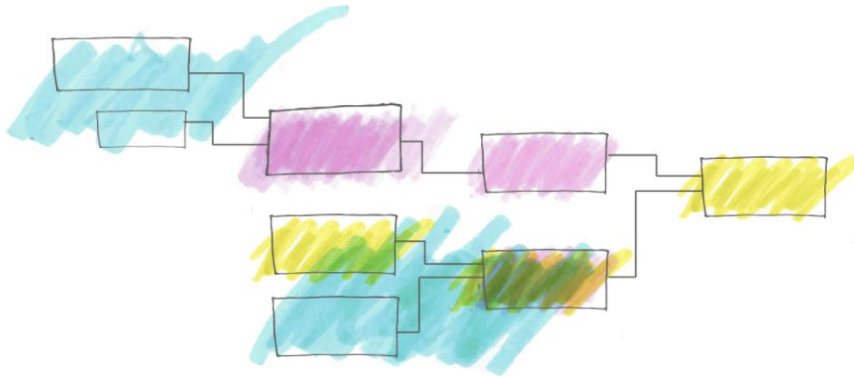


MAR. 31, 2020, AT 12:16 PM

Why It's So Freaking Hard To Make A Good COVID-19 Model

By Maggie Koerth, Laura Bronner and Jasmine Mithani

Filed under Coronavirus

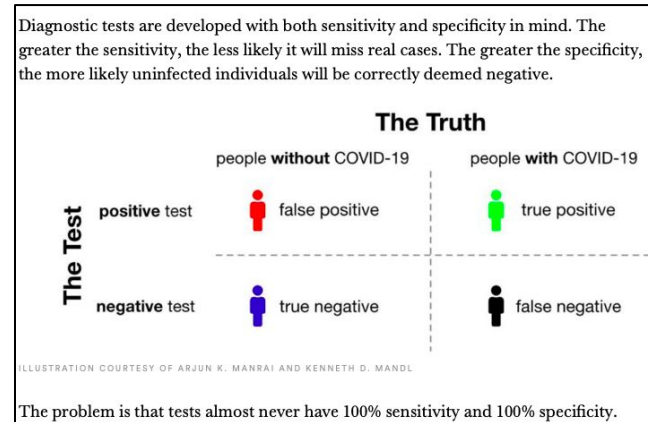


How Do We Engage Students...

...with **COVID-19** data?

Unit: Communicating Risks (diagnostic testing)

Shared online news article on COVID-19 testing



<https://www.statnews.com/2020/03/31/covid-19-overcoming-testing-challenges/>

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YOUR TURN!

Questions? Comments? Ideas?

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How Do We Engage Students...

...in a **virtual environment?**

Activities + Collaborative Keys

- Students work independently or in groups to complete the activities.
- Students also work collaboratively as a class to create the “answer keys” for the activities via Google Documents.
- Teaching team [instructor(s), TAs] monitor the documents.

How Do We Engage Students...

...in a **virtual environment?**

Ways to Contribute

1. If blank, post an answer to a question.
2. If a question has a correct answer, but you think there are alternative correct answers, add your alternative.
3. If a question has an answer, but you think it is incorrect, add a comment and/or post what you think is the correct answer.
4. If a question has an answer, but you think the concept is confusing or needs additional explanation, ask a question OR provide a clearer explanation.
5. Post any additional thoughts you had while answering the question.
6. Answer additional questions posed by the instructor or TAs.

8. Why is your second estimate different than your first estimate?

9. Why is your second estimate different than the population proportion of US men who smoke?

- **Student D:** The second *estimate* is still a small sample size and is very unlikely to equal to population proportion of US men who smoke. Also, the population proportion we are using is .216. If our estimates are using 100 people, it's impossible to have that number generated because we can't have 21.6 men; it's strictly whole numbers.

8. Why is your second estimate different than your first estimate?

- **Student A:** The second estimate is different than the first estimate because it is based on a different sample group. Sampling variability explains the different estimate.

9. Why is your second estimate different than the population proportion of US men who smoke?

- **Student D:** The second *estimate* is still a small sample size and is very unlikely to equal to population proportion of US men who smoke. Also, the population proportion we are using is .216. If our estimates are using 100 people, it's impossible to have that number generated because we can't have 21.6 men; it's strictly whole numbers.

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- **Student A:** The second estimate is different than the first estimate because it is based on a different sample group. Sampling variability explains the different estimate.
 - **Instructor:** You hit it on the head!! Sampling variability is the key here. We are trying to beat this idea of sampling variability to death in this activity...because without sampling variability, there would be no point to statistics. Hope this idea comes across loud and clear in this activity.

9. Why is your second estimate different than the population proportion of US men who smoke?

- **Student D:** The second *estimate* is still a small sample size and is very unlikely to equal to population proportion of US men who smoke. Also, the population proportion we are using is .216. If our estimates are using 100 people, it's impossible to have that number generated because we can't have 21.6 men; it's strictly whole numbers.
 - **Instructor:** What if you had a larger sample size (e.g., 100,000 or more)? How would you answer this question then? Would the estimates be equal to the population proportion? If not, why not?

8. Why is your second estimate different than your first estimate?

- **Student A:** The second estimate is different than the first estimate because it is based on a different sample group. Sampling variability explains the different estimate.
 - **Instructor:** You hit it on the head!! Sampling variability is the key here. We are trying to beat this idea of sampling variability to death in this activity...because without sampling variability, there would be no point to statistics. Hope this idea comes across loud and clear in this activity.
- **Student B:** Considering how many groups of 100 you can make out of the 120 million men living in the United States, it is unlikely that the proportion of smokers in one group of 100 would match the proportion of smokers in another group of 100.
- **Student C:** I agree with what was said above, every group of 100 people could have very different results, which would affect sampling variability estimate.

9. Why is your second estimate different than the population proportion of US men who smoke?

- **Student D:** The second *estimate* is still a small sample size and is very unlikely to equal to population proportion of US men who smoke. Also, the population proportion we are using is .216. If our estimates are using 100 people, it's impossible to have that number generated because we can't have 21.6 men; it's strictly whole numbers.
 - **Instructor:** What if you had a larger sample size (e.g., 100,000 or more)? How would you answer this question then? Would the estimates be equal to the population proportion? If not, why not?
- **Student E:** An estimate is most of the times different than the population proportion. If we also have the confidence intervals at 95% we can say that the population estimate is going to be within that range 95 time in 100 experiments. |

Survival Basics Concept Activity

The goal of this activity is to understand how to properly account for censoring when estimating survival and what a Kaplan-Meier curve tells you.

Please use some color (other than black or yellow) for your answers. THANKS!!

Please place your name BEFORE your answer.

For example,

Laura L: This is my answer to this question.

Let's use the same imaginary tiny cancer treatment study example that Motulsky uses in Chapter 5 of our textbook.

Participant ID	Starting Date	Ending Date	Time to Event (years)	What Happened
A	Feb. 7, 1998	Mar. 2, 2002	4.07	Died of cancer
B	May 19, 1998	Nov. 30, 2004	6.54	Moved away (lost to follow-up)
C	Nov. 14, 1998	Apr. 3, 2000	1.39	Died of cancer
D	Mar. 4, 1999	May 4, 2005	6.17	Alive at end of study
E	June 15, 1999	May 4, 2005	5.89	Died of cancer
F	Dec. 1, 1999	Sept. 4, 2004	4.76	Died of cancer
G	Dec. 15, 1999	Aug. 15, 2003	3.67	Died in car accident

1. How many participants were enrolled in the study?

Student A: Seven participants were enrolled in this study. Each participant was given a Participant ID between A and G.

TA: Correct!

2. How many participants had been lost to follow-up at the end of the study?

Student B: It appears that only one participant was lost to follow-up at the end of this study. This is because under the "What happened" column, only one of the participants are listed as being lost to follow-up.

Student A: Clarification Question - Would we include participant G who died in a car accident in the number of participants lost to follow-up? Assuming the "event" of interest is mortality from cancer, the car accident prevented further data on participant G. The participant did not die from cancer (the event) throughout their participation in the study and we do not know if the participant would have died from cancer had they not been in a car accident. In essence, can the "censored due to a competing event" definition (i.e. car accident) align with loss to follow-up or is that only covered under "censored due to loss to follow-up"?

Student C: Christian, that's a really good question. From my understanding, participants B, D and G would be censored (for different reasons), but as Nick stated, only 1 participant (B) would have been truly lost to follow-up (in turn, "lost to follow-up" is the reason patient B was censored). Since "death from cancer" and "death from any other cause" are mutually exclusive in this scenario, it is impossible to obtain data after the "death from car accident" event. Thus, participant G isn't lost to follow-up, they are simply censored from the data because (as you said) "a competing event" occurred (no longer at risk of the event of interest). Hope that helps!

TA: Great discussion here! The correct answer is indeed participant B. Participants D and G would also be censored, but for different reasons as David mentioned.

Instructor: Thanks for asking a question, Christian, and for responding to his question, David. :)

3. What defines the starting date for a participant in this study?

Student D: The starting date (time zero) for a participant would be the day they received their first treatment. Participants would not all necessarily start the study on the same date and they had the opportunity to enroll in the study between 1995 and 2000.

Student E: I feel that this answer could also be the date they received the cancer diagnosis. I am just wondering if time between diagnosis and treatment initiation would in any way bias the results. In terms of survival rates would one be looking at time from diagnosis to death?

Student F: I do not think the answer is the date they received the diagnosis because it is a study on cancer treatment (not cancer survival)... totally just typing thoughts here, so I am not certain at all. Just considering Natalie's point above, I think that you would look at time from diagnosis to death when you are considering survival rate for a disease. This brief description says it is looking at survival rate for cancer treatment though, so I think diagnosis is not the concern as much as beginning treatment is. Diagnosis sounds like an entry criterion. The starting date (time zero) would be the first treatment.

Student G: Starting times are discussed on pg 52 in our textbook in an interesting way. It says that studies usually use the "intention to treat" protocol. This is used to avoid biases if patients die before their first treatment, which could skew comparisons between the control and experimental groups. Following this policy the date is usually set as first diagnosis or first hospital admission according to the book with this example in mind.

Student I: I believe it is the date they received their diagnosis because the event of interest in this study is death d/t cancer. Although they are testing cancer treatment, censoring d/t a patient dying prior to initiating treatment can lead to biases between different treatments (especially if you censor for one treatment and not another) and since this study doesn't specify which treatment/treatments (medical vs. surgical, etc.) these patients are receiving, then the date they received their diagnosis would be the most logical/statistically accurate start date for each participant in this study.

How Do We Engage Students...

...in a **virtual environment?**

Benefits

- ● Low stakes
- ● Quick feedback
- ● Less time for faculty
- ● Cooperative learning techniques
- ● Builds learning community
- ● ...and more!

Challenges

- ● Quality of answers
- ● Buy in (engagement) from students
- ● Overambitious students

How Do We Engage Students...

...in a **virtual environment?**

Alternative Approaches using Collaborative Keys

- Assign students to question(s) [+ peer review]
- Turn-in completed activity + Contribute to collaborative key
- Grading (participation points and/or quality of answer points)
- Availability of collaborative key (synchronous and/or asynchronous)
- Have multiple softwares? Can have multiple collaborative keys.
- Have a large class? Can have multiple collaborative keys.

How Do We Engage Students...

...in a virtual environment?

MINE ÇETINKAYA-RUNDEL

TEACHING REMOTELY

Preparing to Teach
eCOTS 2020

How Do We Engage Students...

...in a virtual environment?

MINE ÇETINKAYA-RUNDEL

TEACHING REMOTELY

Preparing to Teach
eCOTS 2020

Slides & Video:

preparingtoteach.org/agenda/

How Do We Engage Students...

...in a **virtual environment?**

- Tips for teaching tech online, deeply informed by the Carpentries (Elizabeth Wickes) [[Blog post](#)]
- Teaching R online with RStudio Cloud (Mine Çetinkaya-Rundel) [[Webinar](#)] [[Blog post](#)]
- Teaching online on short notice (Greg Wilson) [[Webinar](#)] [[Blog post](#)]
- Mapping and planning a live coding workshop (The Carpentries) [[Blog post](#)]
- Jumping into digital: Lessons learned while moving live-coding workshops online [[Webinar](#)]
- Sharing on Short Notice: How to Get Your Materials Online With R Markdown (Alison Hill and Desiree De Lyon) [[Webinar](#)] [[Blog post](#)]
- A pattern language for screencasting (Chen and Rabb, 2009) [[DOI](#)]

How Do We Engage Students...

...in a **virtual environment?**

- [Engaging a Diverse Audience through Online Learning](#)
- Breakout rooms!
- Poll questions
- Encourage videos
- Reactions (e.g. thumbs up)
- Contribution by a variety of options:
 - Raise hands / unmute
 - Type in chat
- [Roxy's 4 Cs: context, communication, connections, commitment](#)

How Do We Engage Students...

...in a virtual environment?

YOUR TURN!

Questions? Comments? Ideas?

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- **Post in Q & A** to ask questions