

# Topic B Assignment 3

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Table 1: Data Meaning

Number of Occupied Beds | Number of whom succumbed to the virus | Control Action (0,1,2)

NorovirusDataA3 has data for independent outbreaks in 125 wards (variable sizes)

Analyse the data Advise the government on effectiveness of interventions, and which should be implemented (if any). Assume that the interventions reduce the transmission rate parameter  $\beta$ .  $R_0$  for norovirus in typical hospital settings is between 2 and 3 with 66% probability - can use this as a prior.

Require two reports: one with mostly explanation and interpretation, other with the actual analysis (including approach/algorithms, evidence of correctness)

The assumption on  $R_0$  implies a normal prior with mean 2.5. Want 66% of the data in (2,3).

Hints from the lecture:

- research the virus - real dynamics
- probably use SIR model (explain why)
- explain why we might not use the proper dynamics
- will want to estimate  $R_0$
- the two reports: government is effectively an exec summary and regular one is a maths report.
  - for the government - can use plots to make it pretty
- metropolis hastings to get param(s)
- think about how we can use the data to best estimate what we need to find
- We want to find how effective the intervention schemes are
  - i.e. the  $R_0$  for the different interventions
  - Would be valid to get  $\beta$  and  $\gamma$
  - since the intervention effects the spread,  $\gamma$  should remain unchanged.
- Could consider as 3 separate data sets
- Also could consider as 1 data set (cryptic clue from Josh was to look at this collectively as one whole set)
- try writing down the likelihood and look at what it tells us
- Wants us to use for simulated data of similar form to the ‘real’ data:
  - Trace plots from multiple independent chains
  - Kernel density estimators
  - box plots
  - etc.
- TAKE A LOOK AT HIS PAPERS