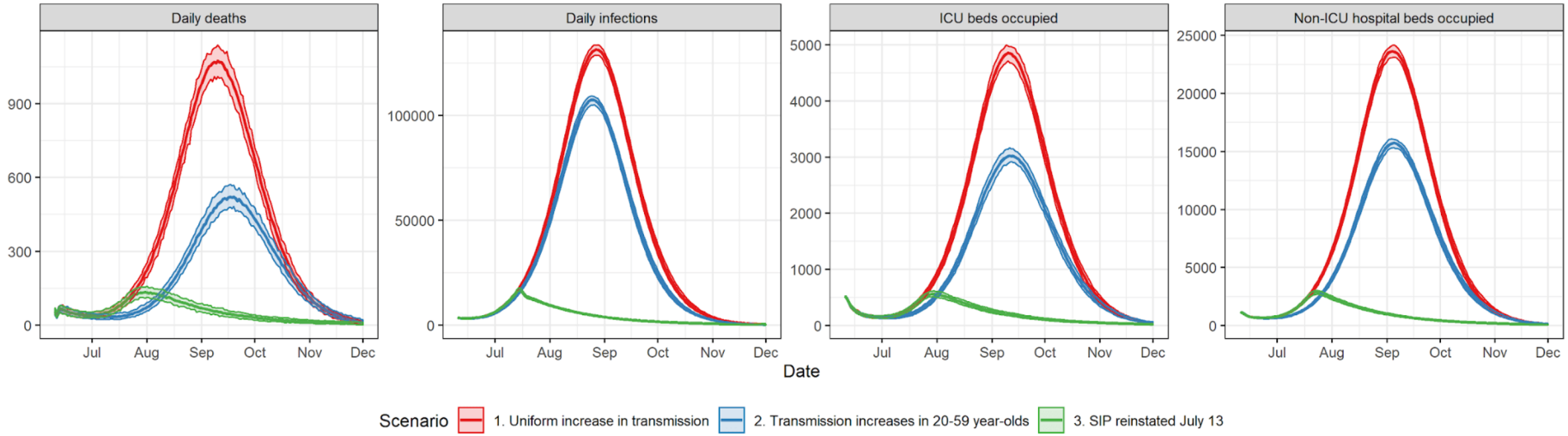
July 3, 2020

Important conclusions

- We continue to expect cases to rise exponentially from reopening in Phases 3 and 4. If measures are not taken to reduce spread, ICU capacity could be exceeded by August 29 in most regions.
- The first warning of exponential growth will probably appear simultaneously in reported cases and hospital admissions, which lag changes in transmission by approximately 8-14 days. (The uncertainty is from a lack of reliable data on symptom onset and test turnaround times.) A sentinel surveillance program could reveal changes in transmission in a week or less.
- Based on estimated prevalence and R_t in Illinois, we expect that ICUs will reach capacity approximately 35 days after hospital admissions start rising.
- In the best case scenario, if transmission drops sharply (to approximately Phase 2 levels) starting July 13, we will reach a maximum of 17201 daily infections and 134 daily deaths around July 20.
- If expected the increase in transmission rates in Phase 4 to occur *only* in adults aged 20-59, total deaths and hospitalizations will drop by 48% and 32%, respectively.

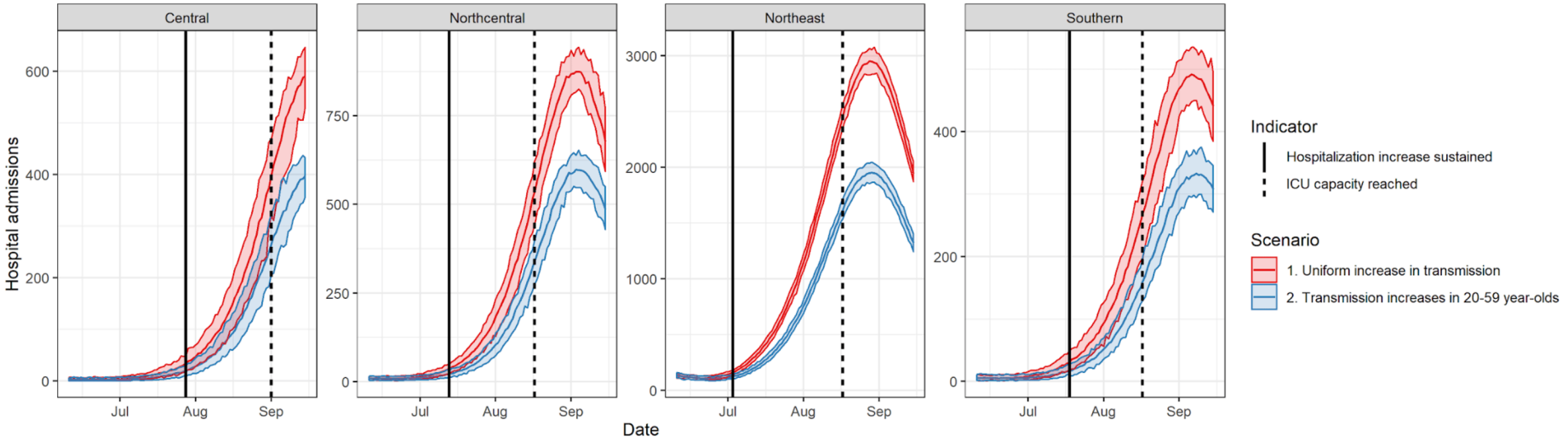
Expected statewide dynamics under Phase 4



- Scenarios 1 and 2 assume a 35% increase in transmission.
- Daily infections are not representative of reported new cases, which would be lagged by at least a week.

July 3, 2020

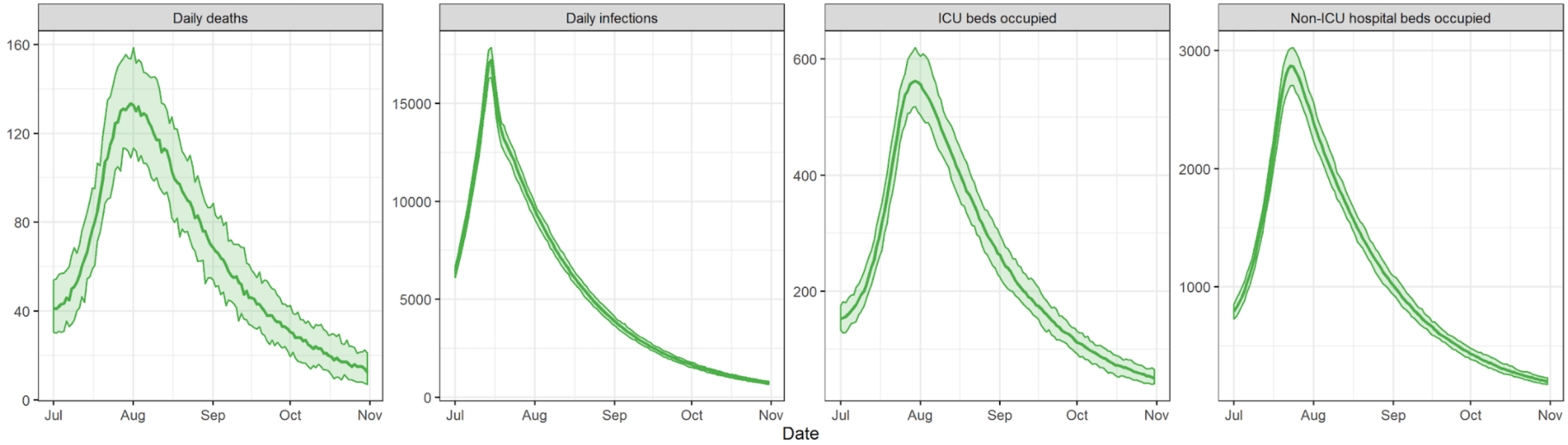
Time to reach ICU capacity



ICUs will reach capacity in most regions 35 days after hospital admissions begin to rise detectably.

July 3, 2020

If strong measures implemented July 13



Returning to SIP on July 13 reduces the impact of the epidemic, but we still experience significant deaths and hospitalizations.

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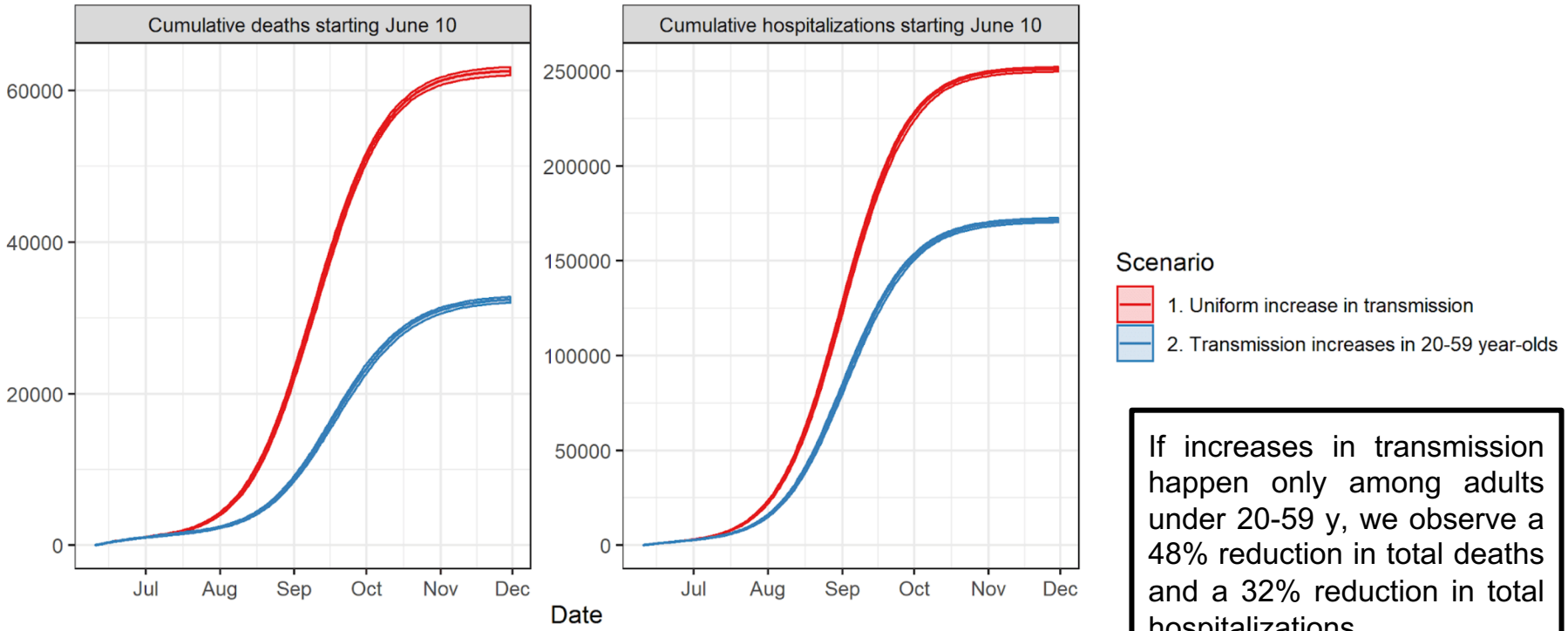
If transmission increases only in adults 20-59 y



If increases in transmission happen only among adults under 20-59 y, we observe a 48% reduction in total deaths and a 32% reduction in total hospitalizations.

July 3, 2020

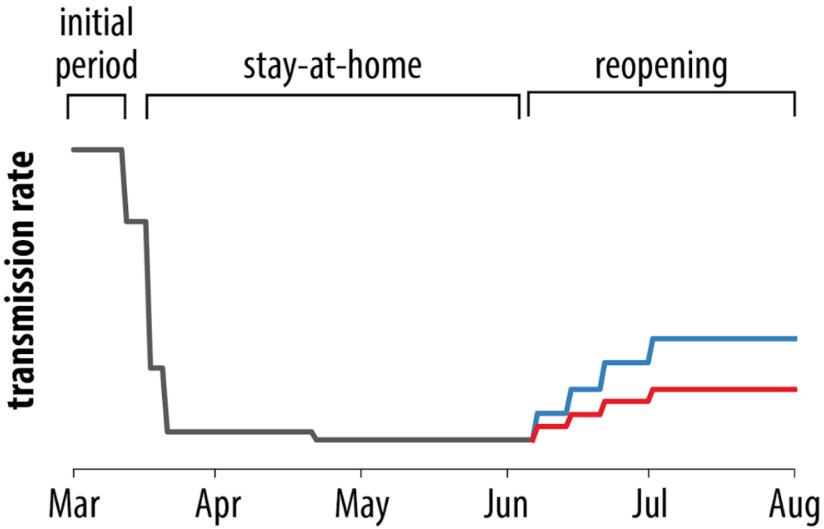
Northwestern University

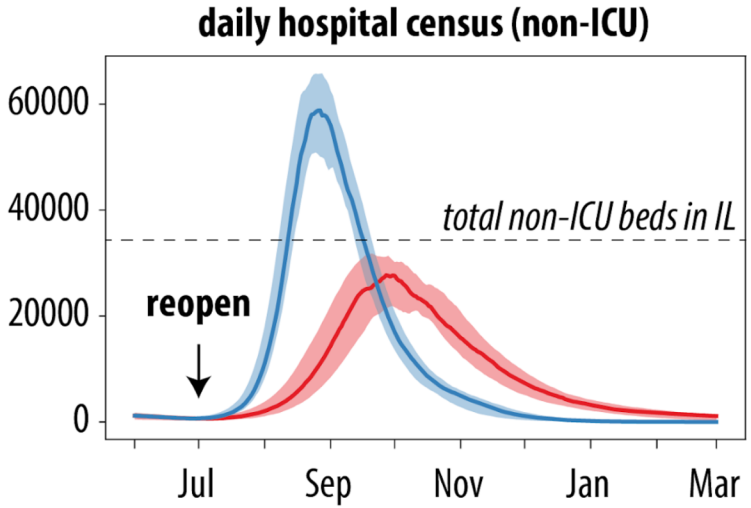
July 3, 2020

Important conclusions

- We predict that backsliding 17-35% toward March levels of transmission will result in thousands more deaths in Illinois
- Relaxing stay-at-home policies cannot be completely mitigated with improved testing and contact tracing at reasonable coverage
- Stay-at-home remains the most effective strategy to prevent a resurgence in hospitalizations and deaths
- Partial reopening together with improved testing and contact tracing might enable a safer reopening, as long as contact tracing is already functioning at a high level when reopening occurs
- Upstream indicators can buy us 1-2 weeks to take action before we start seeing signals of resurgence in deaths

Reopening by backsliding toward March levels of transmission can lead to overwhelming hospital capacity by fall





backslide 35% toward March transmission levels

backslide 17% toward March transmission levels

both scenarios: case detection stays at June levels; no contact tracing

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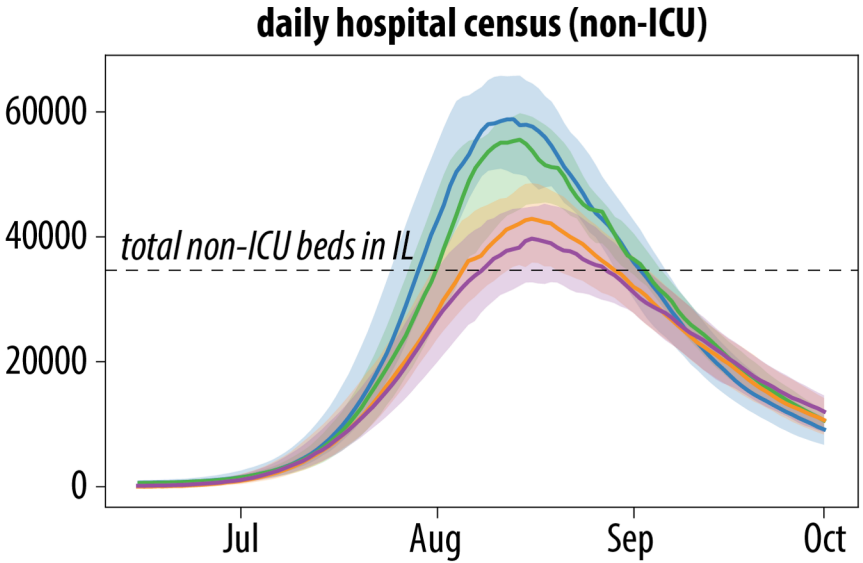
Mitigation interventions can help bring down peak hospital needs, but mitigating a 35% backslide will be tough



backslide **35%**

backslide 35%
+increase symptomatic testing

backslide 35%
+ contact tracing

backslide 35%
+ increase symptomatic testing
+ contact tracing

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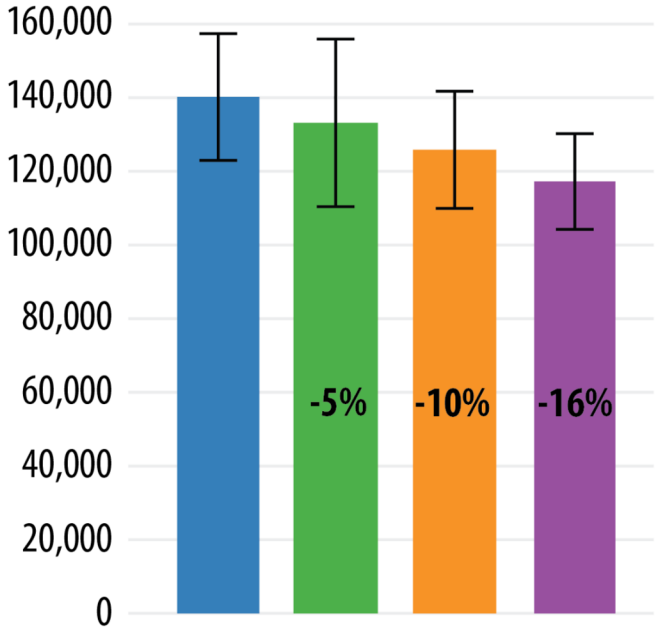
Under 35% backsliding, the death toll could be very high, and test-and-trace may have only limited impact

cumulative deaths through March 2021



backslide **35%**

backslide 35%
+increase symptomatic testing

backslide 35%
+ contact tracing

backslide 35%
+ increase symptomatic testing
+ contact tracing

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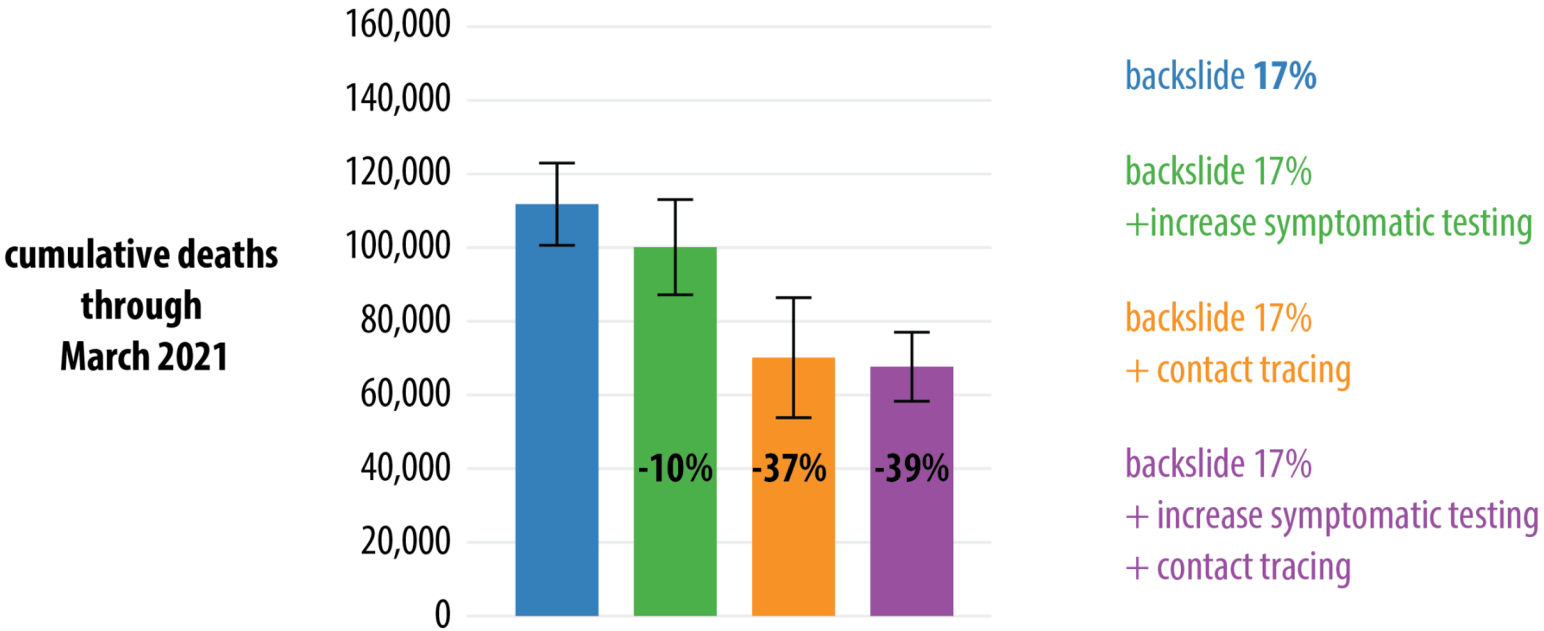
Mitigation strategies are **more effective** if we don't backslide as much



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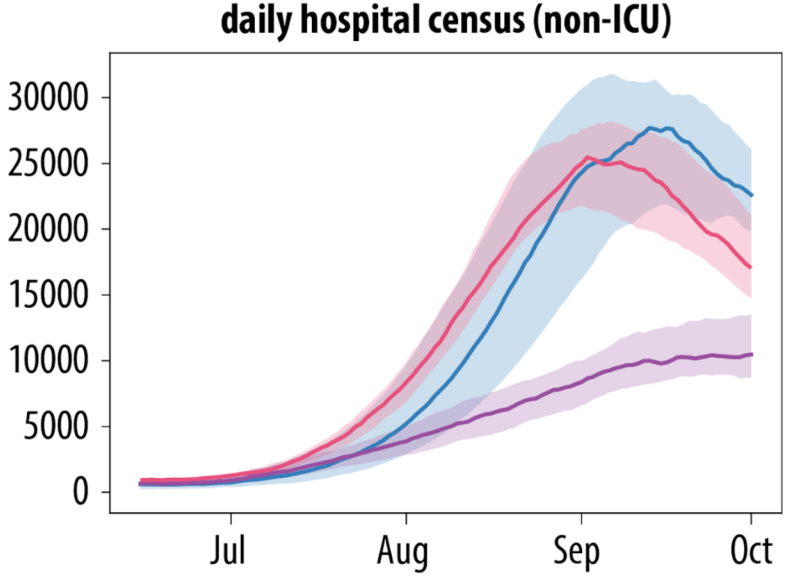
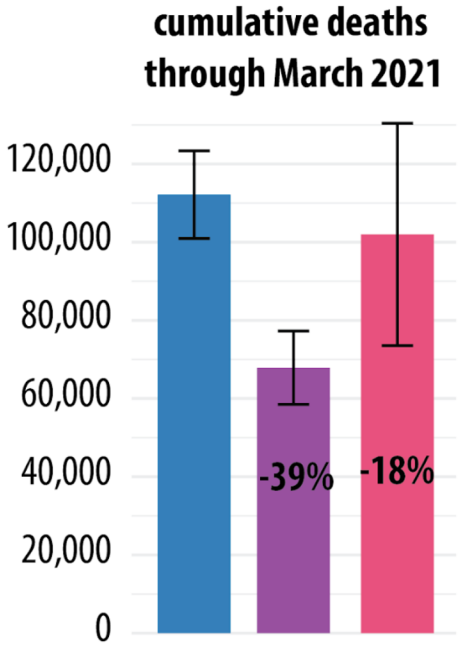
If implementing contact tracing takes several months, the additional benefit is negligible





backslide **17%**

backslide 17%
+ increase symptomatic testing
+ contact tracing

backslide 17%
+ increase symptomatic testing
+ contact tracing (gradual implementation)

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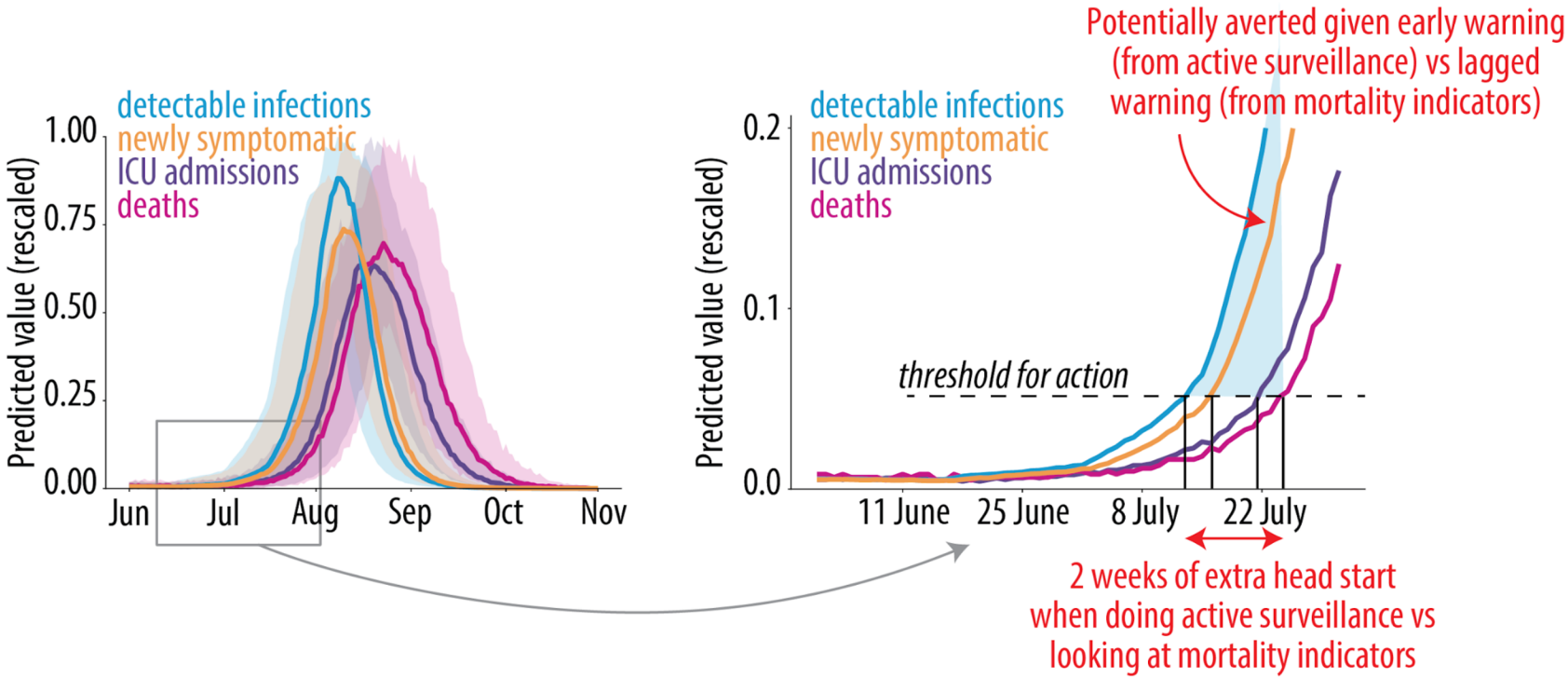
Active surveillance on upstream indicators can buy us 1-2 weeks of lead time to take early action



July 3, 2020

July 3, 2020

IMPORTANT CONCLUSIONS

- We ran scenarios that look at increased transmission in the 18-40 age group, coinciding with the June 26 Stage 4 reopening
- Exposed (newly infected but non-infectious) point prevalence shows the increases in new infections starting June 26 in the 10-20, 20-30, and 30-40 age groups (slides 2-3)
- Hospitalized point prevalence shows lagged increases in hospitalizations, particularly in the 30-40 age group (slide 4)
- The lag appears to be about 2.5 weeks between increased new infections and hospitalizations (slide 5)
- There is a drop in the ICU/Hospitalization ratio around the July 4th weekend (slide 6)
- Scenario details: The 18-40 age group modified their average self-protective behaviors from the stay-at-home (SAH) 90% transmission reduction (compared to pre-SAH dyadic transmission levels) to 75% transmission reduction. The rest of the age groups retain their SAH 90% transmission reduction as out of home activities are gradually increased over 90 days starting on June 3 (Stage 3 reopening).

Charles M. Macal, PhD, PE, macal@anl.gov

Jonathan Ozik, PhD, jozik@anl.gov

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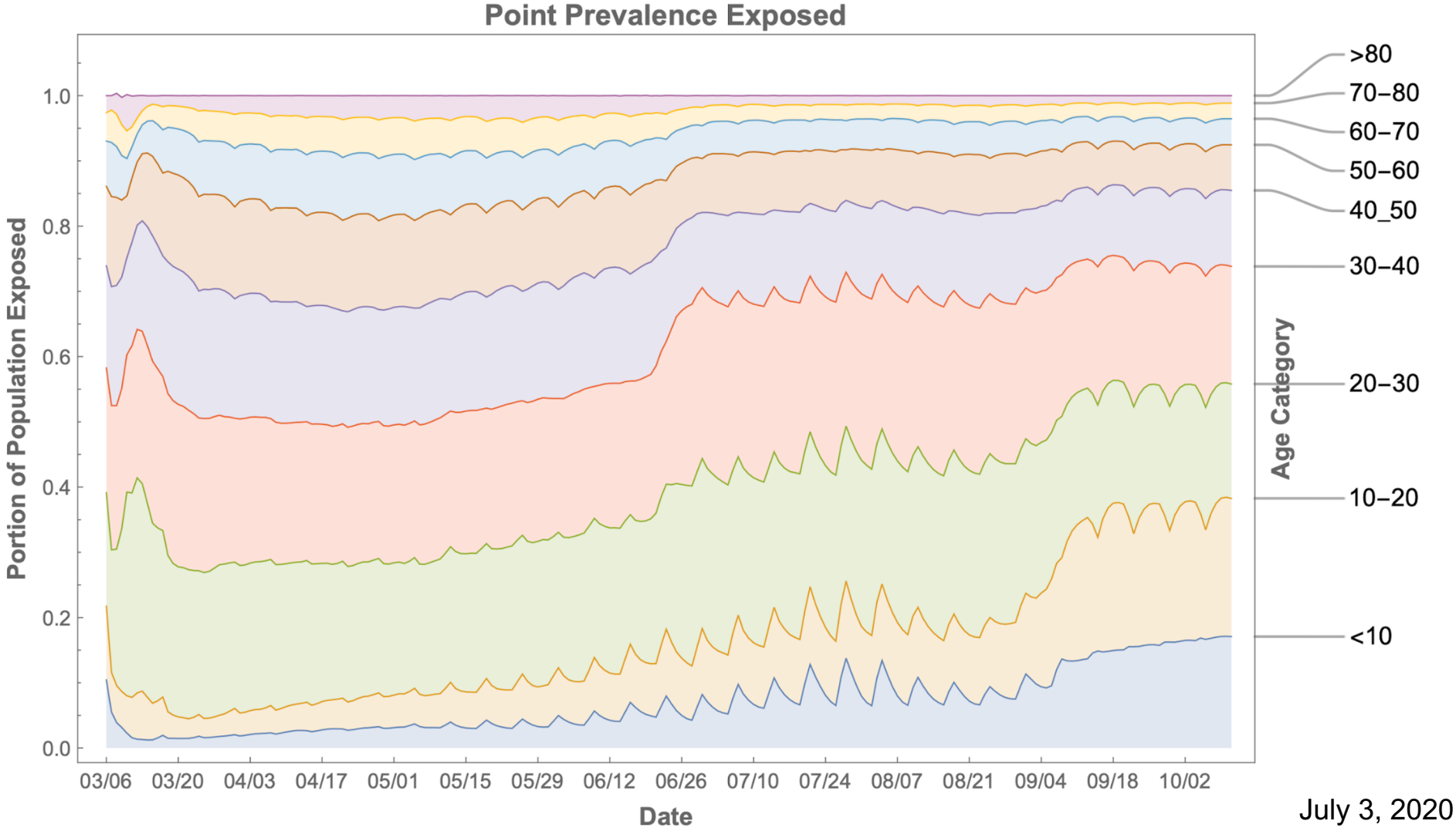
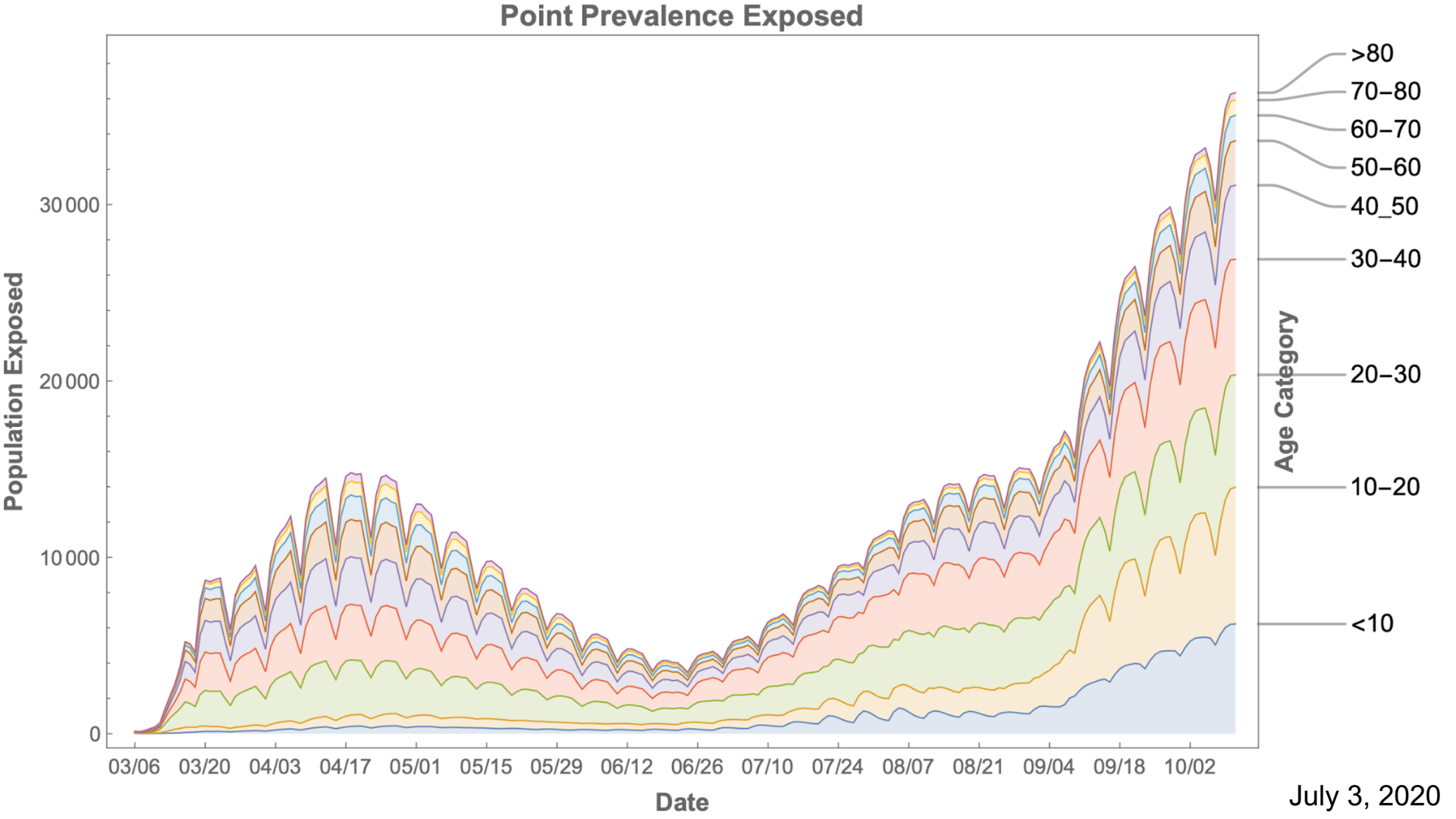
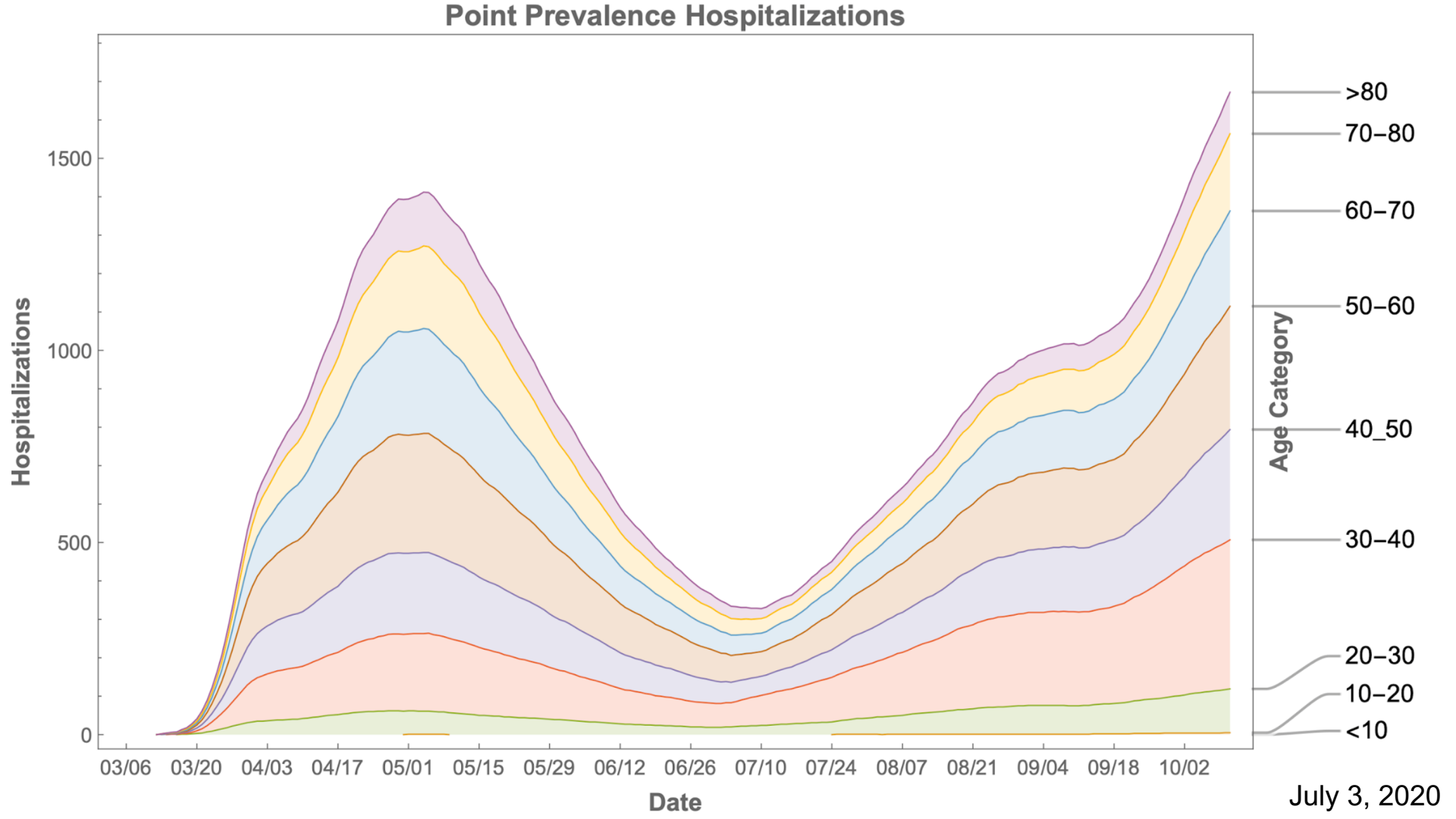

Point Prevalence Exposed
Portion of Population Exposed
1.0
0.8
0.6
0.4
0.2
0.0
03/06
03/20
04/03
04/17
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
10/02
Date
Age Category
>80
70–80
60–70
50–60
40_50
30–40
20–30
10–20
<10

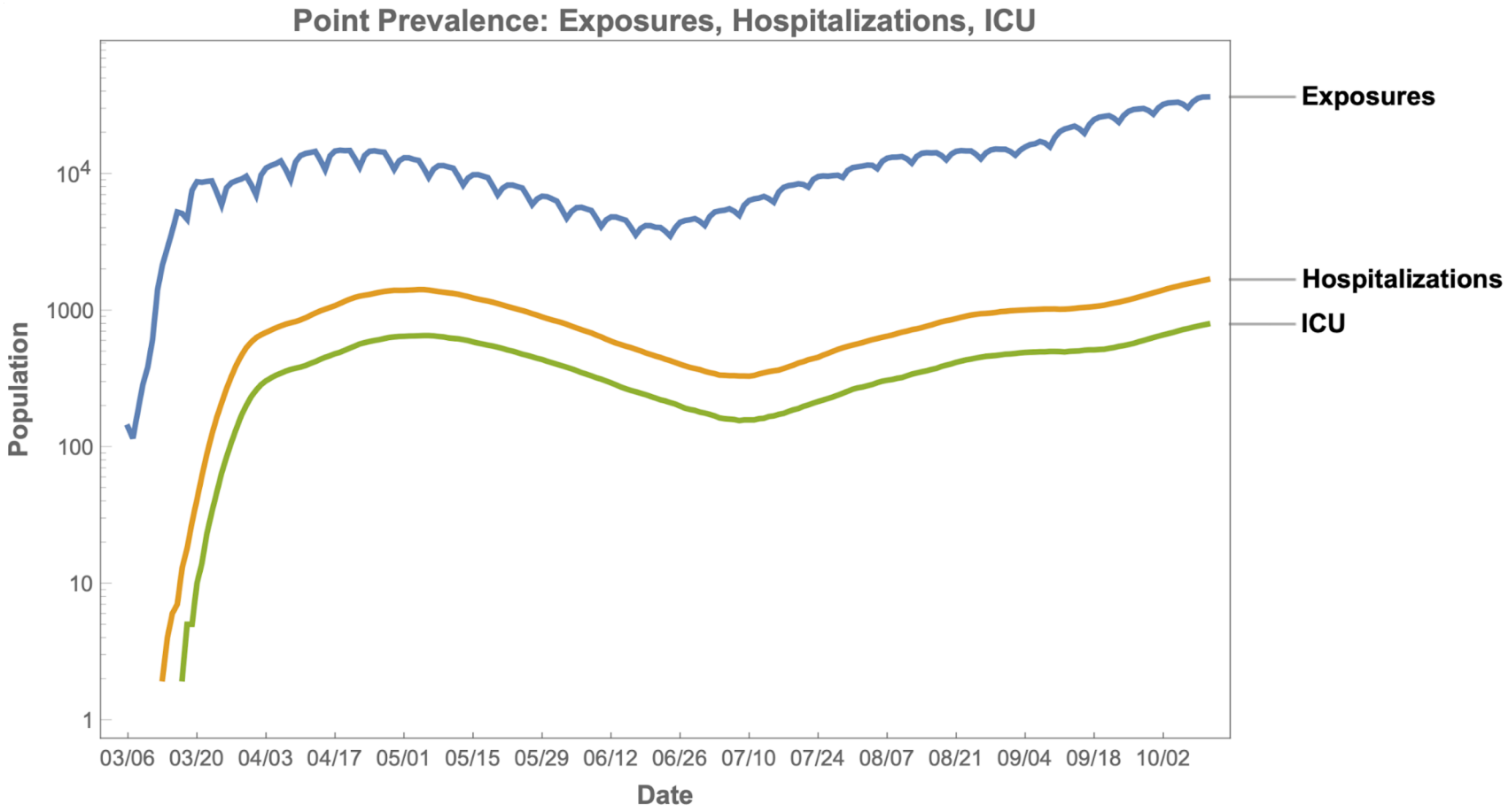
July 3, 2020


Point Prevalence Exposed
Population Exposed
30 000
20 000
10 000
0
03/06
03/20
04/03
04/17
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
10/02
Date
Age Category
>80
70–80
60–70
50–60
40_50
30–40
20–30
10–20
<10

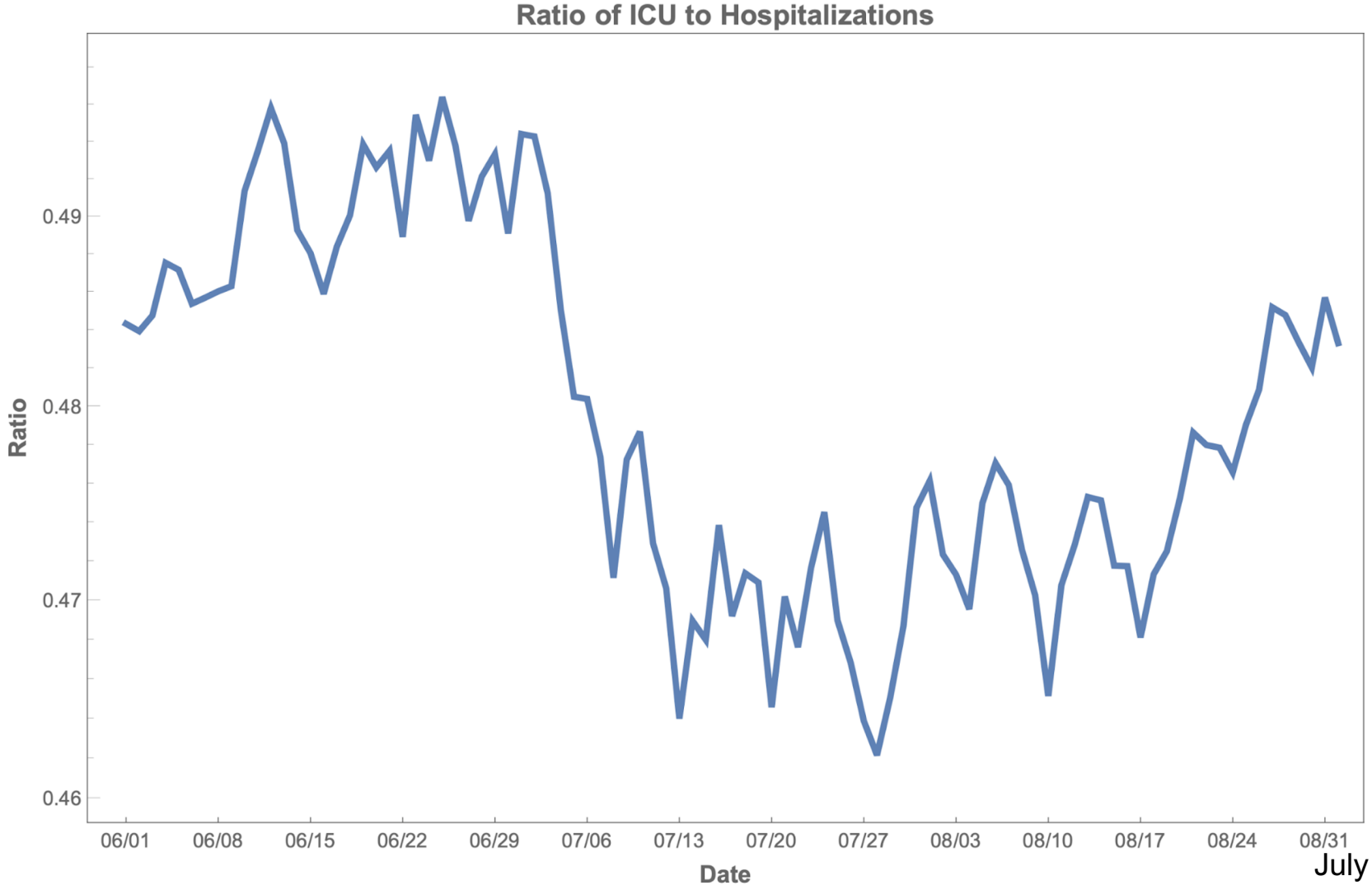
July 3, 2020


Point Prevalence Hospitalizations
Hospitalizations
0
500
1000
1500
03/06
03/20
04/03
04/17
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
10/02
Date
Age Category
>80
70–80
60–70
50–60
40_50
30–40
20–30
10–20
<10

July 3, 2020


Point Prevalence: Exposures, Hospitalizations, ICU
Population
10^4
1000
100
10
1
03/06
03/20
04/03
04/17
05/01
05/15
05/29
06/12
06/26
07/10
07/24
08/07
08/21
09/04
09/18
10/02
Date
Exposures
Hospitalizations
ICU

July 3, 2020


Ratio of ICU to Hospitalizations
Ratio
0.49
0.48
0.47
0.46
06/01
06/08
06/15
06/22
06/29
07/06
07/13
07/20
07/27
08/03
08/10
08/17
08/24
08/31
Date

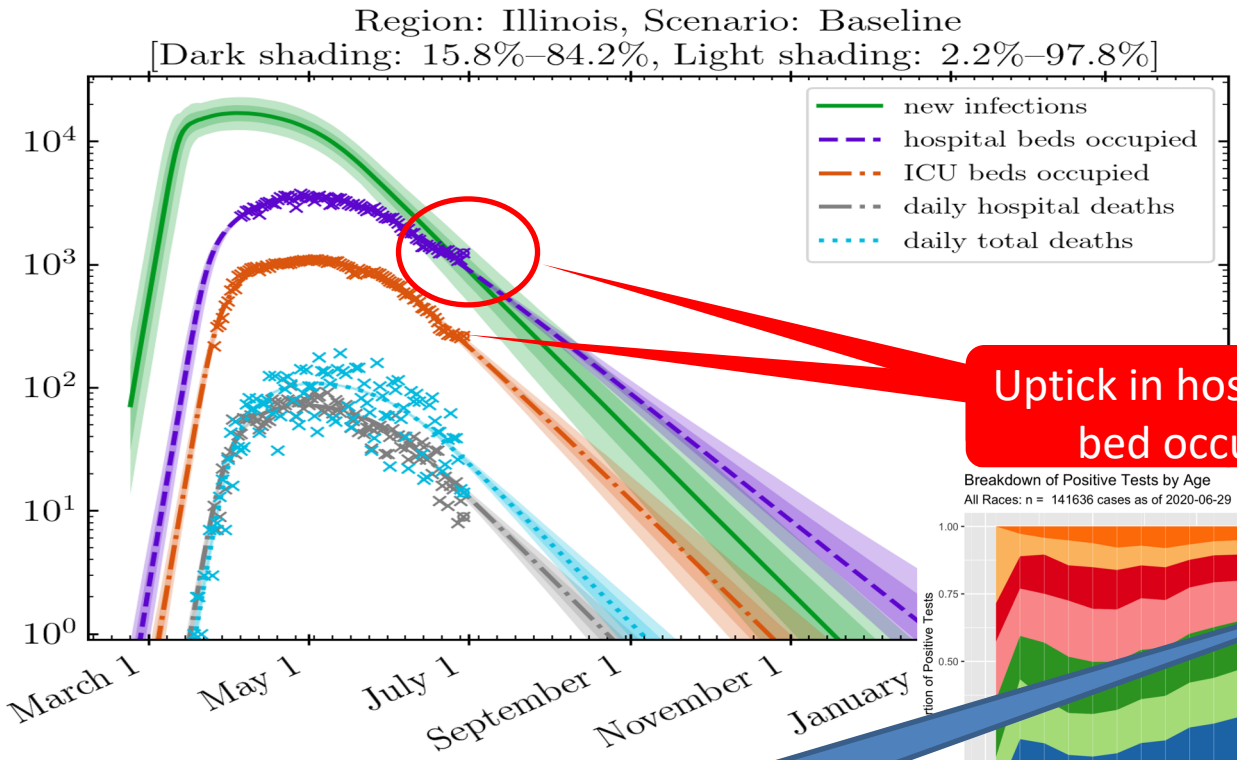
July 3, 2020

July 3, 2020

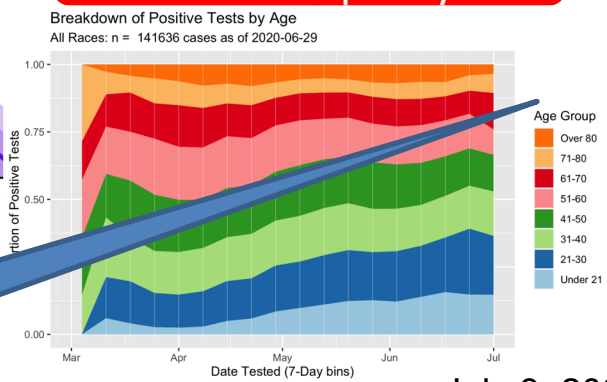
Important Conclusions

- Since last week, the predictions for the future have moved slightly higher
  - There is starting to be a small uptick in hospitalizations and ICU occupancy
  - Rt is slightly higher too
  - Likely driven by younger people, since positivity rate for them is increasing [thanks to Northwestern for sharing this data]
- If Phase 4 is accompanied by the same human response as in the early States that re-opened, there will be a second wave that is at least as big as the first wave in all regions of the State.
  - Anecdotally, this is due to bars and indoor dining
  - FL, TX, AZ closing bars now
  - Illinois should close bars before super-spreader events drive a return to Phase 2 or 3.
- Early warning sign: monitor rate of change of test positivity

Predictions for Illinois if no Phase 4



Uptick in hospital & ICU bed occupancy



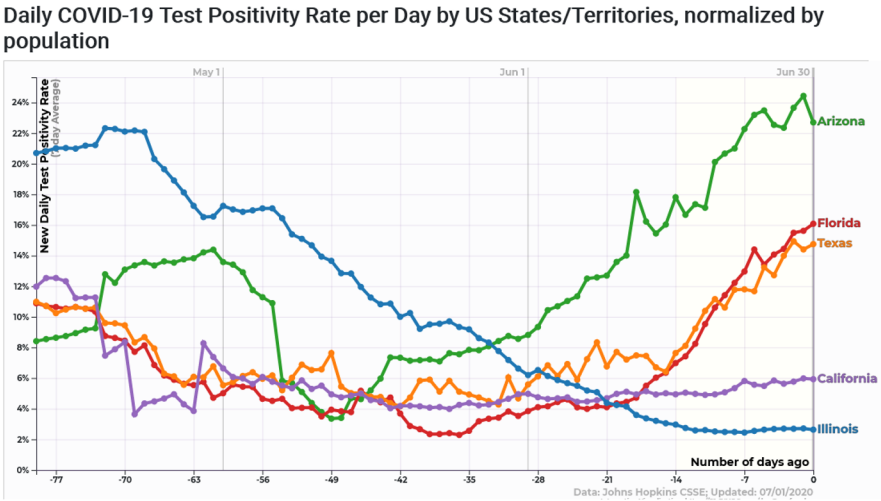
Case positivity of < 21 is rising

Credit: Northwestern

July 3, 2020

Early warning sign: growth of test positivity

- IDPH early warning sign: case positivity > 10%
- A better one: monitor the rate of change of case positivity.
- This gives nearly 2 weeks of extra warning for case of FL, TX, which started with same baseline as Illinois.

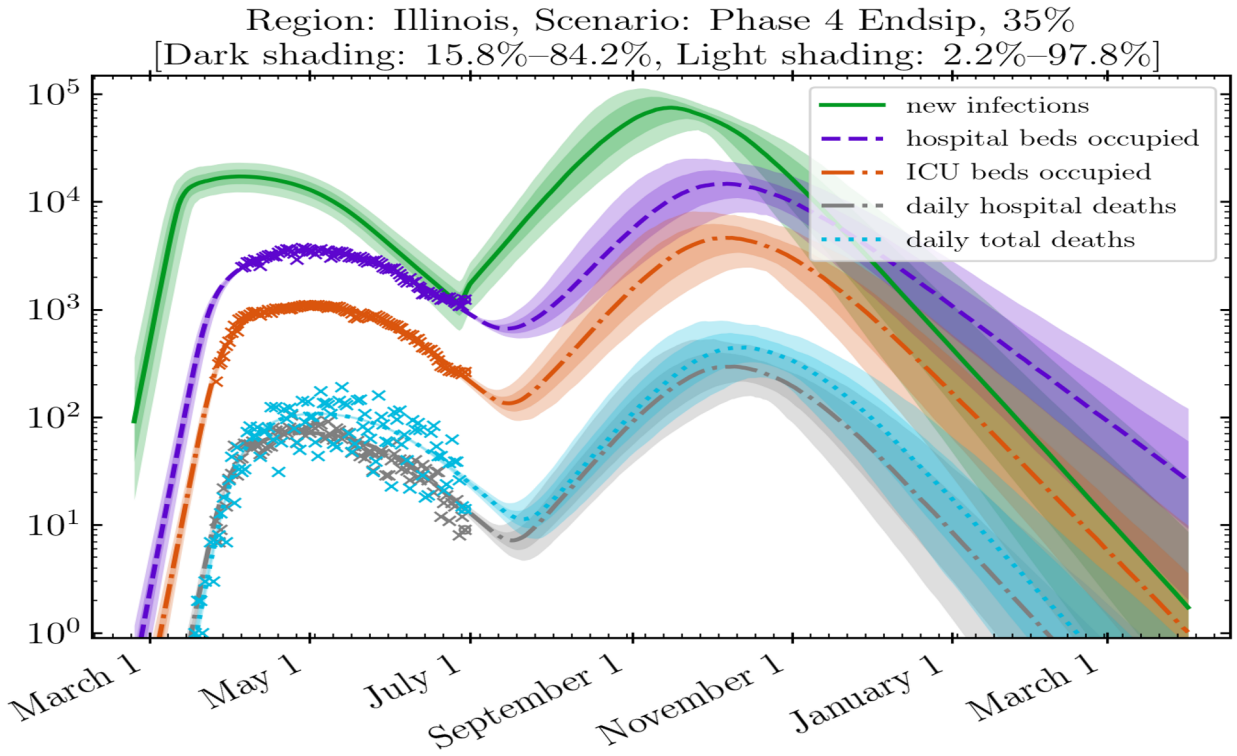


Scenarios for Phase 4

- Methodology: we calculate an “endsip factor” by defining a Rt4 value that results from the transition to phase 4 in each simulated scenario
  - We define Rt to be the value estimated by our calculations for Illinois on June 24 2020
  - We define R0 to be the initial value estimated by our calculations for Illinois at the onset of the epidemic
- We define the endsip factor by

  $E = (Rt4 - Rt)/(R0 - Rt)$
- We estimate that the value of Rt4 which corresponds to Arizona, Texas, Florida after reopening is 27%, 34% and 30% respectively
  - Analysis by measuring hospitalization doubling times
- We show results for E = 15, 25, 35, 45, 100 %

“Texas-level” Phase 4 predictions for Illinois



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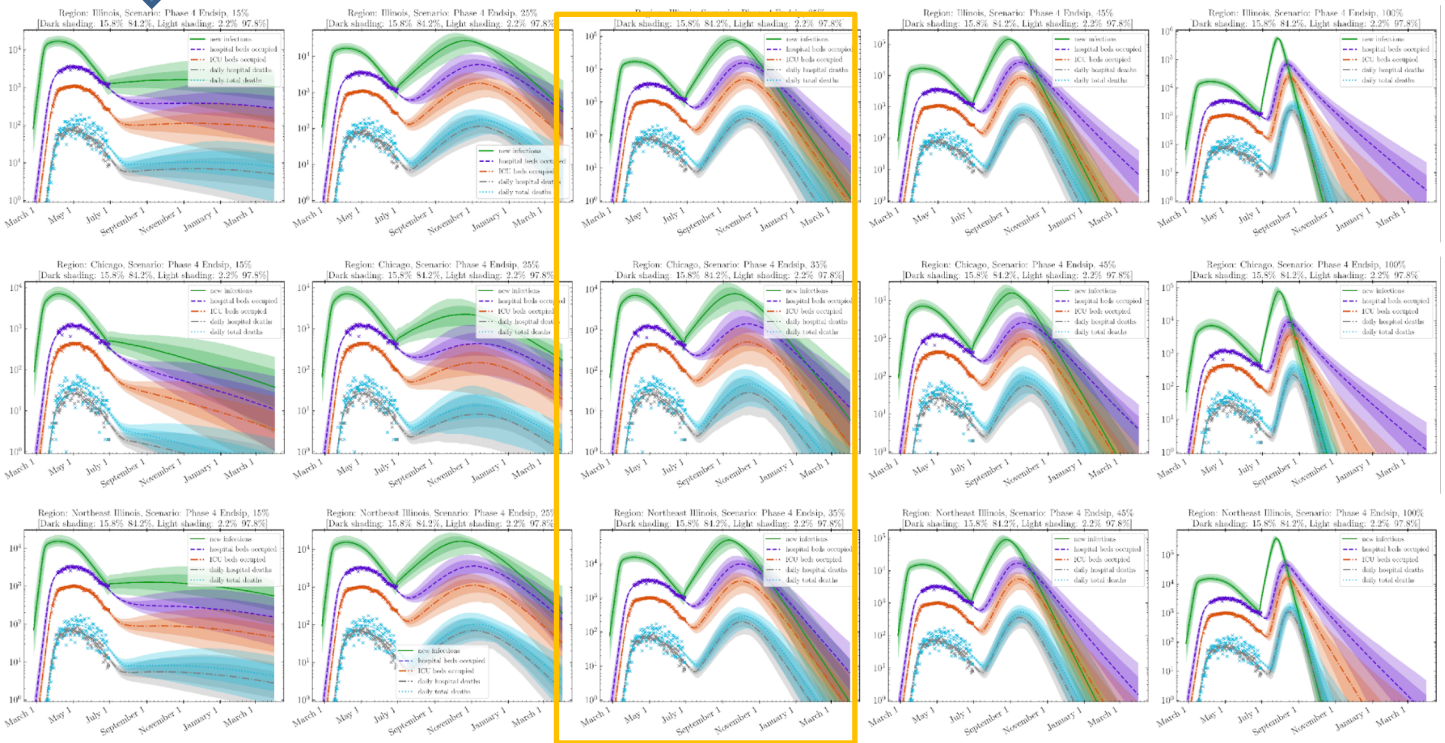
Scenarios for State, Chicago, Northeast

E = 15, 25, 35, 45, 100 %

State
Chicago
Northeastern

Texas –level scenario



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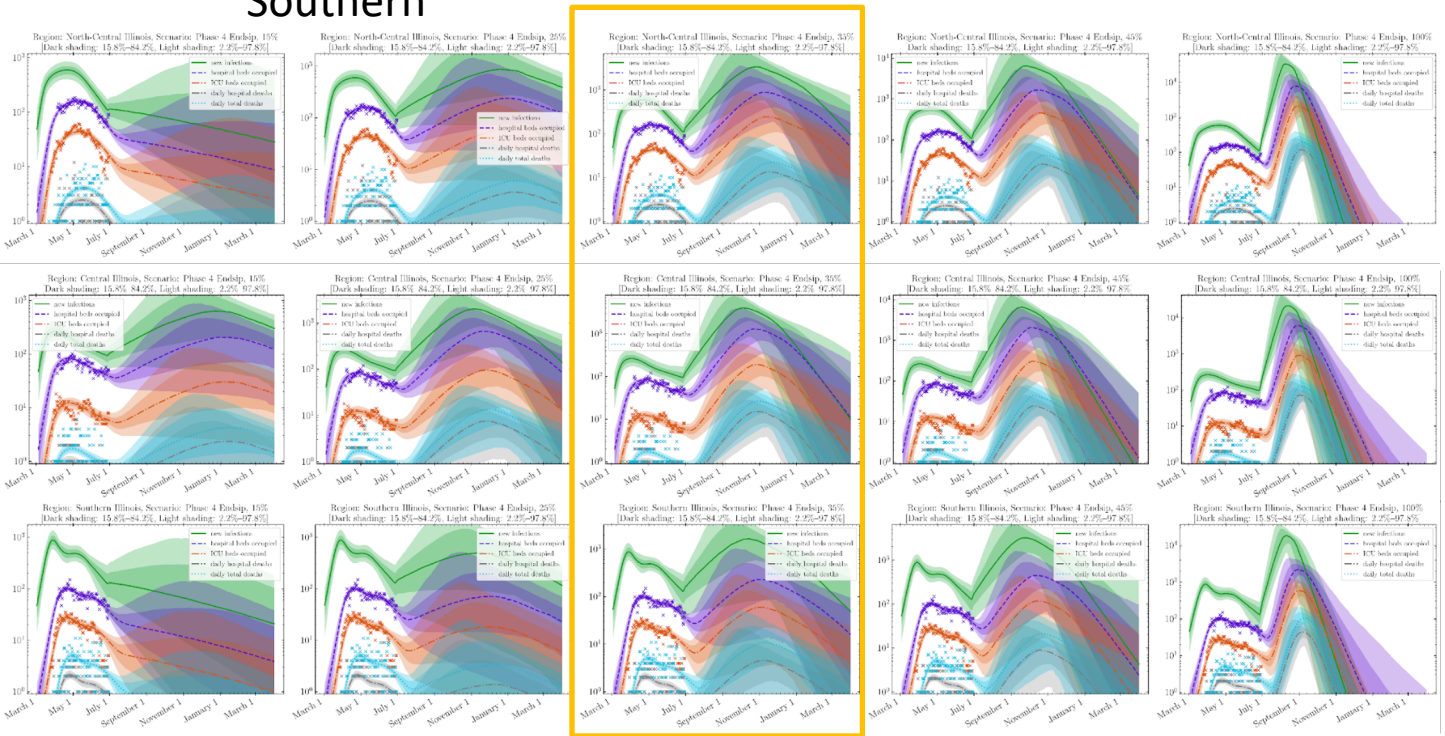
Scenarios for Restore Illinois Regions

E = 15, 25, 35, 45, 100 %

North-Central
Central
Southern

Texas –level scenario



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