

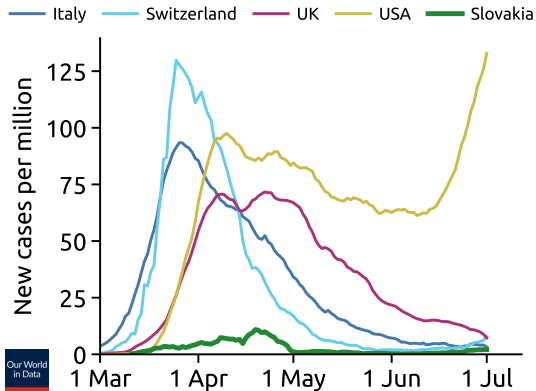
Effects of population-wide antigen testing in Slovakia

Matúš Medo

ISPM Monday Research Meeting, June 28, 2021

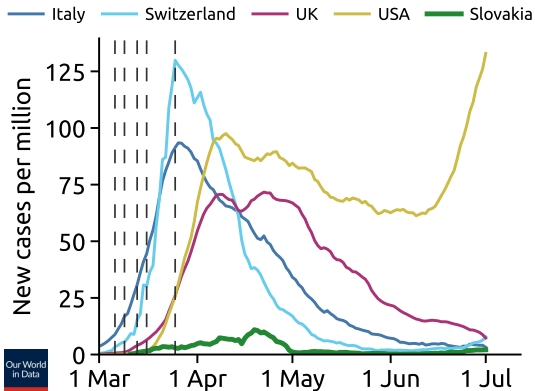
Department of Radiation Oncology, Inselspital
Department for BioMedical Research, University of Bern

COVID-19 and Europe until July 1, 2020 (“the first wave”)



Our World
in Data

COVID-19 and Europe until July 1, 2020 (“the first wave”)



March 6: First confirmed case

March 9: Closing all schools in the capital region

March 13: 14-day quarantine upon returning from abroad

March 16: Non-essential stores closed

March 25: Compulsory face masks in public

COVID-19 and Europe until July 1, 2020 (“the first wave”)



Joe Klamar / AFP / Getty (March 21, 2020)

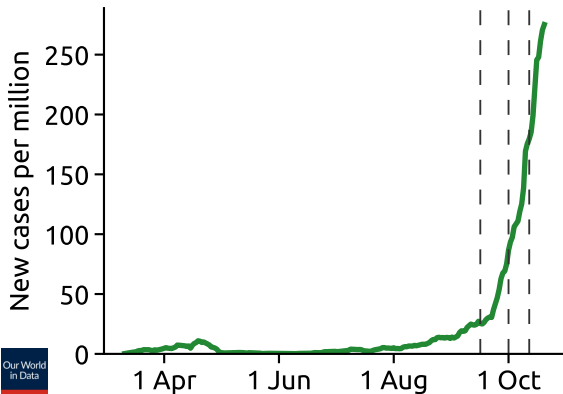
COVID-19 and Europe until July 1, 2020 (“the first wave”)

Deaths per million until July 1, 2020

Italy	575
Switzerland	227
United Kingdom	598
United States	388
Slovakia	5

Our World in Data

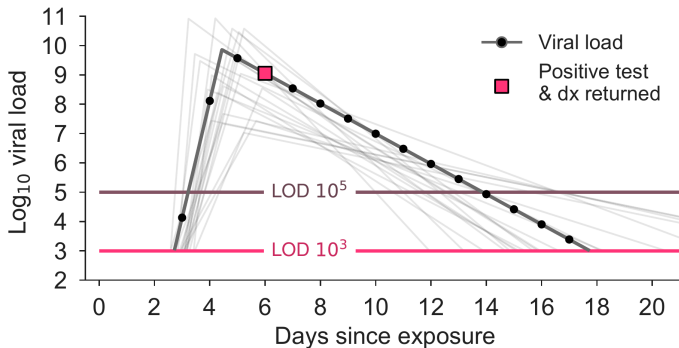
COVID-19 and Slovakia until October 20, 2020



- September 16: Plan to limit wedding guests to 30 cancelled
- October 1: Wedding receptions banned
- October 12: Closures of schools, restaurants, churches, etc. (I_1)

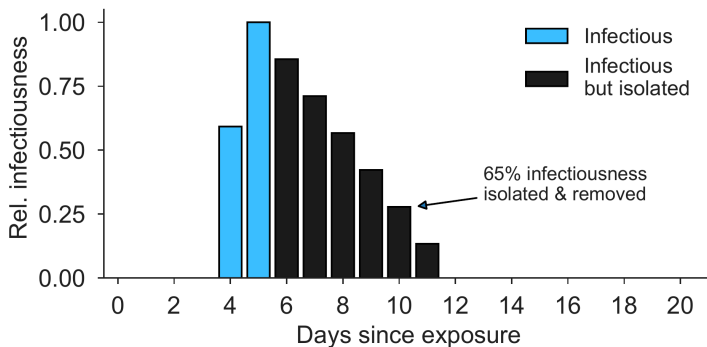
What to do?

Repeated mass testing in theory (Michael Mina & others)



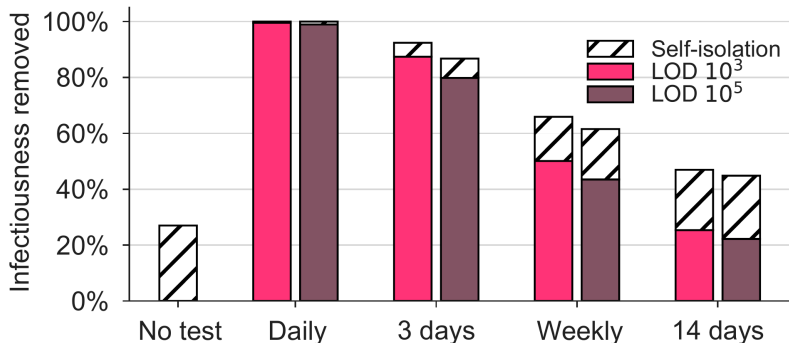
D. B. Larremore *et al*, Science Advances 7, eabd5393, 2021

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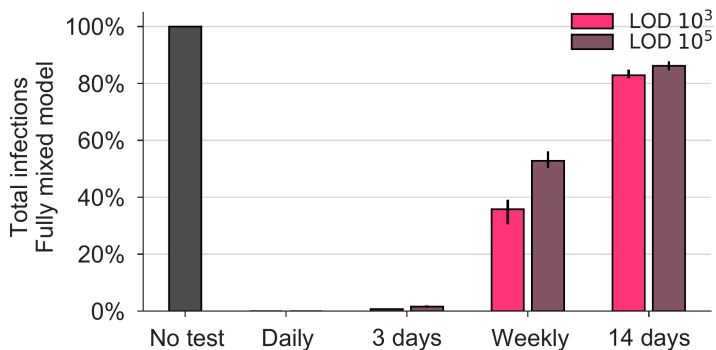
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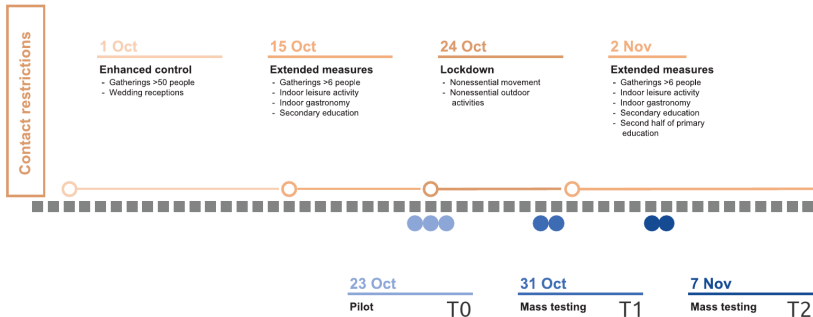


D. B. Larremore *et al*, Science Advances 7, eabd5393, 2021

Back to Slovakia:

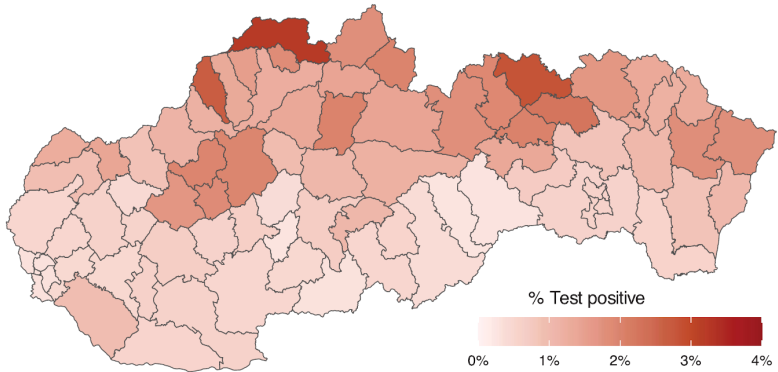
In October 2020, it was decided to employ a country-wide antigen testing (Operation Joint Responsibility)

The timeline of mass antigen testing in Slovakia



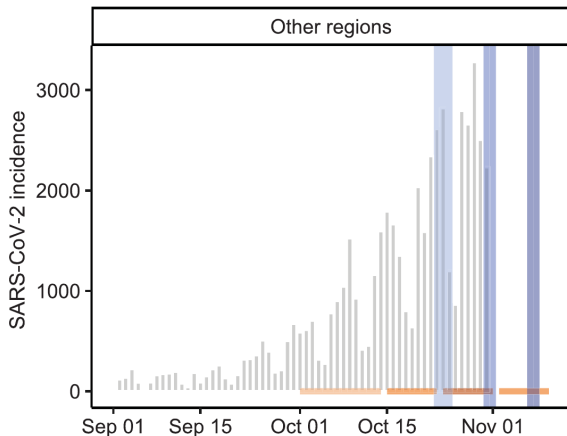
M. Pavelka et al, Science 372, 635–641, 2021

The timeline of mass antigen testing in Slovakia



M. Pavelka *et al*, *Science* 372, 635–641, 2021

The timeline of mass antigen testing in Slovakia



M. Pavelka *et al*, Science 372, 635–641, 2021

The rules of mass antigen testing in Slovakia

- Age-eligible population:
 - 10 to 65 years and older employed individuals

1. Not tested:

- 10 days quarantine

2. Tested positive:

- 10 days quarantine (themselves, family members, self-traced contacts < 2 days)

3. Tested negative:

- “Ticket to freedom”

Pavelka et al: Results of mass antigen testing in Slovakia

Huge effort, high participation (> 80% in each round)

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Test positivity in one county

County	Pilot	Round 1	Round 2
Bardejov	3.25%	1.67%	0.83%

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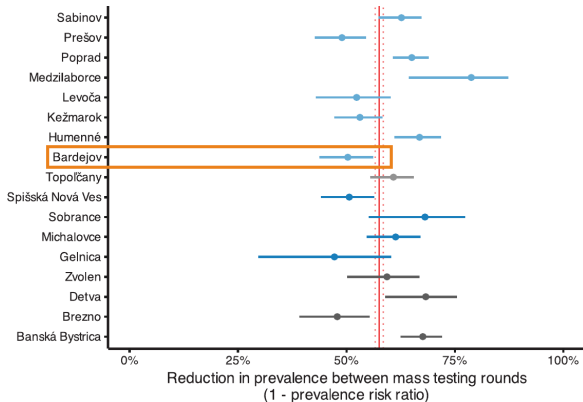
Positivity reduction between Pilot and Round 1:

$$1 - 1.67/3.25 \approx 0.49$$

Positivity reduction between Round 1 and Round 2:

$$1 - 0.83/1.67 \approx 0.50$$

Pavelka et al: Results of mass antigen testing in Slovakia



From the abstract: “*Observed prevalence* decreased by 58% (95% CI: 57–58%) within 1 week in the 45 counties that were subject to two rounds of mass testing.”

This looks great but...

Problems with Pavelka et al: Terminology

- “Observed prevalence” is test positivity, not prevalence

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The impact of population-wide rapid antigen testing on
SARS-CoV-2 prevalence in Slovakia



The impact of population-wide rapid antigen testing on
positivity of rapid antigen testing

Problems with Pavelka et al: Terminology

- “Observed prevalence” is test positivity, not prevalence
- Even if large, the **population samples were biased**:
 1. Individuals positive in T1 and their whole households were quarantined and skipped T2



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- Even if large, the **population samples were biased**:
 1. Individuals positive in T1 and their whole households were quarantined and skipped T2
 2. After T1, people who suspected that they are positive could avoid T2 to prevent loss of income of the entire household
 3. Residents from counties exempted from T2 who needed a negative test for commuting traveled to other counties



Problems with Pavelka et al: Fact-check

- Antigen testing was used both as an intervention and its efficacy measurement, other metrics were ignored

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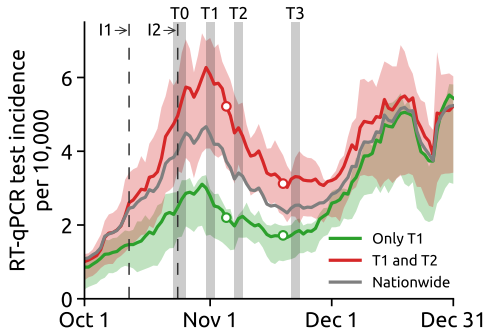
If one round would decrease prevalence by 58%,
prevalence after three rounds should get as low as

$$(42\%)^3 \approx 8\%$$

If the epidemic growth was 4.4% per day
as before mass testing, it should take
60 days to get back

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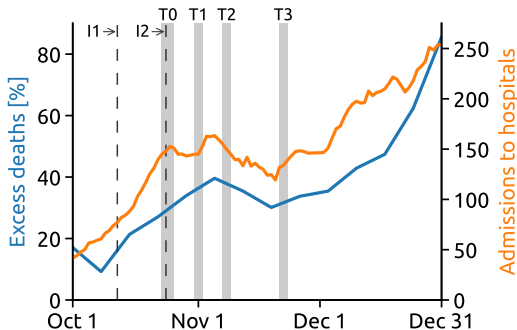


PCR incidence decrease in counties with T2: 40%

PCR incidence decrease in counties without T2: 22%

Problems with Pavelka et al: Fact-check

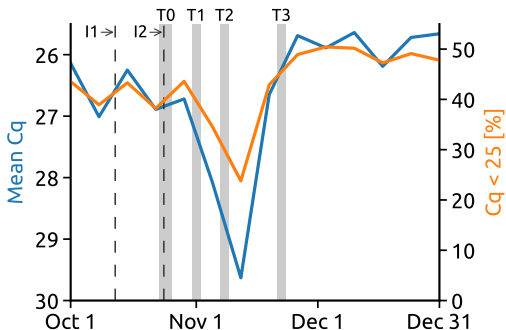
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Hospital admissions decrease from the peak: 30%
Excess deaths decrease from the peak: 24%

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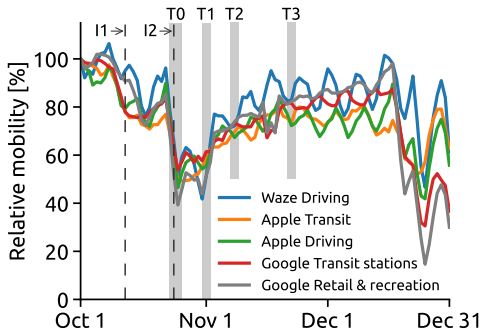
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Drop of the average viral load for two weeks only
The fraction of tests with high viral load too

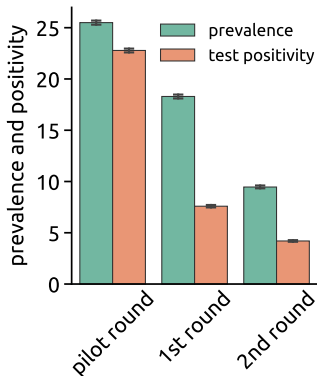
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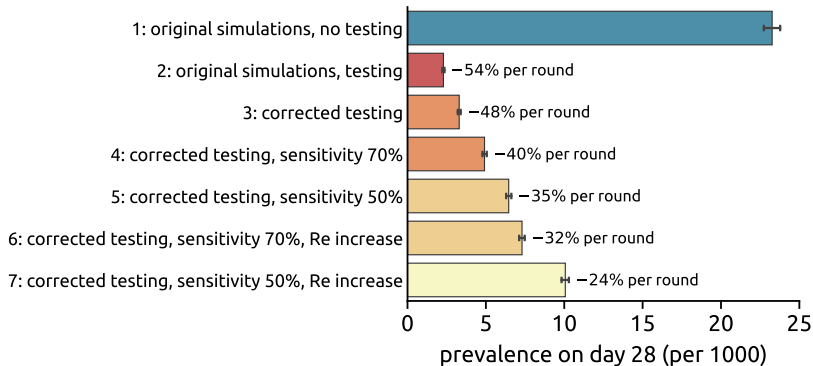
Mobility steadily increased after T1
(partly design, partly expectations)

Problems with Pavelka et al: Computational model...



Test positivity decrease between Pilot and Round 1: 67%
Prevalence decrease between Pilot and Round 1: 28%

Problems with Pavelka et al: Computational model...



In summary

- One round of mass antigen testing reduced SARS-CoV-2 prevalence not by 58% but by 20-30%
- Despite several testing rounds, the rebound was quick:
 - Hospital admissions started to rise two weeks after T2
 - 4-month lockdown from January 2021
 - Most reported COVID deaths per capita in February 2021

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- Mass antigen testing can be useful in high prevalence regions
 - But you actually do not want to get to that point

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- Mass antigen testing can be useful in high prevalence regions
 - But you actually do not want to get to that point
- What does it tell us about how well science works at the time of an emergency?

Thank you for your attention!

Joint work with Martin Šuster, Katarína Boďová, Alexandra Bražinová, Broňa Brejová, Richard Kollár, Vladimír Leksa, Jana Lindbloom, Jozef Nosek, Veda pomáha COVID-19, Tomáš Vínař

Full article: <https://arxiv.org/abs/2105.13633>
<http://www.ddp.fmph.uniba.sk/~medo/physics/>

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The timeline of mass antigen testing in Slovakia

- **October 12 (I1):** limiting social contacts (closures of schools, restaurants, cultural venues, churches, etc.), mandatory masks outdoors
- **October 24 (I2):** nation-wide “stay-at-home” order
- **October 23-25 (T0):** pilot mass testing in four most-affected counties
- **October 31-November 1 (T1):** nation-wide first round of mass testing
- **November 7-8 (T2):** second round of mass testing in 45 counties (out of 80) with positivity at least 0.7%
- **November 21-22 (T3):** third round of mass testing in 447 municipalities with positivity at least 1% in T1 or T2

Figure 3B from Pavelka et al

