

Something about Epidemiology

- Epidemics involve exponential growth
- R_0 : Basic reproduction nr
 - nr of persons that an infected person infects, on average
- Corona R_0 : about 2.5 (maybe even 4)
- Social Distancing: getting R_0 down below one

The Crucial Role of Uncertainty

Phase transitions

(thanks to Bert Zwart, Bernard Zweers):

- 75% social distancing may imply 'IC (intensive care) wards don't fill up'
- whereas 70% social distancing may imply '4000 people in NL need to but cannot go to IC'
- this means they'll die
- ...if R_0 is 2.4. If $R_0 = 3$ it is completely different again.

Play around with

gabgoh.github.io/COVID/index.html

Feedback Problem

- effect of measures only visible after 12-14 days. In mean time, exponential growth may continue
- ...and when you see a change 12-14 days after the fact, hard to trace back what actually caused it

Corona is totally not like the flu!

- If **everybody gets the attention they need**, then like with flu, corona, while still substantially worse, mostly kills people that already had a very short life expectancy anyway (very old/ill)
- Unlike flu, R_0 and **hospitalization rates** incomparably higher, and **high exposure means higher risk** (doctors die!)
- ...and if you need to go to hospital but can't, **you're quite likely to die.**

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- Without sufficient social distancing, Corona very roughly adds about a year's 'normal' nr of deaths (**David Spiegelhalter BLOG**)...but these would have come to us in the course **of about 1 month**

What to do now?

- Those who want to save all lives at all economic costs and those who fear a repetition of the 1929 recession (which arguably caused World War II) do agree on one thing: *herd immunity is not an option*

herd immunity is not an option

- Simple **back-of-the-envelope** calculation shows this:
 - At least 60% of population needs to be infected
 - we have 2000 IC (Intensive Care) beds in NL
 - people stay at IC around 3 weeks (or, let's say we kick them out after 2 weeks...)
 - % of infected people that need to go to IC = 2%.
 - ...so if you want to do this without IC overload you need...
...**5 years?**

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Quality Press: “this is too complex for back of the envelope (BotE) calculations” **My response:** “you may not use BotE to conclude that something complex is right, but you can still use it to conclude that something complex is wrong!”

What to do now?

- Yet, question remains: how far should distancing measures go?
 - Again, uncertainty about something that grows exponentially fast...
- We can't keep up with current measures for very long
- “Natural” Experiment: **Sweden**
 - What they did was irresponsible!
 - Yet still they might be getting away with it
- Of course NL situation very hard to compare with Sweden

- Assist UMC Utrecht with Clinical Trials
- BCG vaccin has been in use for 130 years as **vaccination against tuberculosis**
 - side effect: generic 'boost' immune system
- 1st trial (already started): does BCG reduce days-missed-because-of-illness (corona and otherwise) for **hospital workers**?
- 2nd trial: does BCG reduce hospitalization rates for **elderly**?

Trial 1: CORONA-BCG

- Coordinating PI: Prof. Dr. Marc Bonten
- Trial Statistician: Henri van Werkhoven
- 750 hospital workers get BCG vaccin, 750 get placebo vaccine. 9 hospitals take part
- Our Role (originally): can we **stop early** if results very convincing? can we **continue experiment** with more (> 1500) subjects if results promising but inconclusive? (“Safe Testing”)
- Rosanne Turner, Alexander Ly, Judith ter Schure



Another Initiative



<https://www.vvsor.nl/articles/covid-19-protocol-review/>

Statistici slaan landelijk de (virtuele) handen ineen voor de kwaliteit van klinisch onderzoek naar covid-19

De Vereniging voor Statistiek en Operations Research (VVSOR) en biostatistici van alle Nederlandse universitair medische centra, het Nederlands Kanker Instituut, de vele medisch-ethische toetsingscommissies en het Centrum Wiskunde & Informatica starten een initiatief om gezamenlijk de methodologische kwaliteit van Nederlands covid-19 onderzoek naar een (nog) hoger plan te tillen.



really Judith ter Schure,

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