COVID-19 in the Dutch Ca

Scenario analyses and c

5.1.2e

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Aim

- To present the course of a COVID-19 outbreak on the 6 islands under various levels of containment, against the natural course - without containment.

- Simulated with a S-I-R deterministic model:
  - hospital beds
  - IC units

- Scenarios:
  - no control measures
  - 40%, 50%, and 60% reduction in transmission

Background

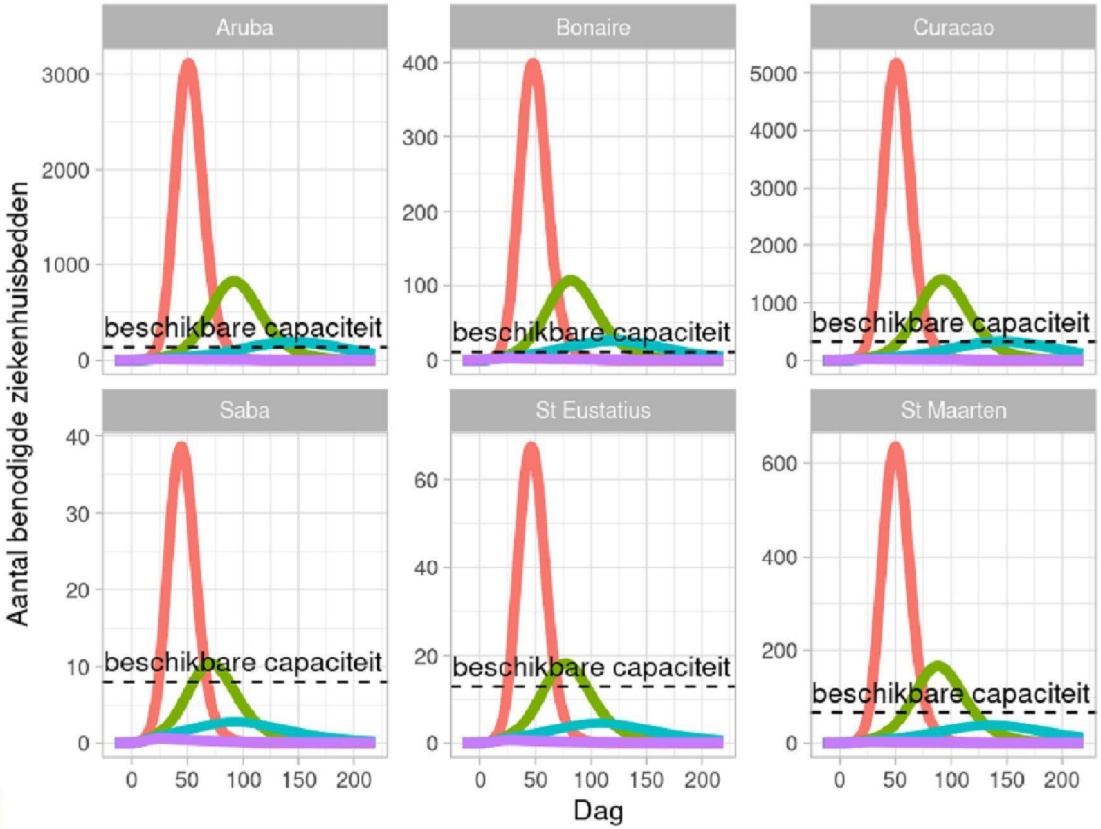
- Natural history same as in model for NL
- Population size/demography specific for islands
- Contacts between and within age groups derived from study on BES
- Higher hospitalisation rate on Aruba and Curaçao, because of higher comorbidity prevalence (hypertension, obesity, DM)

Background II

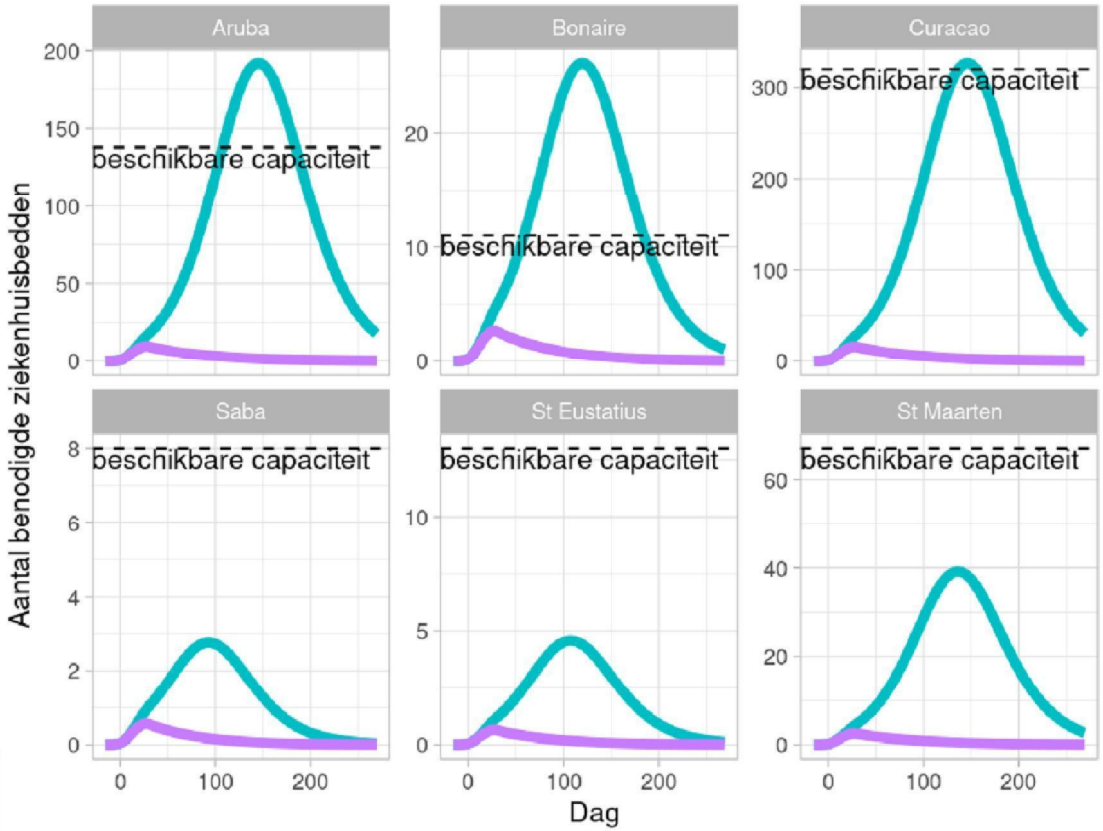
- Simulation: start control strategy when *x* cases have symptomatic disease:

	Aruba	Curaçao	St Maarten	Bonaire	St Eustatius	Saba
Number symptomatic	10	15	5	4	1	1
Total population	105,264	161,014	41,100	20,100	3,138	1,915

Hospital beds needed on the 6 islands



Hospital beds: 50% reduction transmission some islands mini, Aruba & Bonaire 60%



No measure
40% red. transmission
50% red. transmission
60% red. transmission

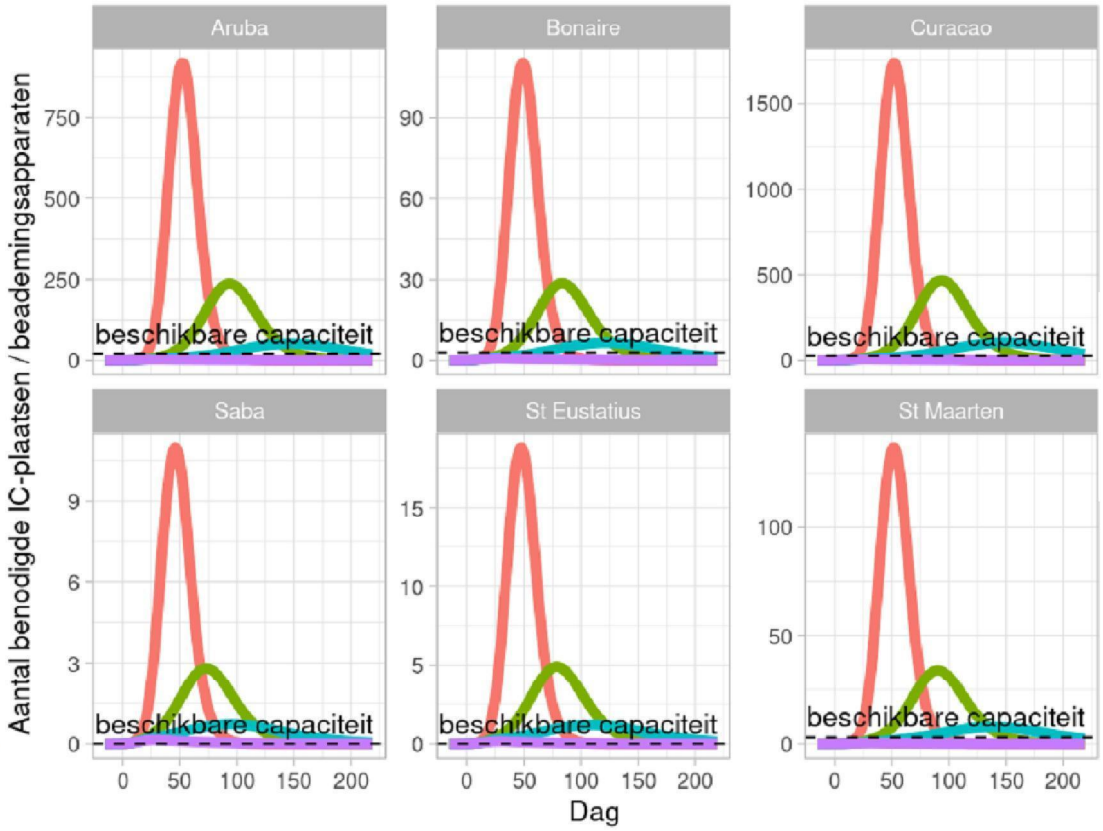
Interpretation hospital beds results

- Hospital beds needed without any measures peak around day 50 after epidemic onset
- Reducing transmission will:
  - reduce (peak) demand
  - delay peak
  - spread demand over longer time period

Suggestions early modelling:

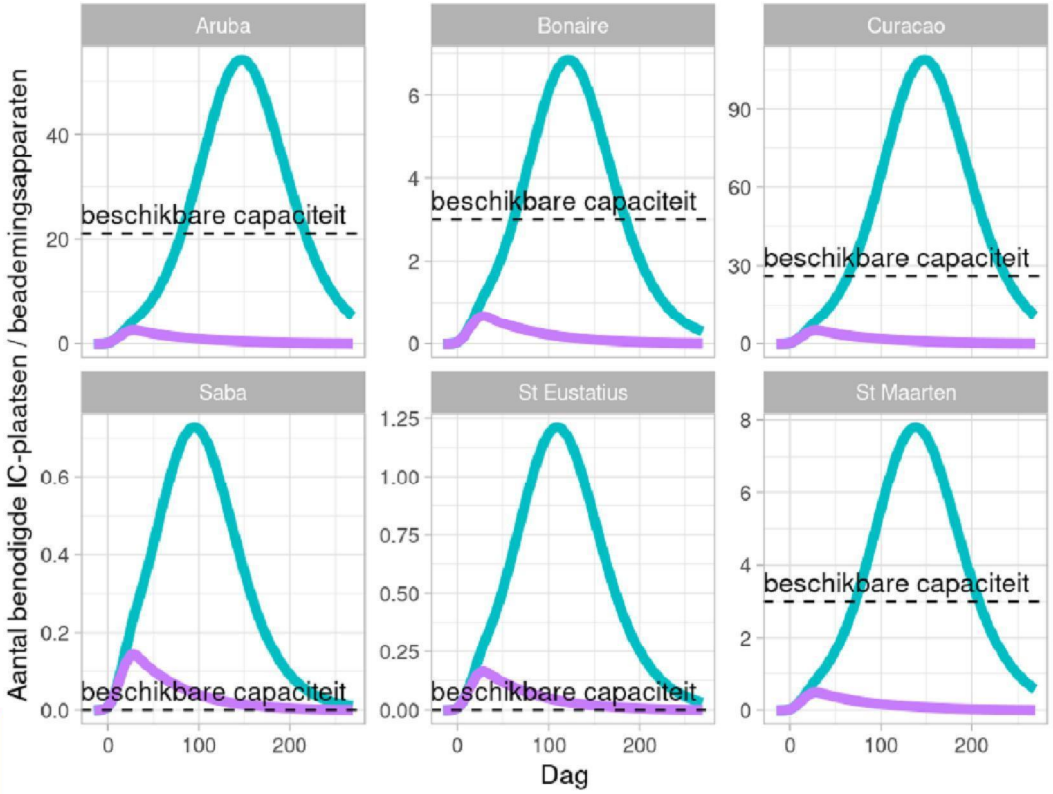
- Containing transmission by 50%:
  Enough capacity on Curaçao, Saba, St Maarten, St Eustatius,
  but not Aruba and Bonaire, where 60% reduction needed.

IC units needed in the 6 islands



No measure
40% red. transmission
50% red. transmission
60% red. transmission

IC capacity: 60% transmission reduction mini. required



No measure
40% red. transmission
50% red. transmission
60% red. transmission

Interpretation IC results

- Compared with hospital beds, IC capacity is more of a bottleneck
- Very low numbers Saba & St Eustatius with 60% containment, difficult to interpret
  - On average, 1 IC unit missing when 50% reduction of transmission, but could be 2 or 3 due to random effects
- Larger islands: peak demand on Curaçao would be ~100, but 26 IC units available, Bonaire ~7 needed, 3 available, Aruba almost 50 but 21 available.
- With 60% reduction you would stay under capacity limit

Take-home message

- Timely response with 60% reduction of transmission is needed to stay within capacity limits

Discussion I

- Deterministic model:
  What happens at day *t* determines what happens at day *t*+1
  Broadly applicable to well-mixing, large populations, but great uncertainty for low numbers –as used here for start control measures
- ➡ Caution with interpretation of low numbers for small islands

- Comorbidities might be higher in BES islands than currently implemented

- Risk of rebound of epidemic once the measures are lifted, as herd immunity is not achieved

Discussion II

- To what levels of reduction of transmission do measures correspond?

  Difficult to compare to Netherlands, given different culture, contact patterns, climate etc.
  In NL: the current combination of measures corresponds to 50-60% reduction in transmission.

Many thanks

- 5.1.2e, 5.1.2e, 5.1.2e: Modelling infectious Disease unit, EPI, RIVM
- 5.1.2e, Surveillance team, EPI, RIVM
- 5.1.2e, 5.1.2e, LCI, RIVM

Assumptions I

- Basic reproduction number –the average number of secondary cases per infectious individual:

  R_0=2.2

- Serial interval 5 days
- Average duration in hospital / IC unit = 23 days (data NL)
- Contact rates between and within age categories inferred from PIENTER 3 study in BES islands
- Island-specific age distribution
- Children: as infectious as adults; data still uncertain