

Eight-Week COVID19 Projections for New York City

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Note: Projections from 4/3/20 onwards included age-specific data and as such the model was likely better constrained and would better reflect the transmission dynamics, compared to our previous model projections. For more details on Methods, see README.pdf

Results – see tables (Projected Epidemic Outcomes and Healthcare Demands etc.) in WeeklyProjections.xlsx; see figures below.

Some observations based on confirmed COVID19 case data up to 4/10/20:

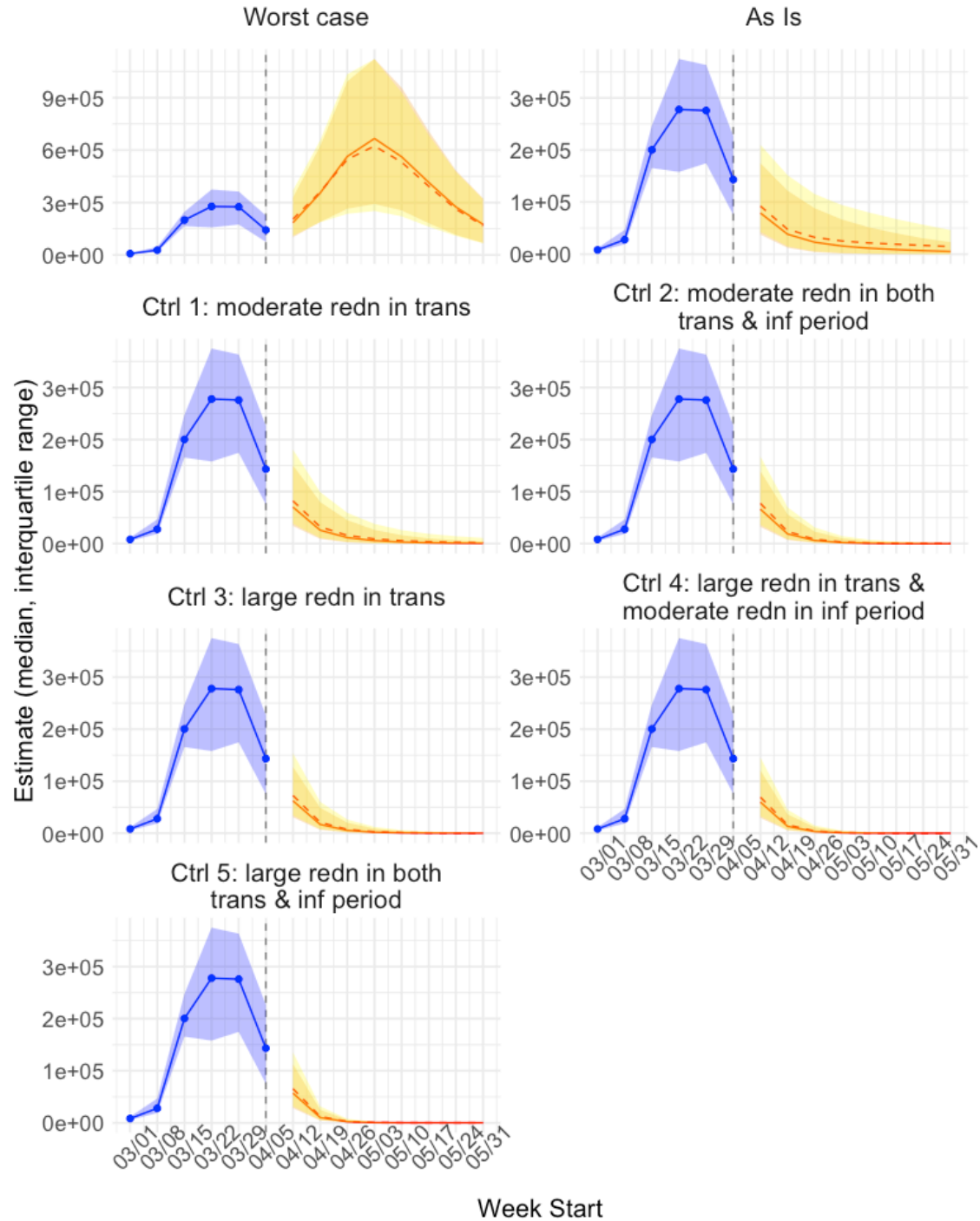
- 1) The speed of spread this week seemed to cross a critical threshold: the real-time reproductive number (R_t) is now slightly below 1 as estimated based on the latest data (median = 0.65; IQR: 0.35 - 1.12). R_t is the average number of people each infected person passes on the disease to currently. $R_t < 1$ means the number of infections would decrease in the following weeks, *should current level of interventions continue*.
- 2) However, note that with the still large number of infections in the population (see estimates in the figure below), it would take some time (~several weeks) for the number to reduce to a low level. And before that, it is crucial to at least maintain current level of social distancing and other control measures. Otherwise, the number of infections would likely rebound quickly, as the majority of the population remain susceptible to the virus (see "Worst Case" scenario below for which interventions were relaxed).
- 3) Maintaining status quo, new number of hospitalizations and ICU admissions would likely start to decrease; however, demands of hospital bed, ICU beds, ventilators may continue to increase slight next week, due to a delay from infection to treatment.
- 4) Comparison with observations in the past couple weeks showed our model tended to underestimate number of deaths due to COVID19. Therefore, our projected mortality is likely underestimation as well.

Acknowledgement: We thank the NYC Department of Health and Mental Hygiene (DOHMH) for sharing of data and allowing this public posting. And we thank Columbia Mailman School of Public Health for high performance computing.

Caution: Please note that there are large uncertainties in our model projections due to unknown disease transmission dynamics (model misspecification), changing behavior and policies, delay in reporting, and under-reporting. In particular, the data our projections are

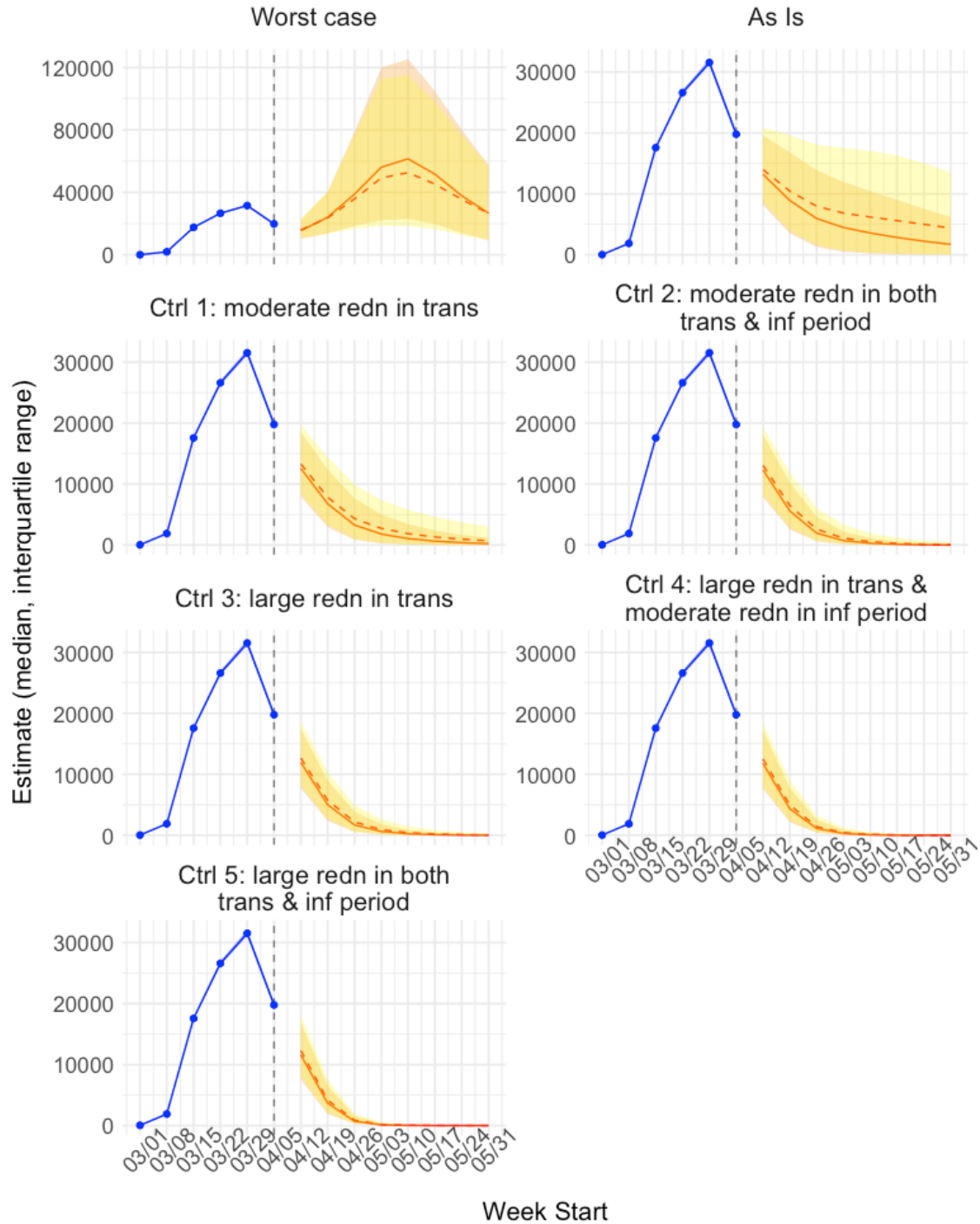
based on reflect situations ~2 weeks ago due to time lags from interventions implemented to transmission events (a couple days to weeks), from infection to symptom onset (~2-6 days), from symptom onset to seeking treatment (~2-7 days), from seeking treatment to getting tested and then reported in the surveillance system (~2-7 days). In addition, how the epidemic would unfold also depend largely on behavior changes over time.

New Infections



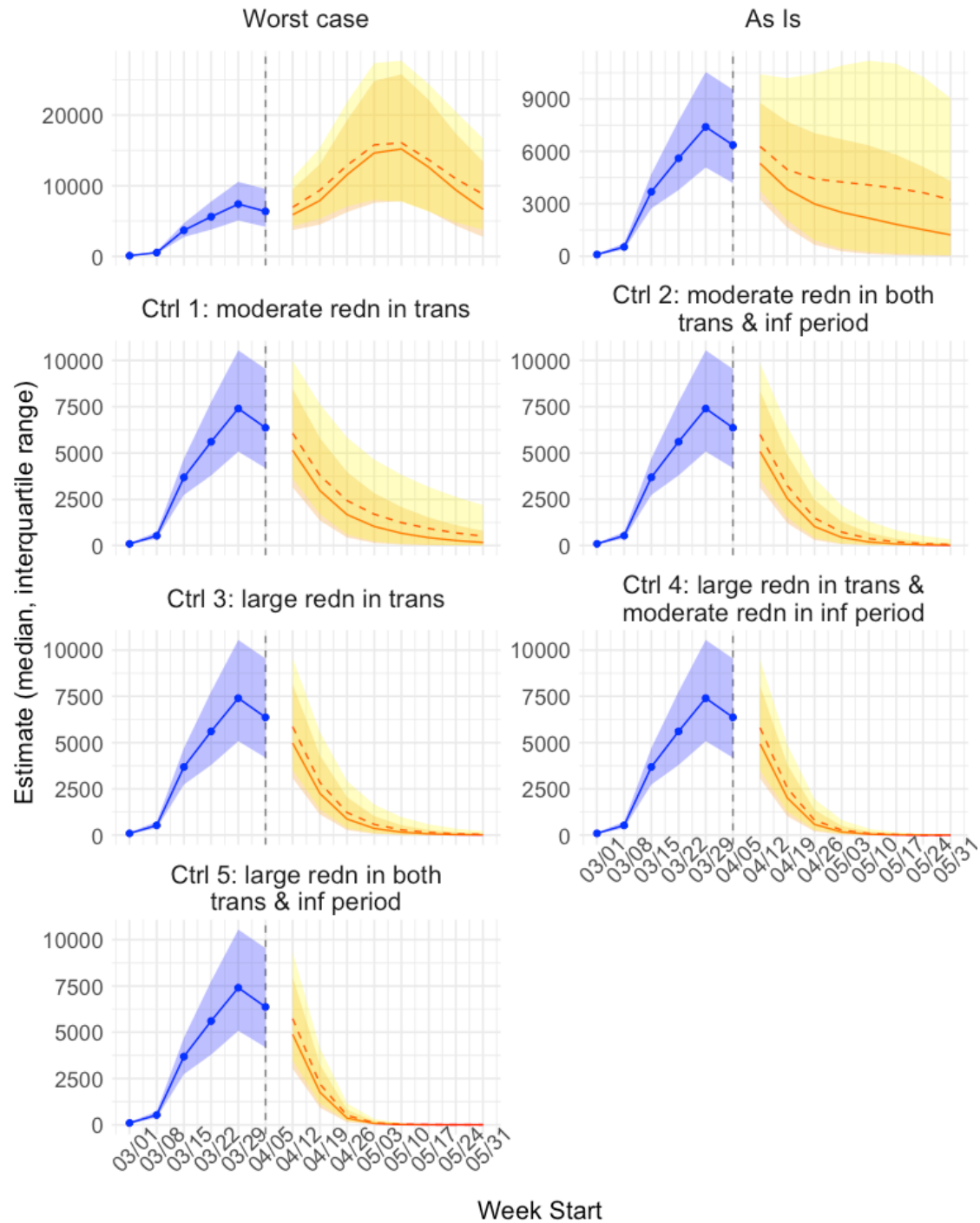
Projected number for the next 8 weeks under different control scenarios. Blue lines and points show median estimates for the model training period; red lines show projected median numbers with seasonality (solid lines) or without seasonality (dashed lines); shaded regions shown the interquartile ranges (IQR) for model estimates with seasonality (in orange) or without seasonality (in yellow). Dates are the first day (i.e. Sunday) of the week.

New Cases



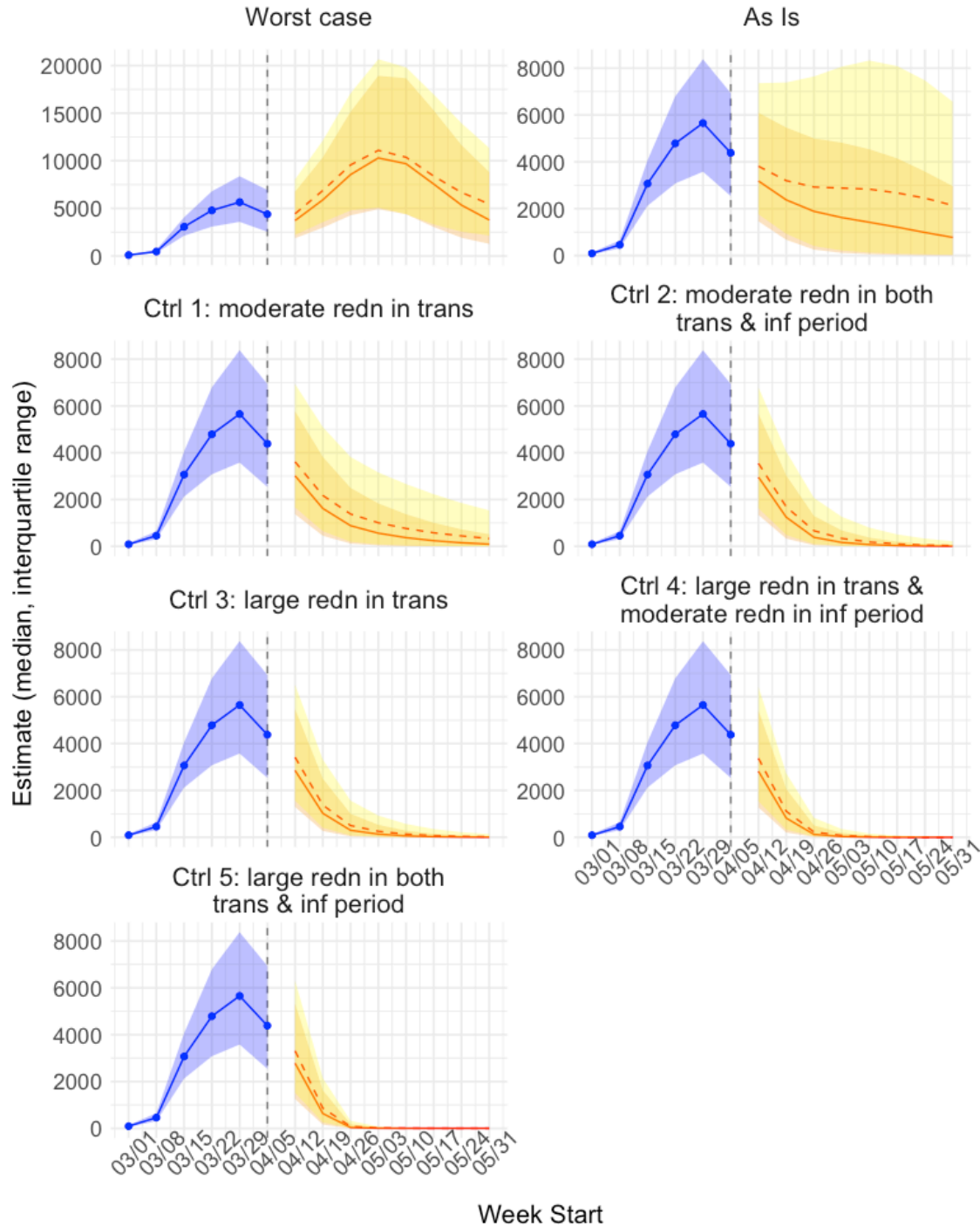
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New Total Hospitalizations



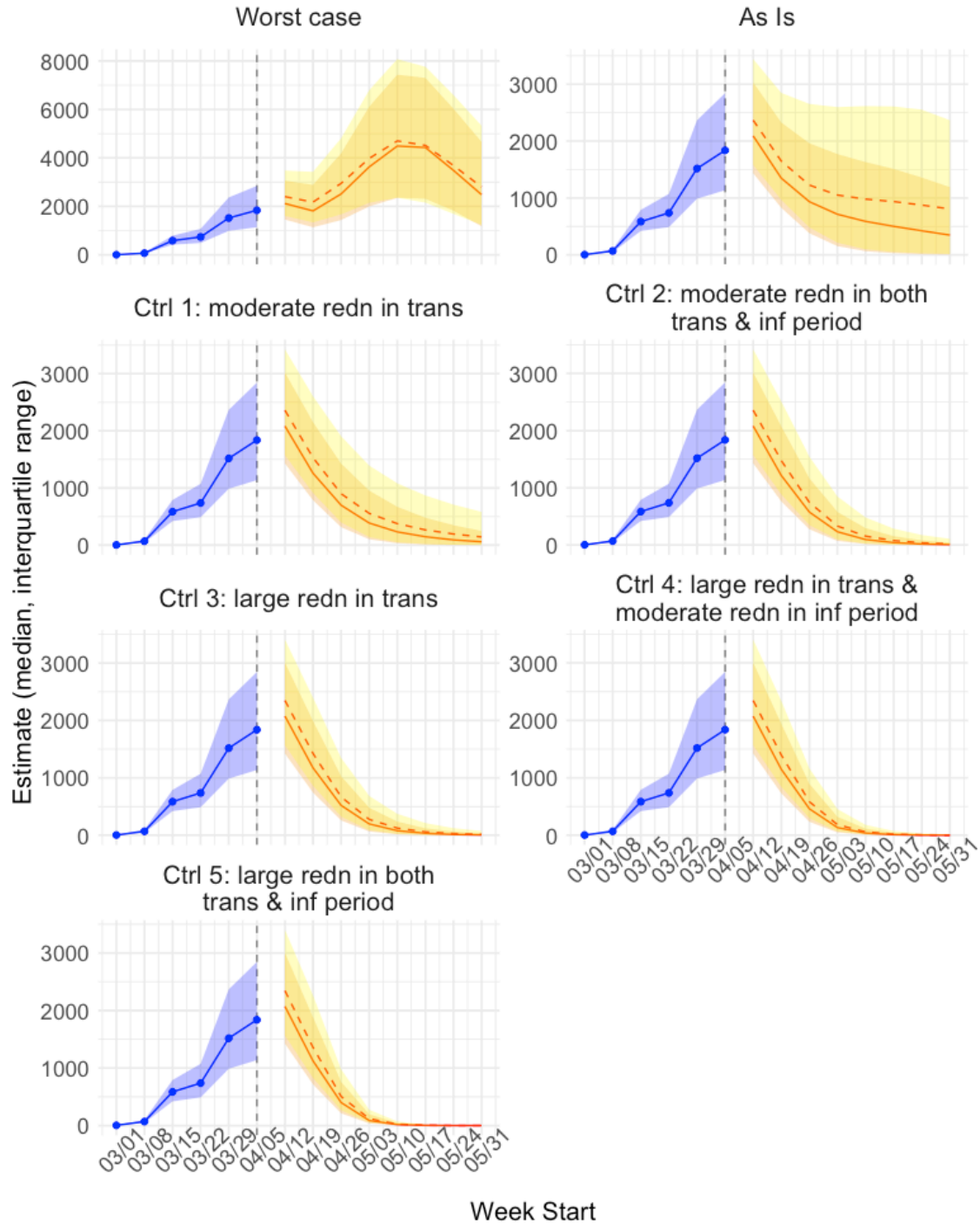
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New Non-ICU Hospitalizations



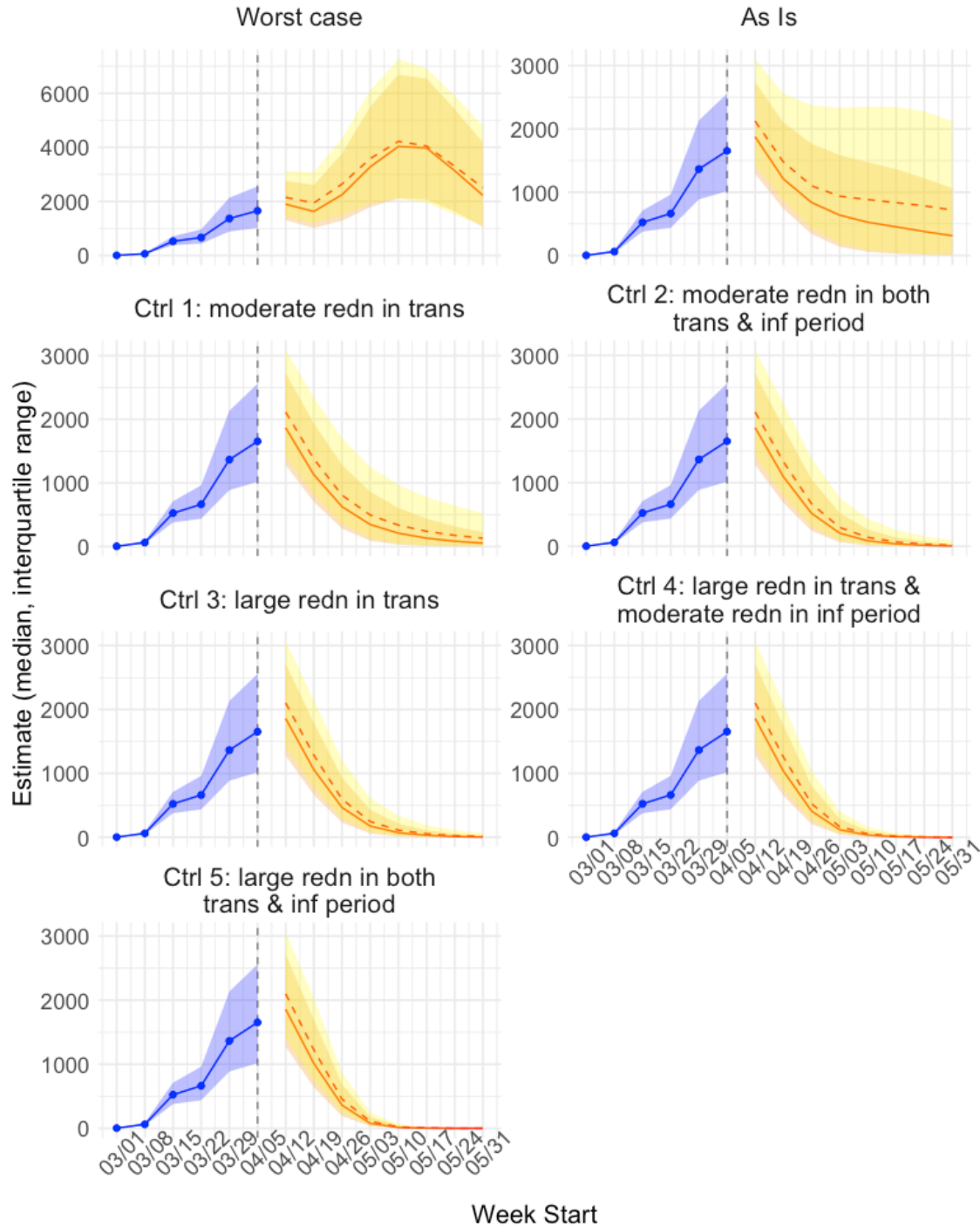
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New ICU admissions

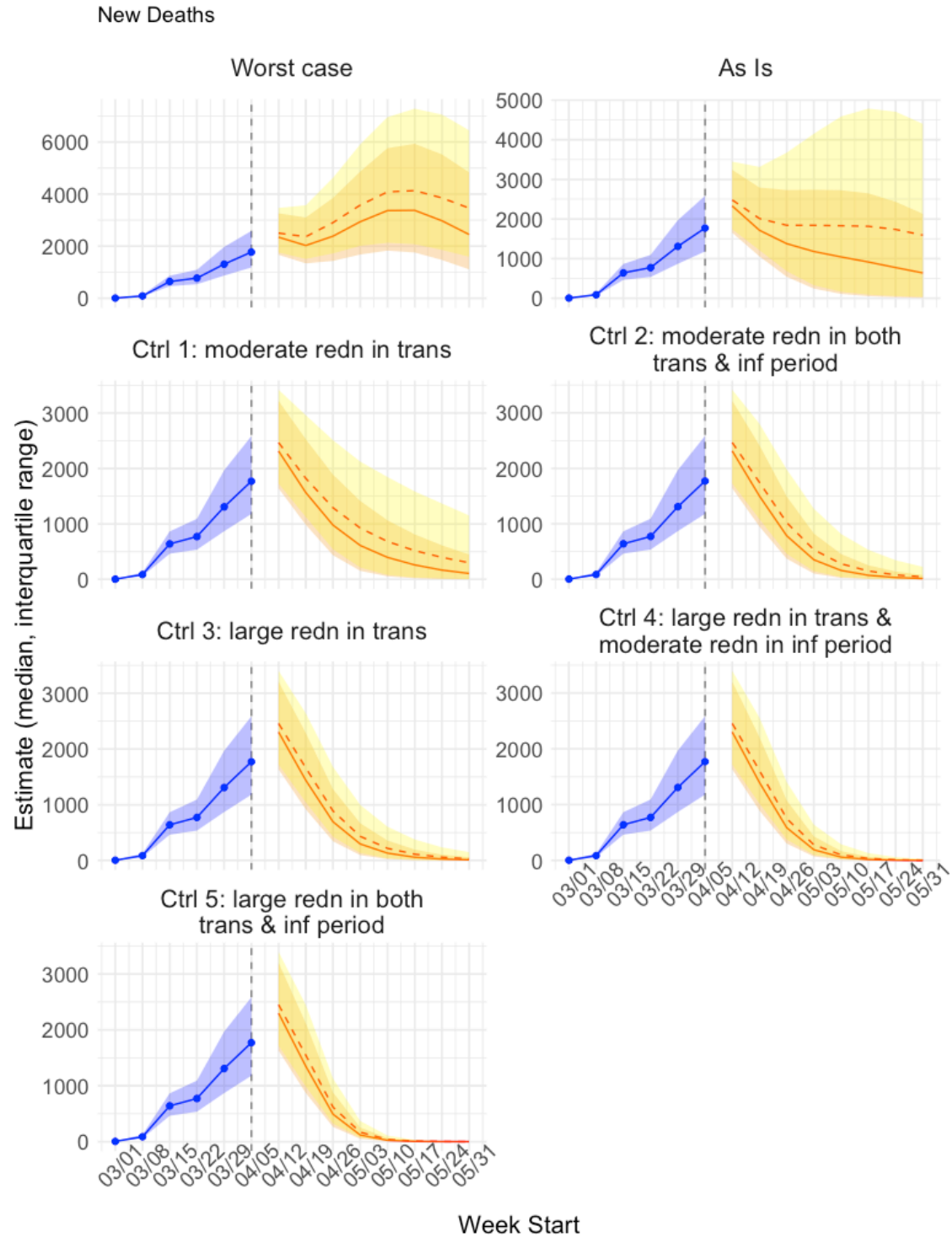


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New Intubations

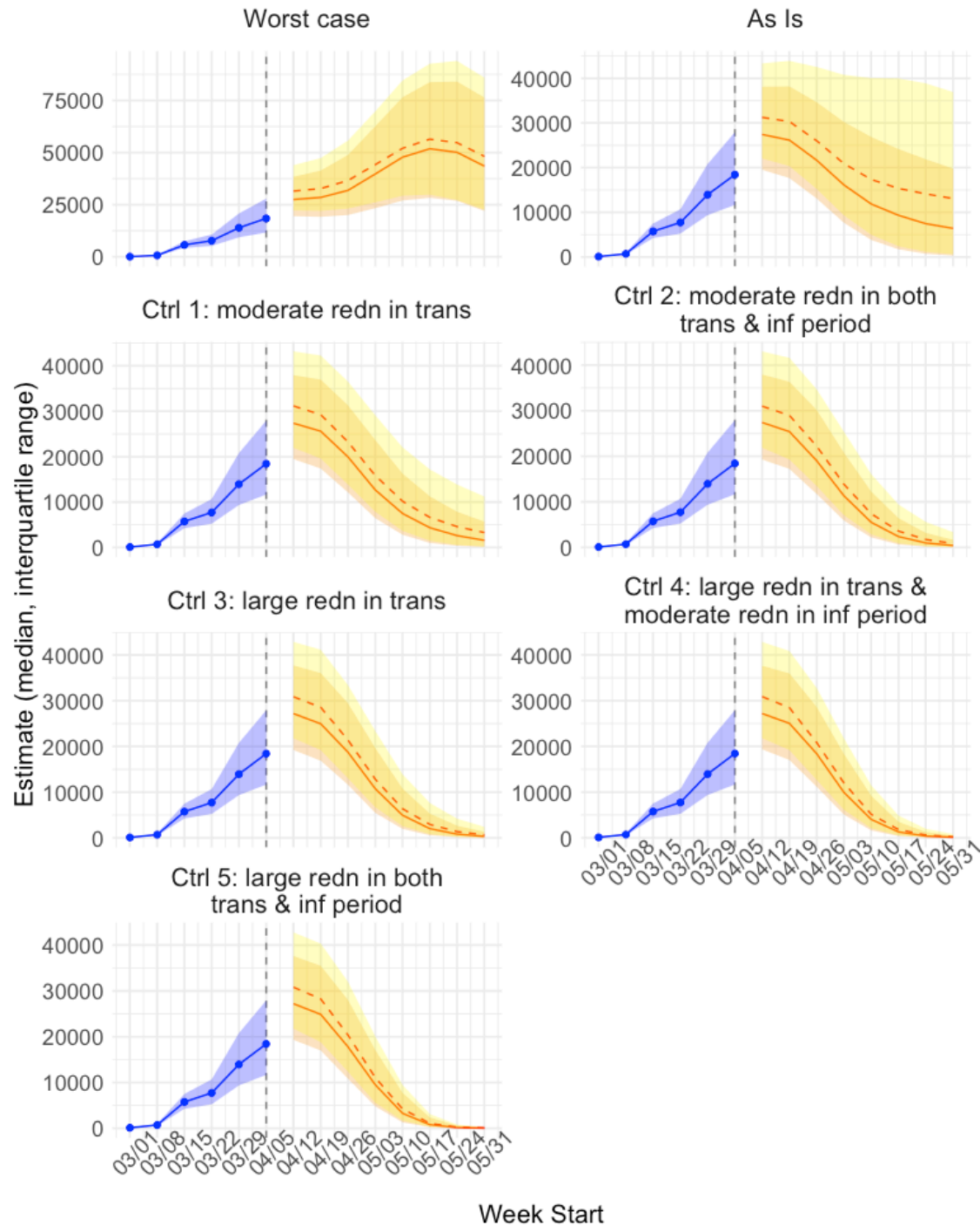


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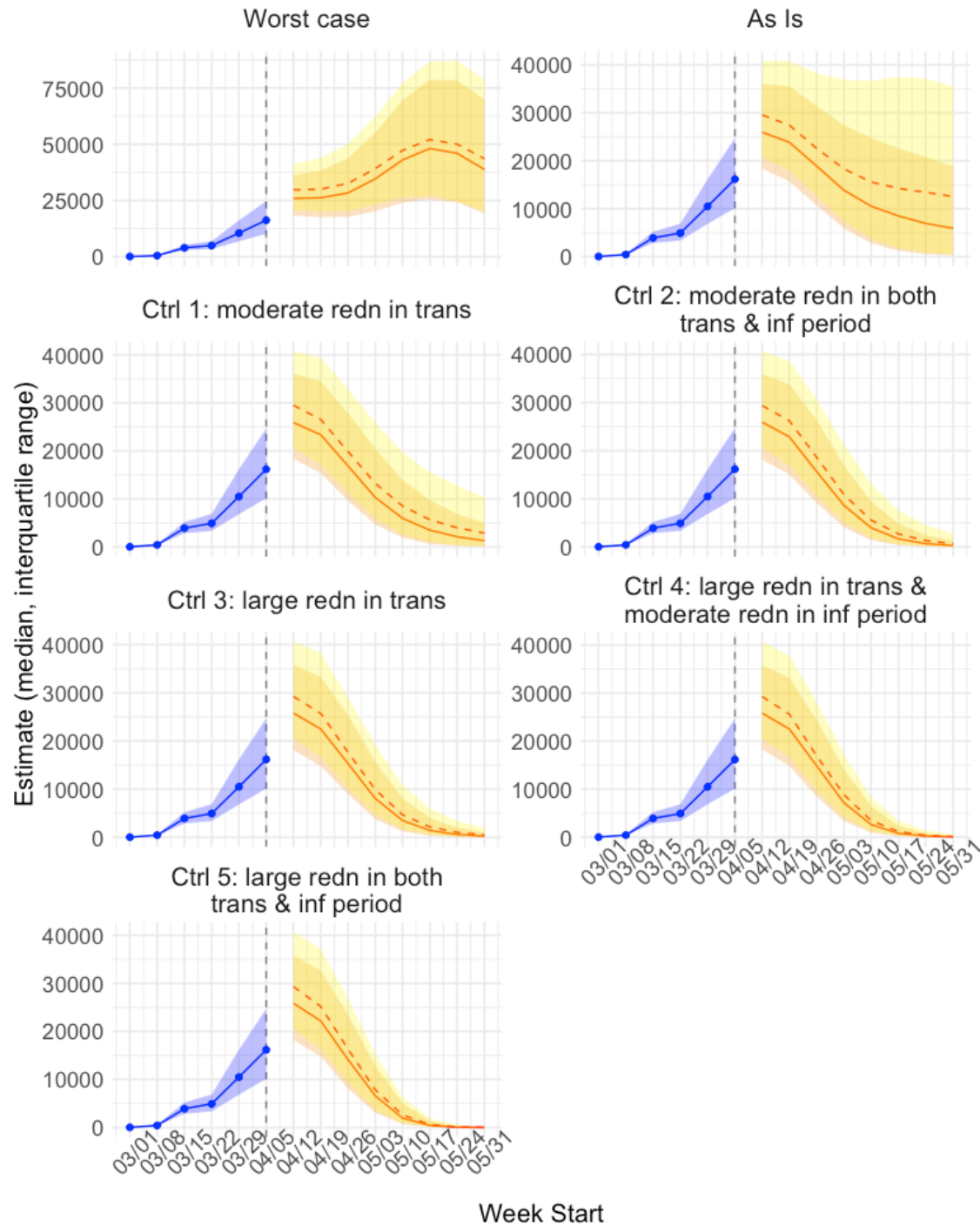
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Total Hospital Bed Needs (prevalence, max)



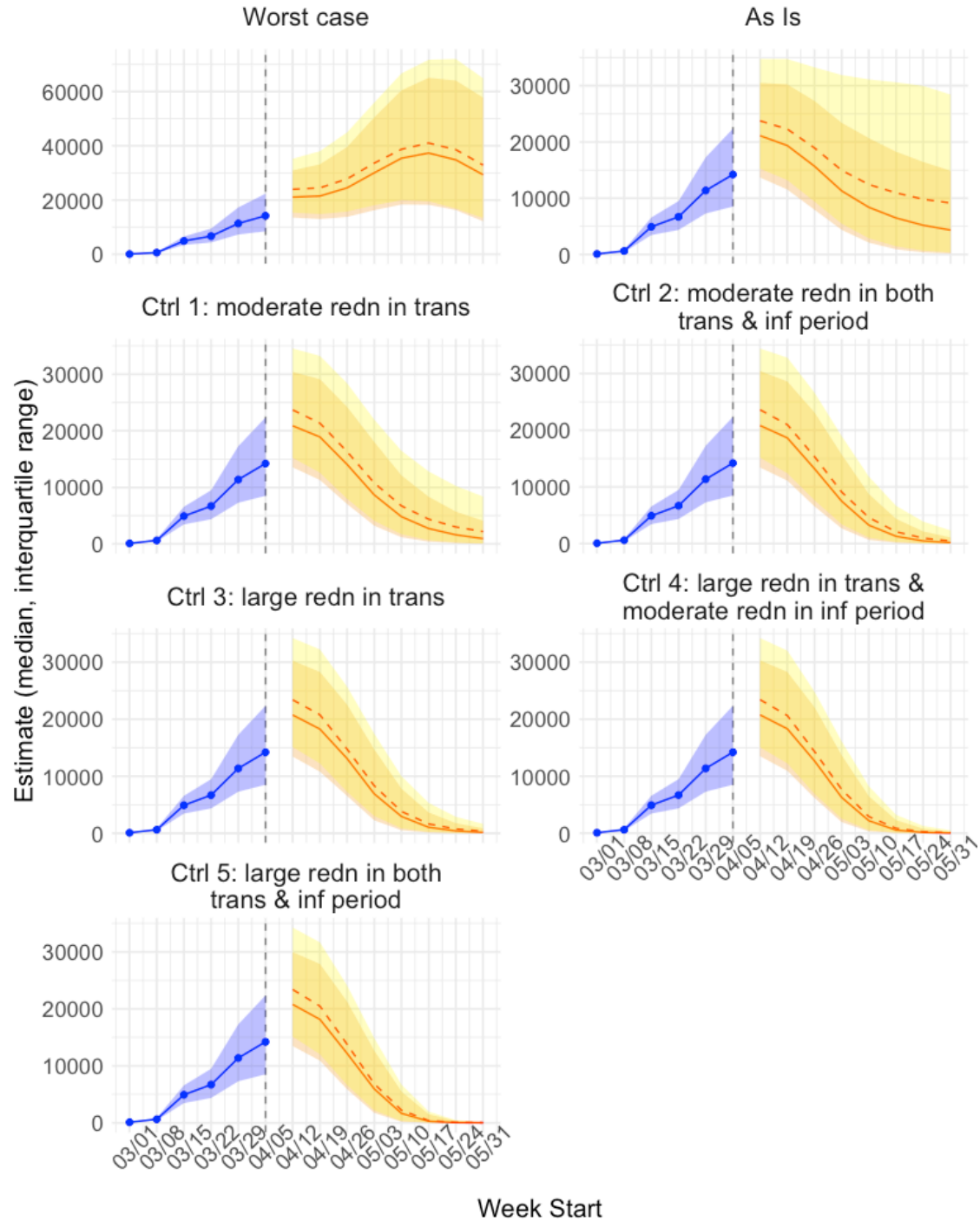
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Total Hospital Bed Needs (prevalence, mean)



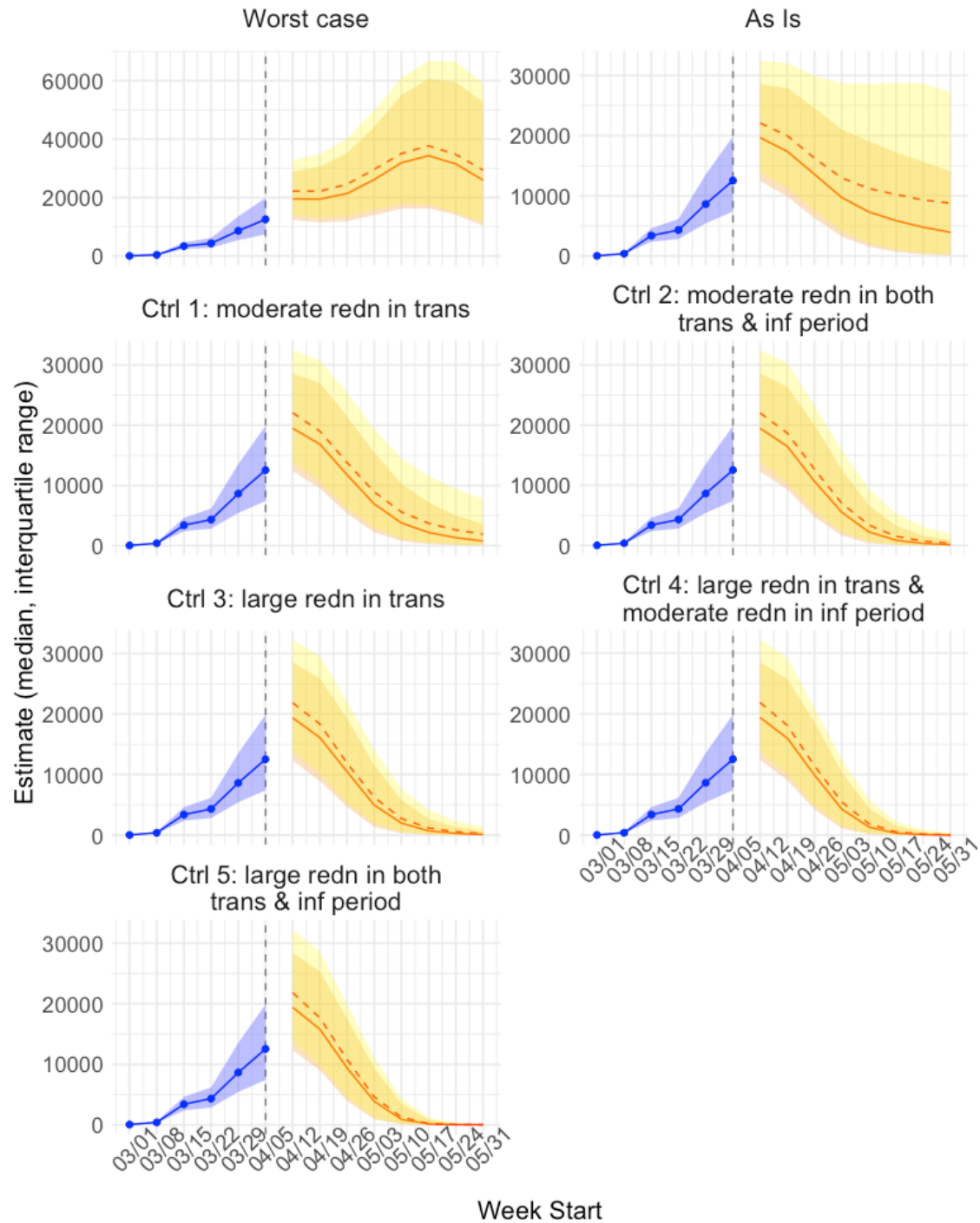
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Non-ICU Hospital Bed Needs (prevalence, max)



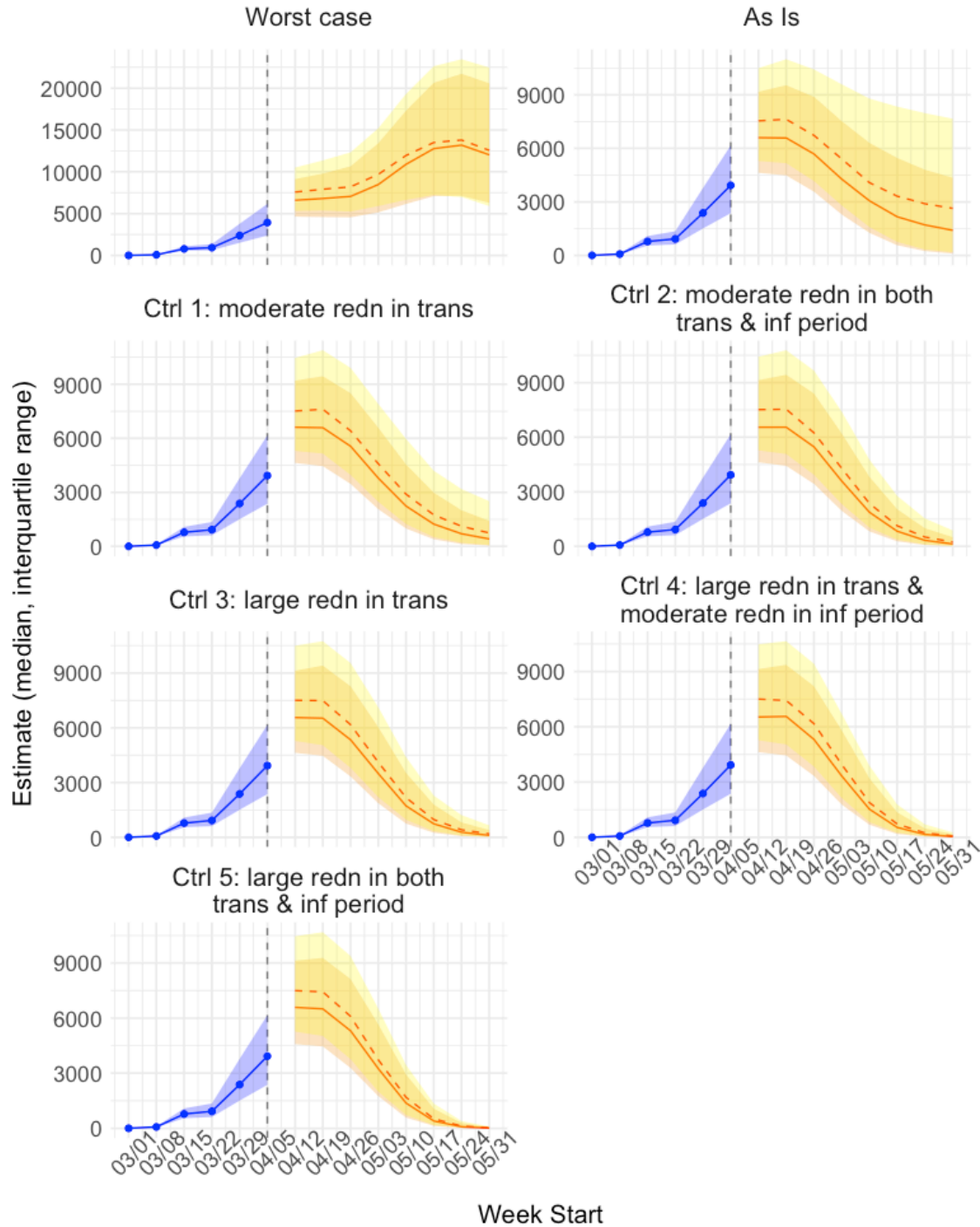
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Non-ICU Hospital Bed Needs (prevalence, mean)



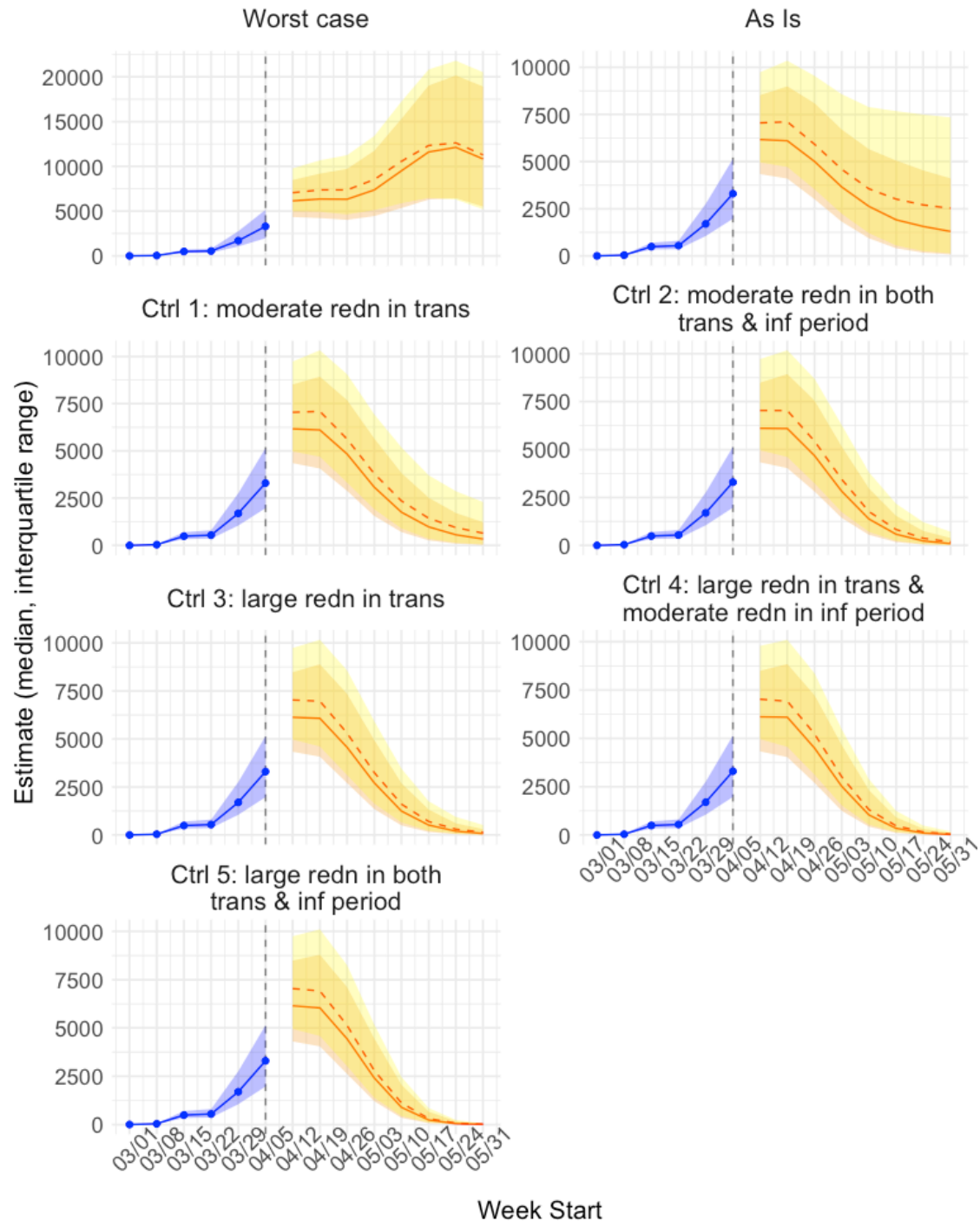
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ICU Bed Needs (prevalence, max)



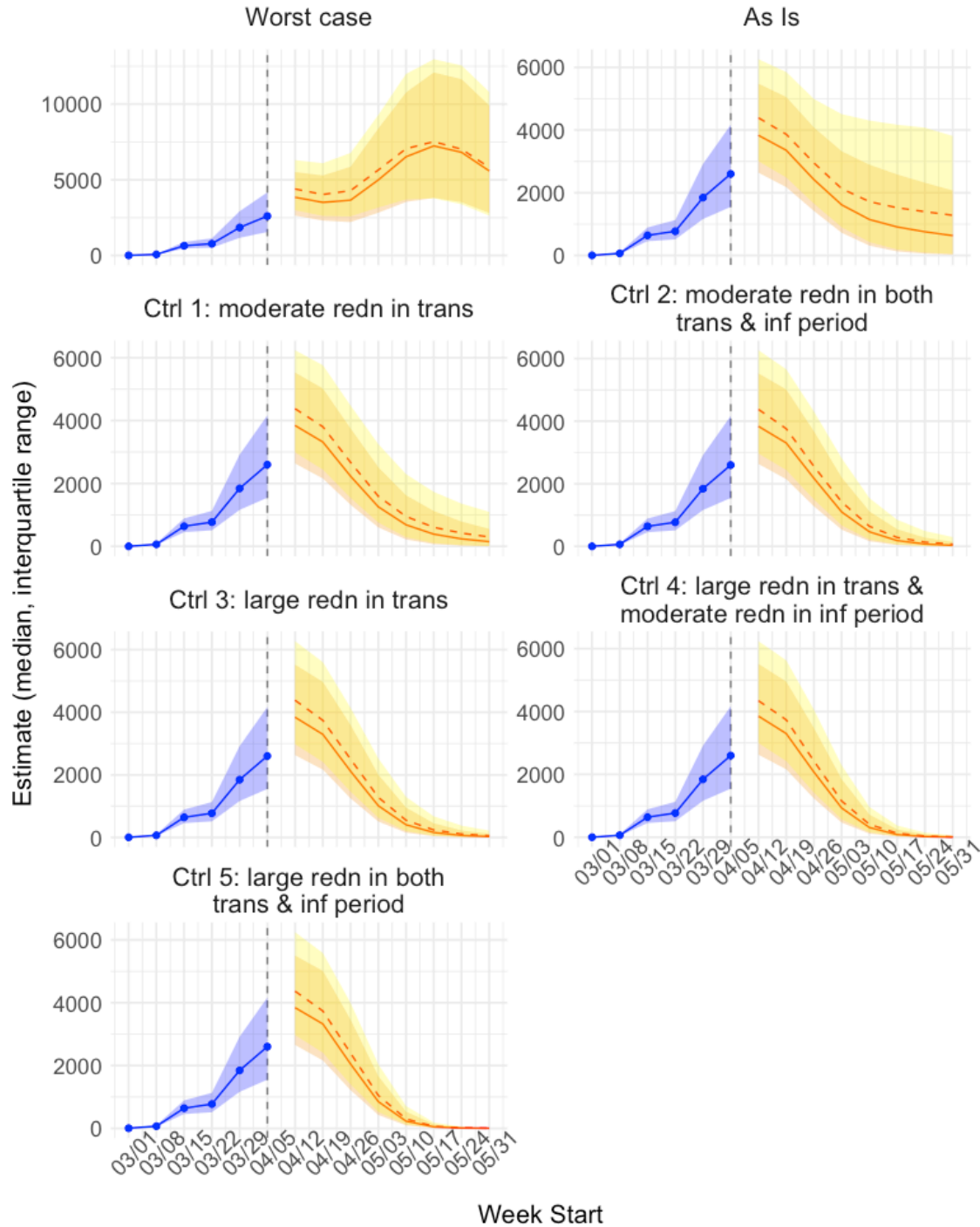
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ICU Bed Needs (prevalence, mean)



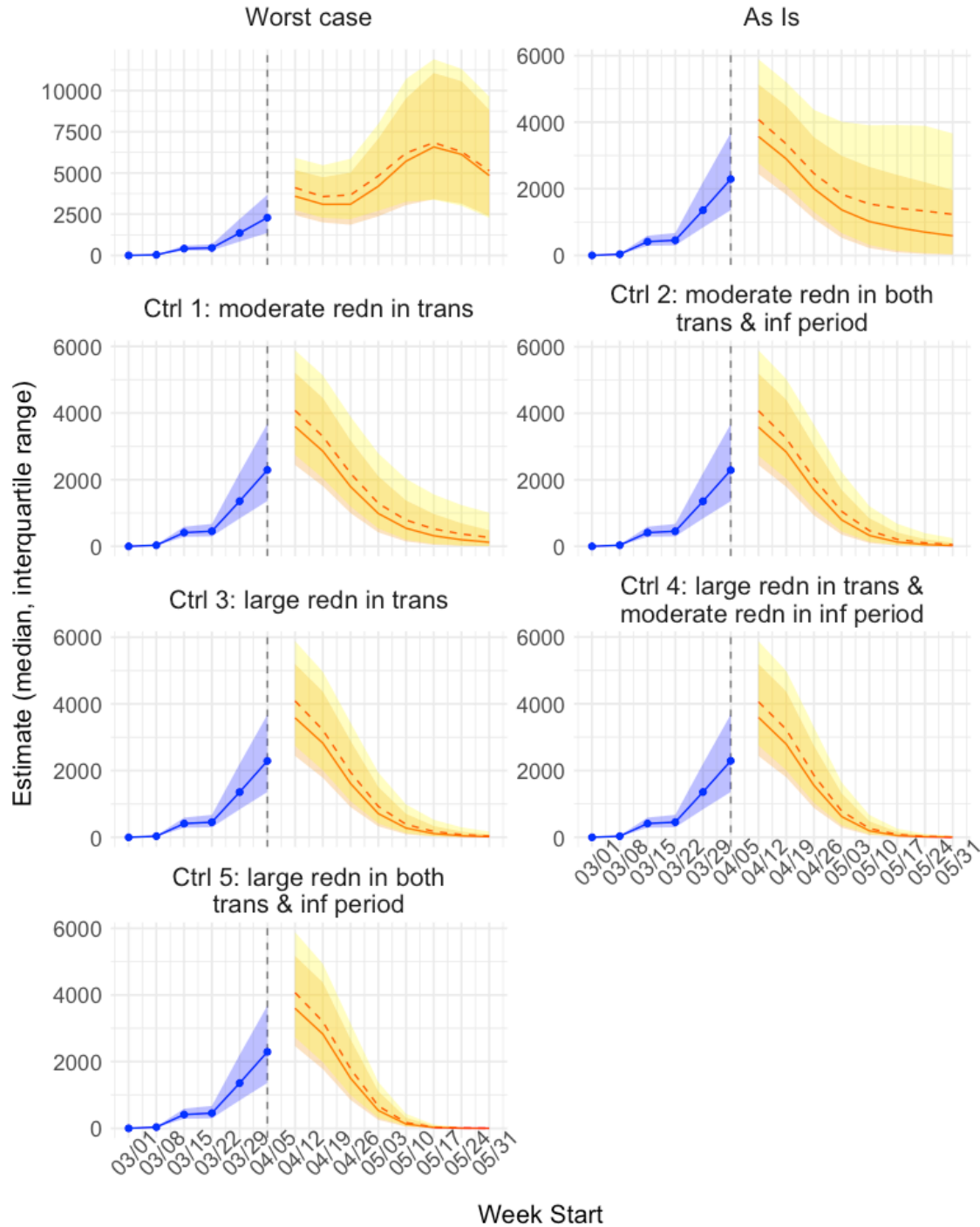
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Ventilator Needs (prevalence, max)



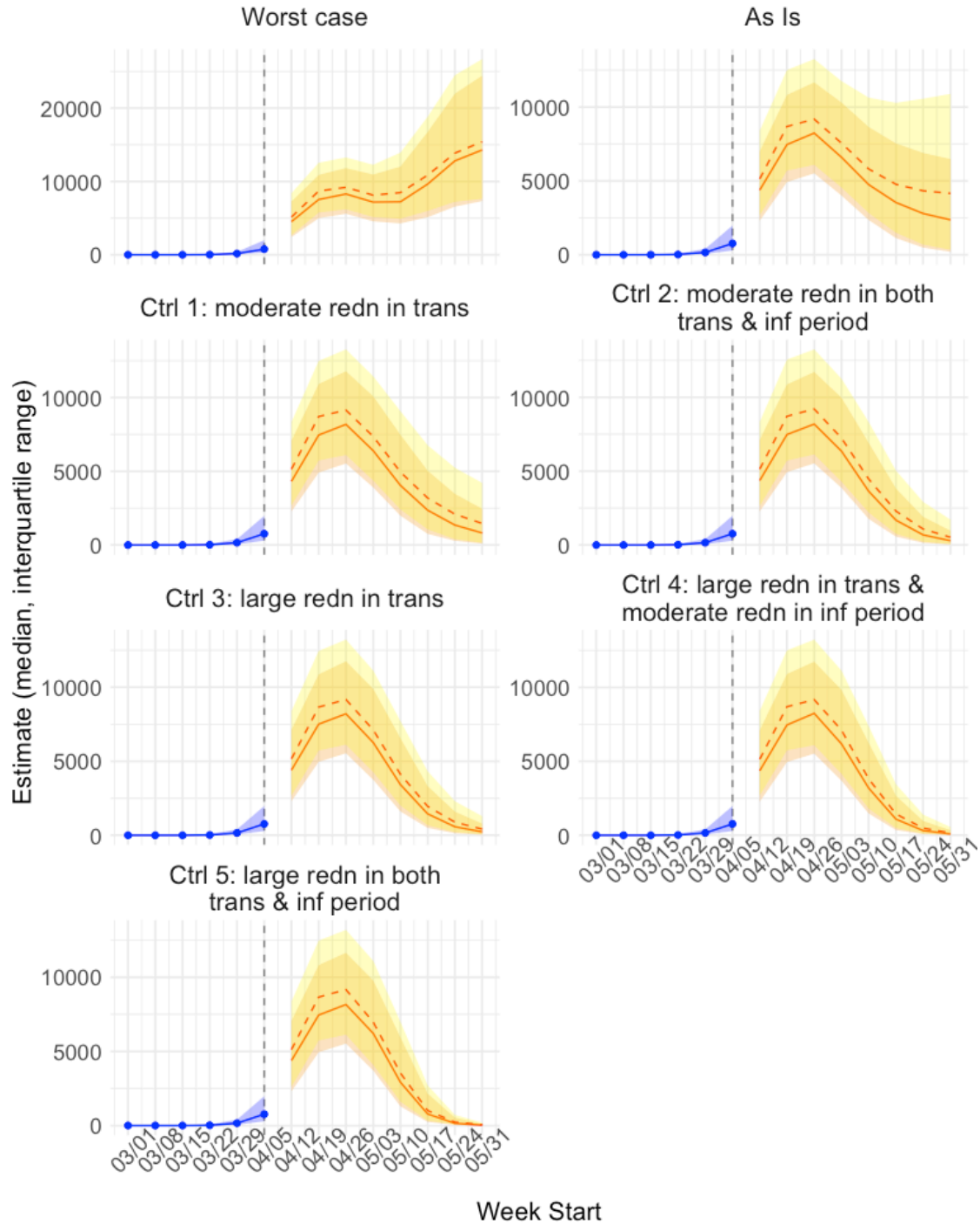
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Ventilator Needs (prevalence, mean)



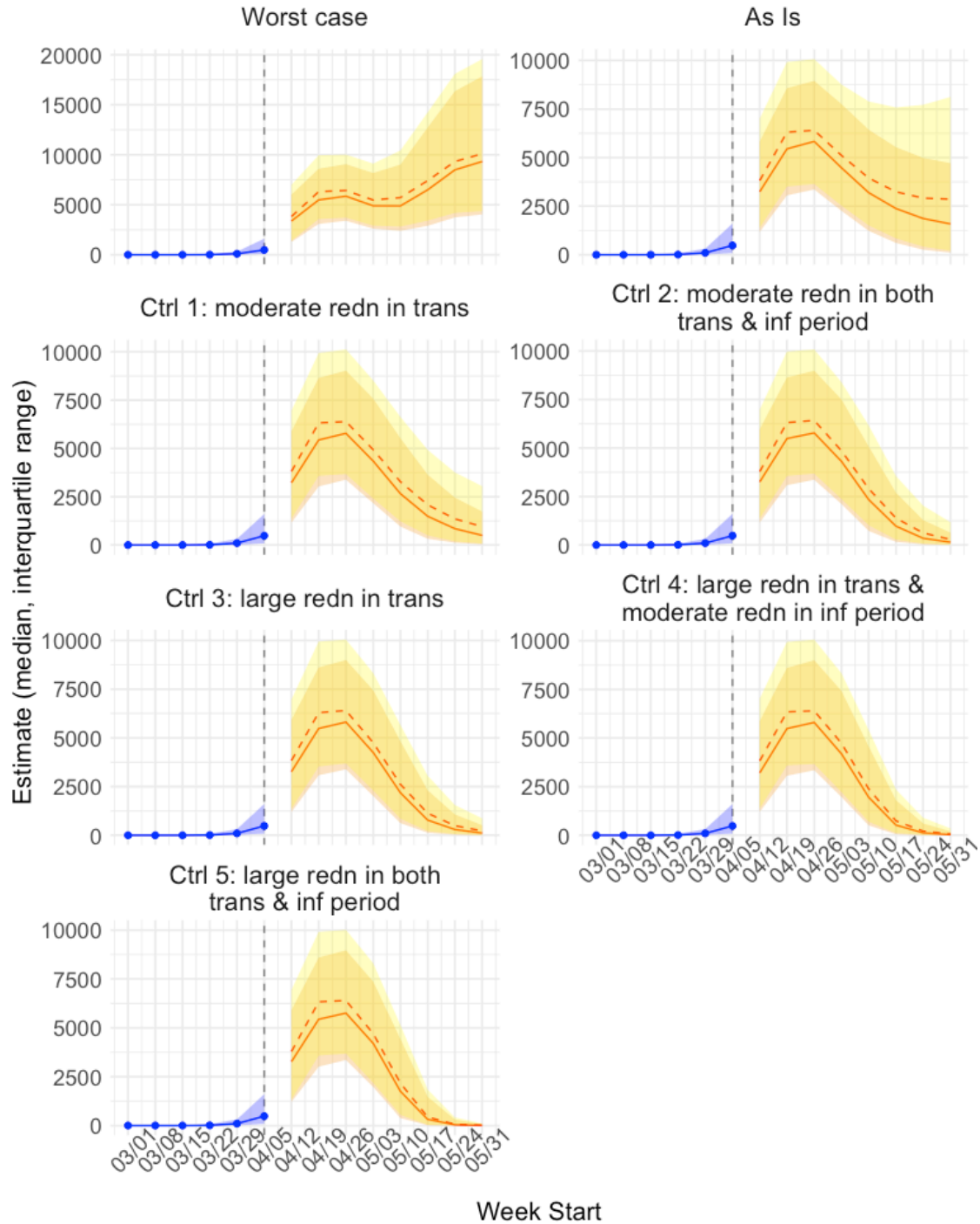
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Total Hospitalization Discharge



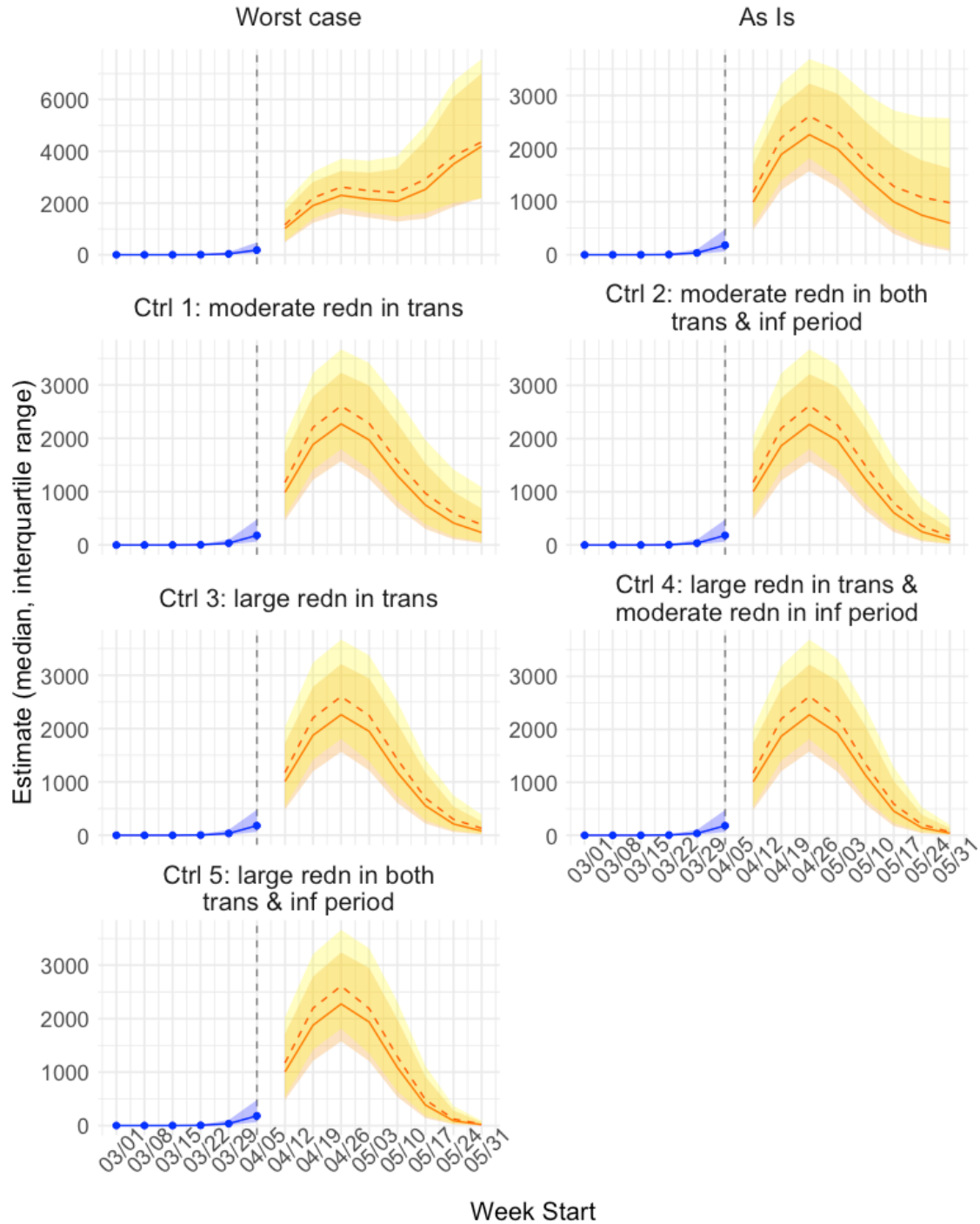
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Non-ICU Hospitalization Discharge



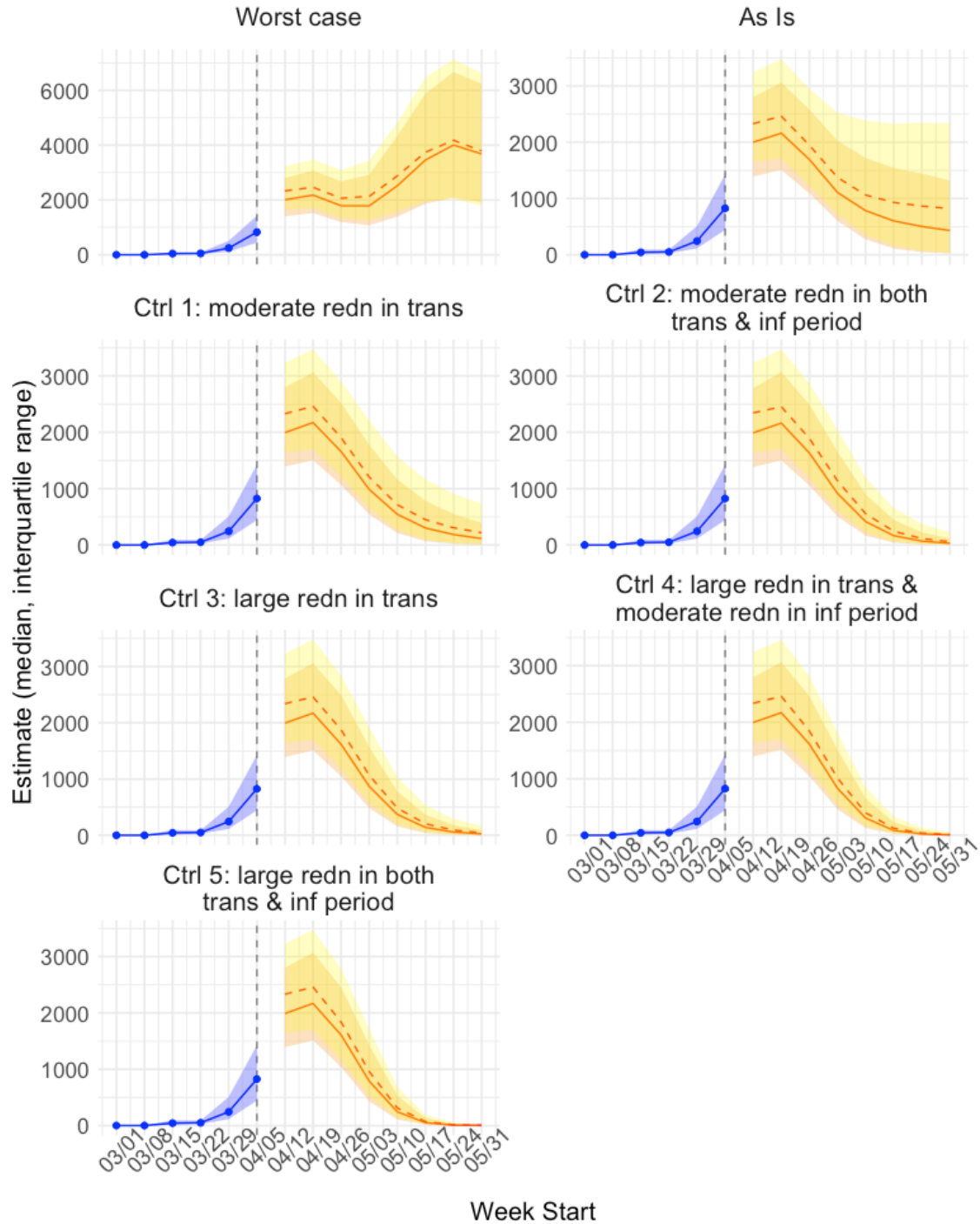
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New ICU Discharge



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New Extubation



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