

Scenario analysis for Ministry VWS

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At RIVM: involve 5.1.2e | 5.1.2e | 5.1.2e | 5.1.2e |

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Questions

-how can get some insight into the dynamics, the trade-off between vaccination, testing and non-pharmaceutical control measures?

Objectives of COVID control

- protect vulnerable population
- protect health care structure and don't exceed capacity
- keep the epidemic in sight, allow for monitoring of epidemic.

Alternative objectives

-open up society as fast as possible and return to normal. As I understand from the ministry, this is not a policy objective

Decisions that have been made

In the first phase of the vaccination campaign, vaccines will be allocated to risk groups and health care workers

Options for policy

What to do with non-pharmaceutical measures during the vaccination campaign? Who to vaccinate in subsequent phases?

Scenario analysis.

There is a roadmap with control measures. A crucial threshold is now at an incidence of 7 notifications per 100 K persons per day, which corresponds in the current situation to an incidence of 10 IC admissions.

Scenario 1. We stick to the roadmap, with a threshold of 10 IC admissions per day. We relax non-pharmaceutical measures when we are below the threshold, we increase measures when we are at or above the threshold

Scenario 2. We stick to the roadmap, with a threshold of 7 notifications per 100 K persons per day. We relax non-pharmaceutical measures when we are below the threshold, we increase measures when we are at or above the threshold

Results

We make very optimistic assumptions: After vaccinating 10% of the population, we have vaccinated 50% of the high risk groups. We assume IC admissions only occur among the high risk groups. Vaccine is 100% effective against severe outcomes, 100% effective against transmission.

Number of IC admissions per day = force of infection x risk of admission per exposure

After vaccinating 50% of the high risk groups, risk of admission has been reduced by a factor $(1 - \text{vaccine coverage} \times \text{vaccine efficacy against severe outcome}) = 0.5$

Results for Scenario 1, we hover around approximately 10 IC admission per day. Because risk of admission upon exposure has been halved, we can afford a force of infection that is twice that before.

Thus we can afford twice the number of infectives in the population. Doubling the number of infectives occurs when we allow for 1 week with control measures as in early September 2021 (with bars and restaurants open) when the reproduction number was $R=1.3$.

Outcome: after vaccinating 50% of the high risk groups, incidence of IC admissions has remained around 10 IC admissions per day, with non-pharmaceutical control measures as before vaccination. We have created an opportunity to have one week with bars and restaurants open. Among the high risk groups, there is increased health disparity: those who are vaccinated, are safe; those who are not vaccinated experience twice the risk they had before vaccination.

Policy objectives: we are not closer to our three objectives, and have limited success in achieving the alternative objective.

Results for Scenario 2, we hover around approximately 7 notifications per 100 K persons per day. Because risk of admission upon exposure has been halved, this corresponds to about 5 IC admissions per day.

Thus we avoid 5 IC admissions per day (and deaths, as there is a 27% probability of dying upon admission), for every day, as long as the vaccine induced protection works.

Outcome: after vaccinating 50% of the high risk groups, incidence of IC admissions has halved, with non-pharmaceutical control measures as before vaccination. We have created no further opportunities to have bars and restaurants open. Among the high risk groups, there is some health disparity: those who are vaccinated, are safe; those who are not vaccinated experience the same risk as before vaccination.

Policy objectives: we are closer to our objectives of protecting the vulnerable population and avoiding high burden on the health care system, and have no success in achieving the alternative objective.

Conclusions

- The policy objectives we strive to achieve will determine whether we should change the threshold levels in the roadmap or not.
- The opportunity to relax measures is very limited: one week of bars and restaurant open after vaccinating 50% of the high risk population.
- We can either have one week of bars and restaurant open after vaccinating 50% of the high risk population, or halving IC admissions, but not both.