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 and DailyProjections.xlsx; see figures below.

Some observations based on confirmed COVID19 case data up to 5/1/20:

1) This week, numbers of infections and related health outcomes (e.g. hospitalizations) continued to decrease and are projected to trend further down in the following weeks, should current level of control measures (social distancing, etc.) be maintained.

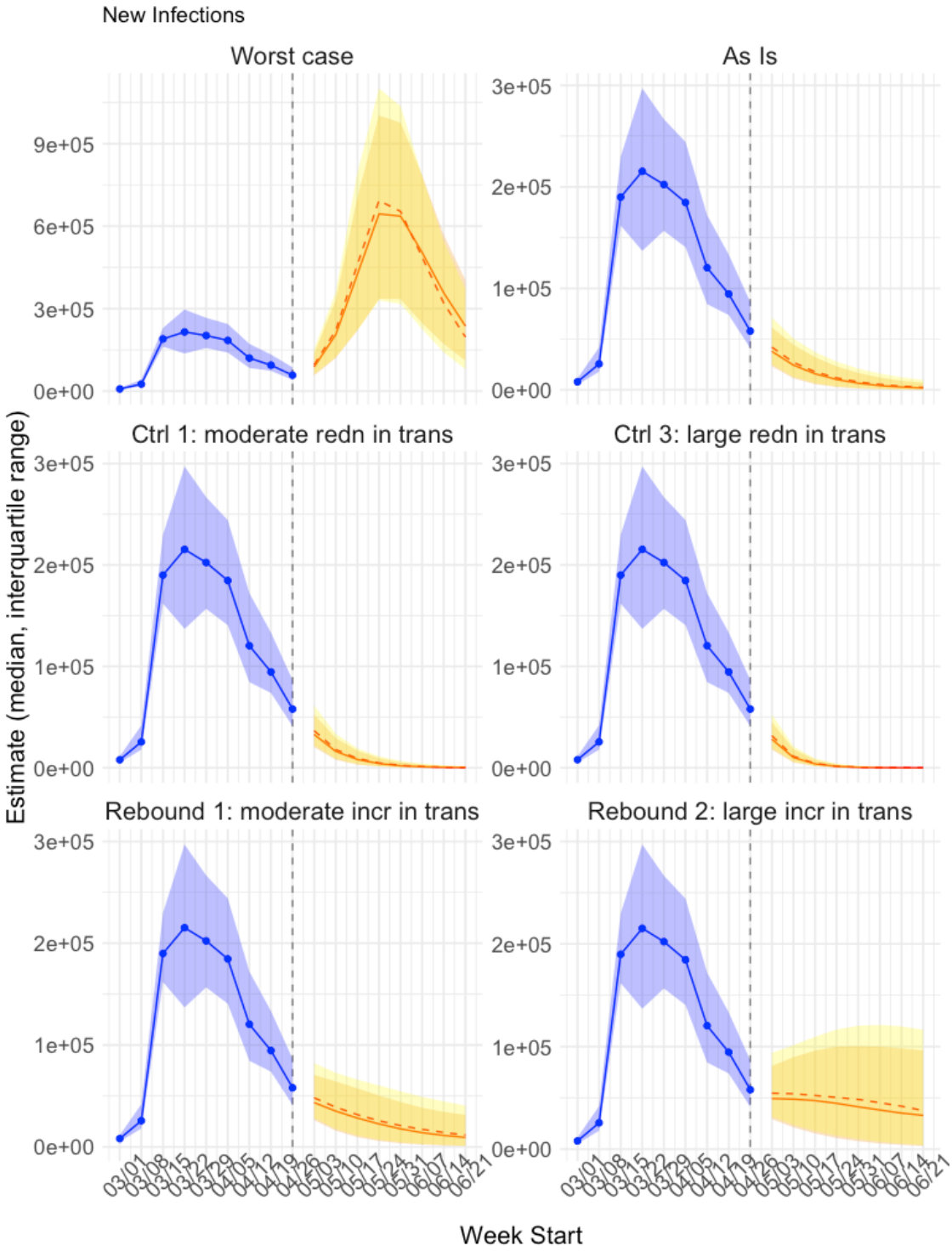
2) Estimated Rt, the real-time reproductive number, for the week of 4/26/20 was 0.67 (IQR: 0.49 – 0.80), which accounted for the depletion of susceptibles (i.e., seroprevalence—assuming people are immune after recovery). Estimated Rt for the week was 0.83 (IQR: 0.62 – 0.97) if seroprevalence is ignored. Note both estimates indicate strong reductions in transmissibility over the last few weeks.

3) Model evaluation: Our model was trained using weekly incidence data (i.e. confirmed case counts) and further calibrated to weekly number of reported hospitalizations citywide and weekly number of reported covid-19 related deaths citywide. Compared to citywide incidence, hospitalization, and mortality data, the relative error of our model estimates was -3.2% for incidence, -5.9% for hospitalization, and -7.4% for mortality.

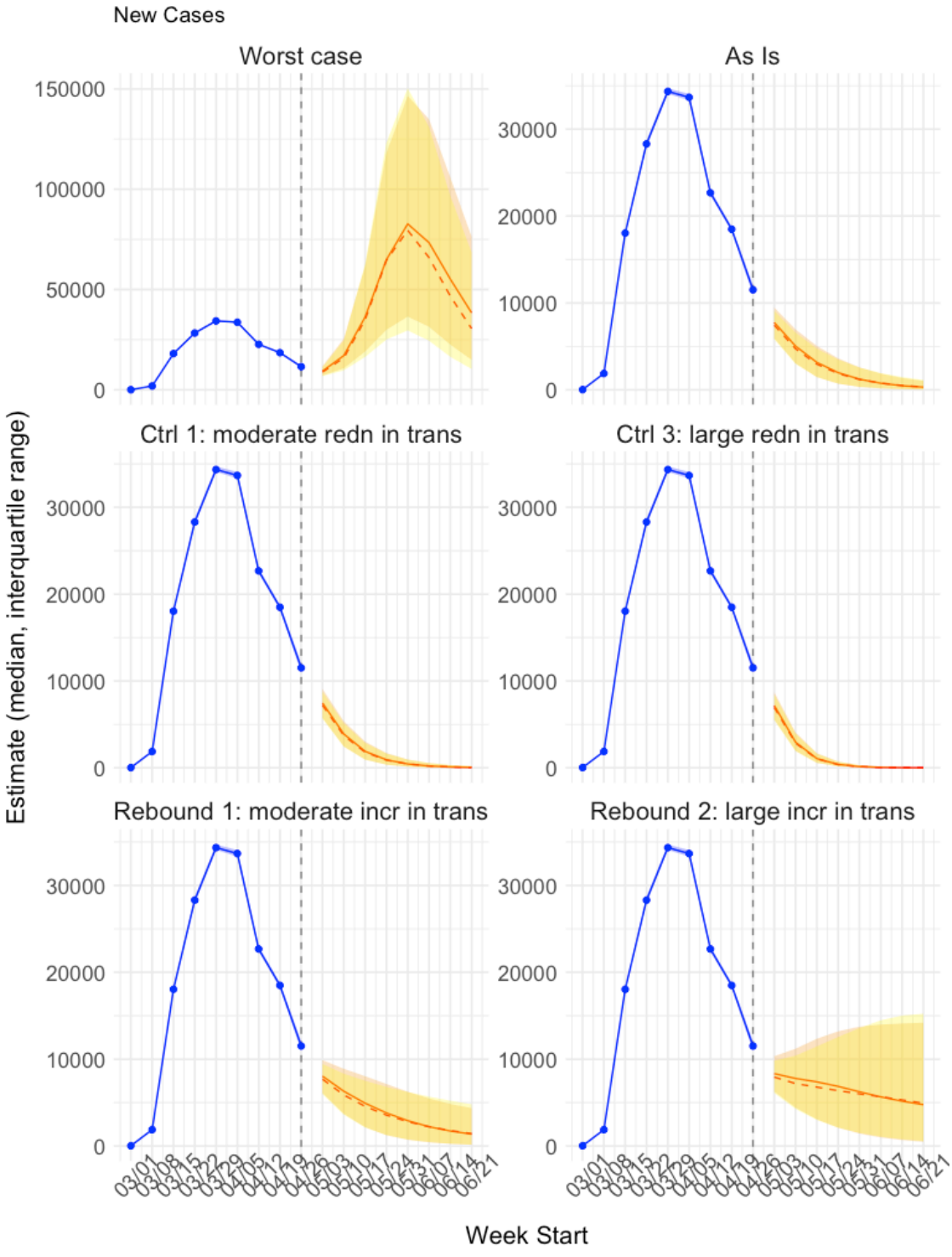
4) Recent data from Cuebiq and SafeGraph have showed increases in mobility in some boroughs/neighborhoods. To account for potential rebounds in transmission due to relax in social distancing, we have now added two new scenarios in our projections: i) "Rebound 1: moderate incr in trans" assumes a 25% increase in transmission rate, relative to that estimated for the most recent week; and ii) "Rebound 2: large incr in trans" assumes a 50% increase in transmission rate, relative to that estimated for the most recent week. Under both rebound scenarios, transmission rate would remain at a relatively high level and may sustain transmission (see projections under scenario Rebound 2 below).

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.



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.



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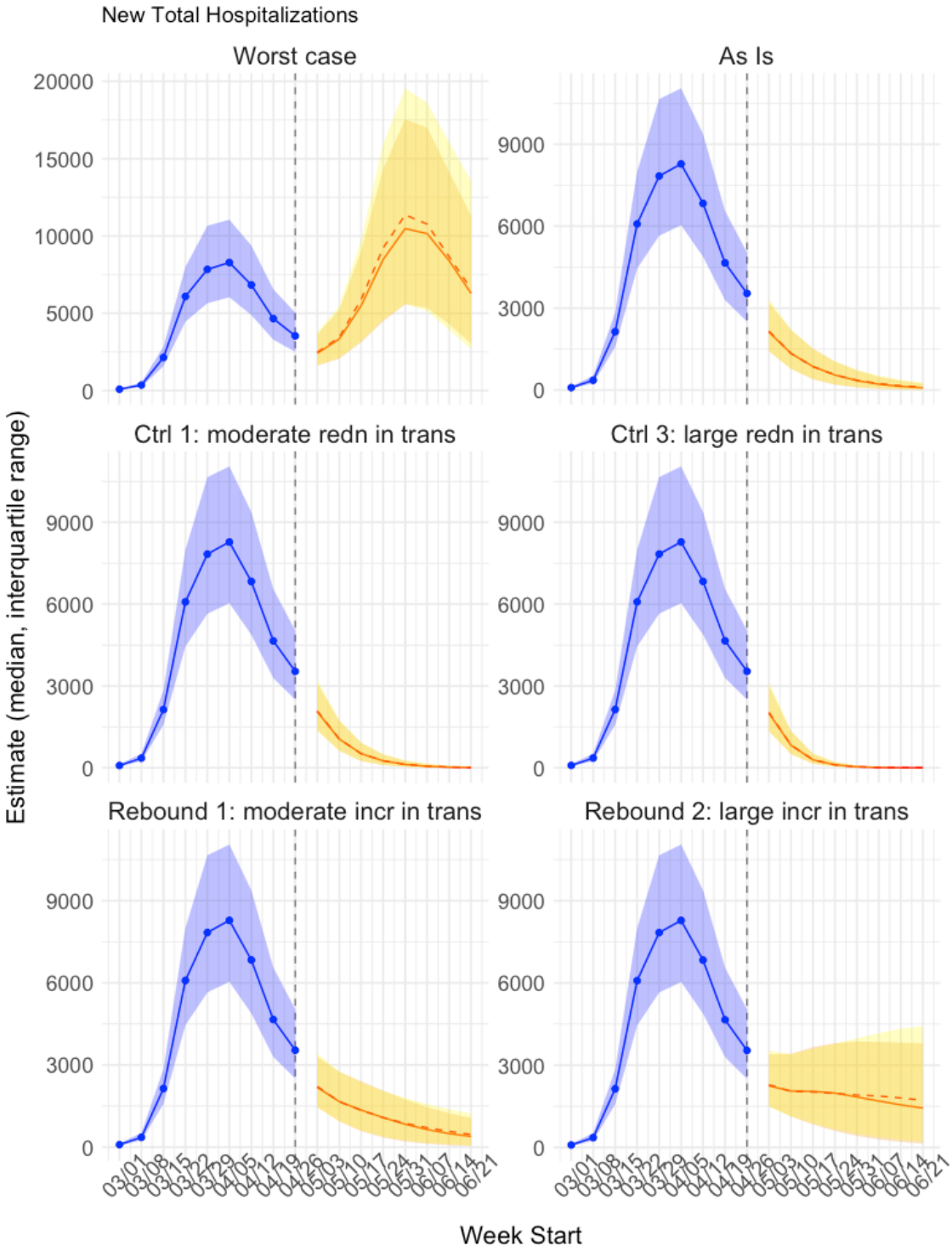

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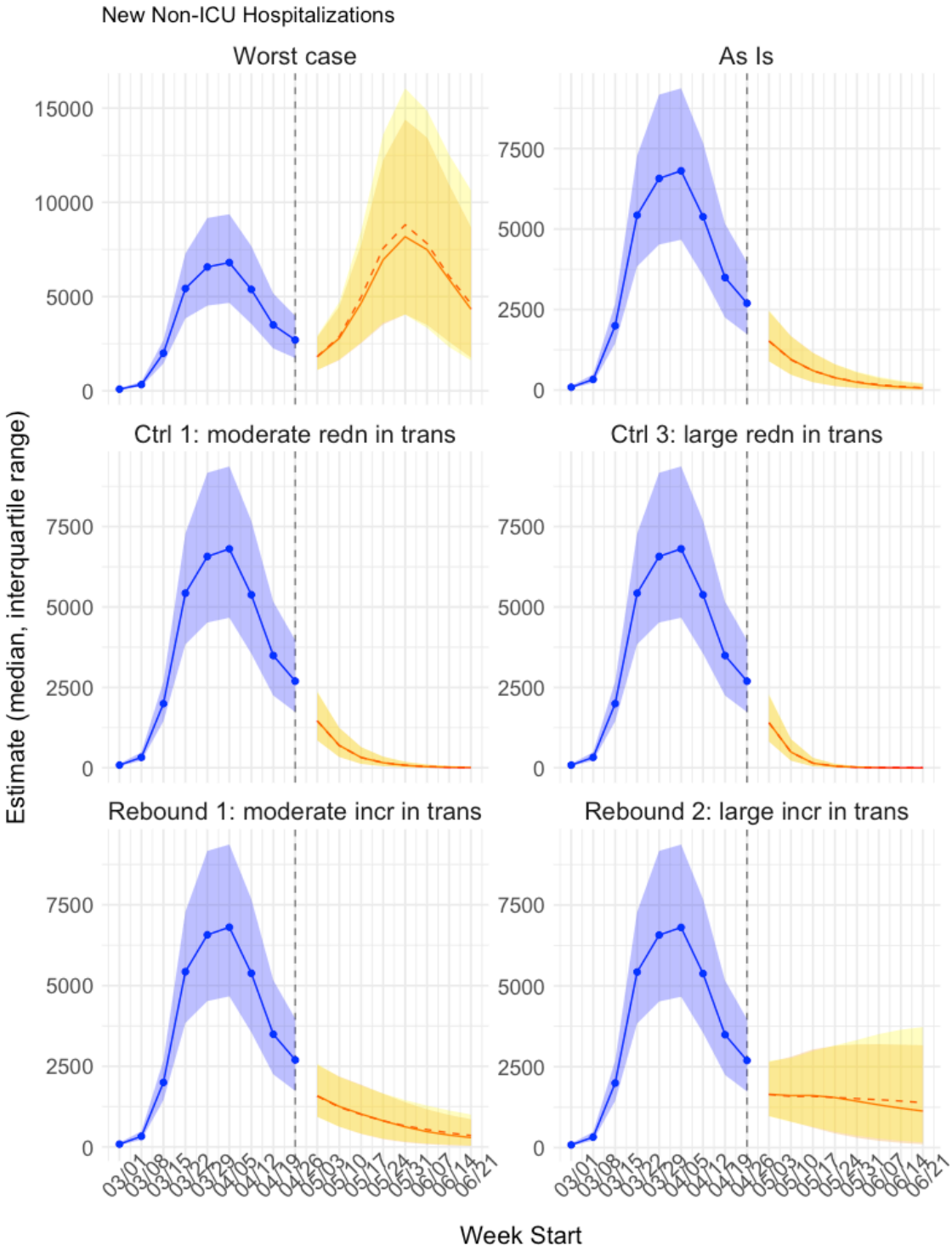

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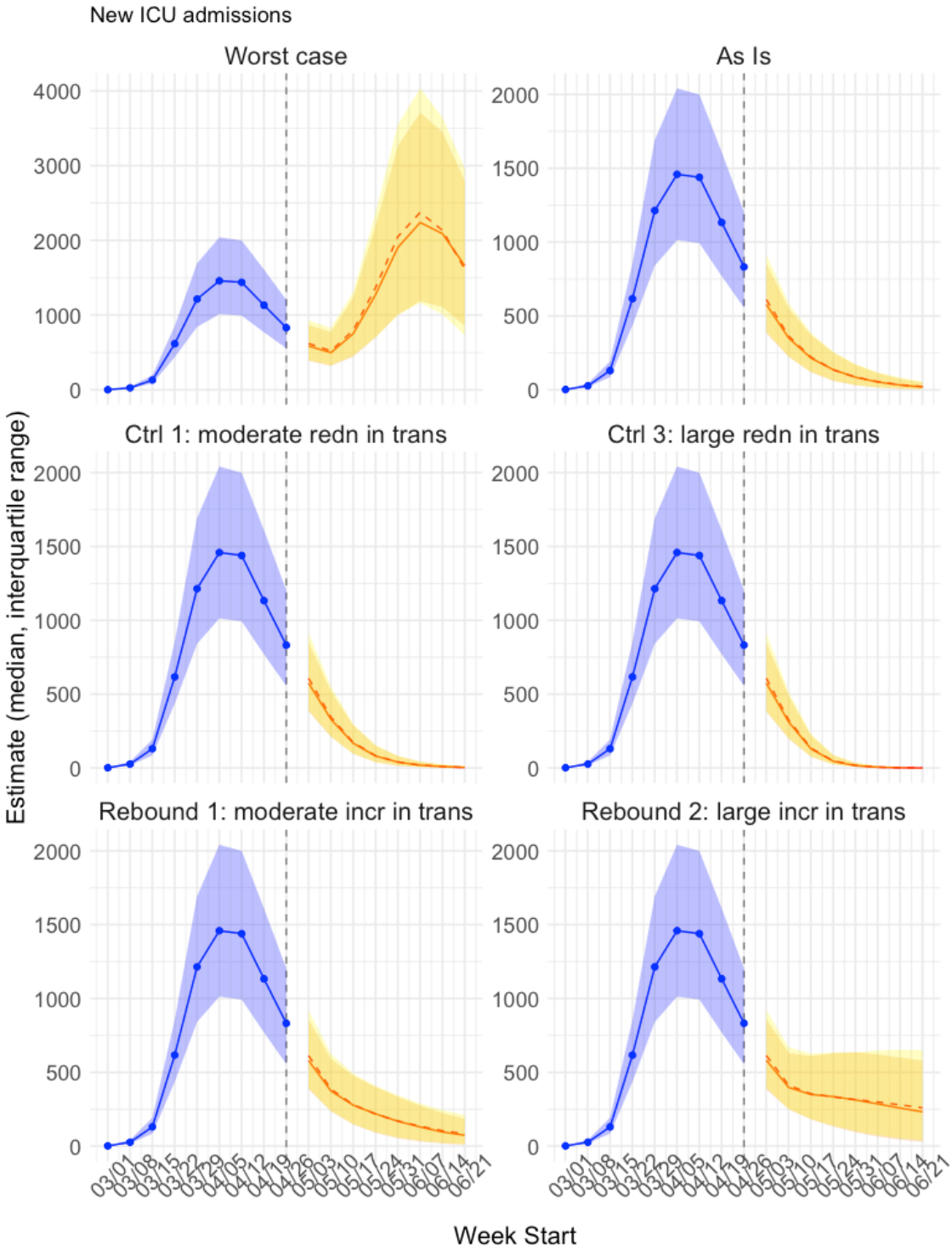

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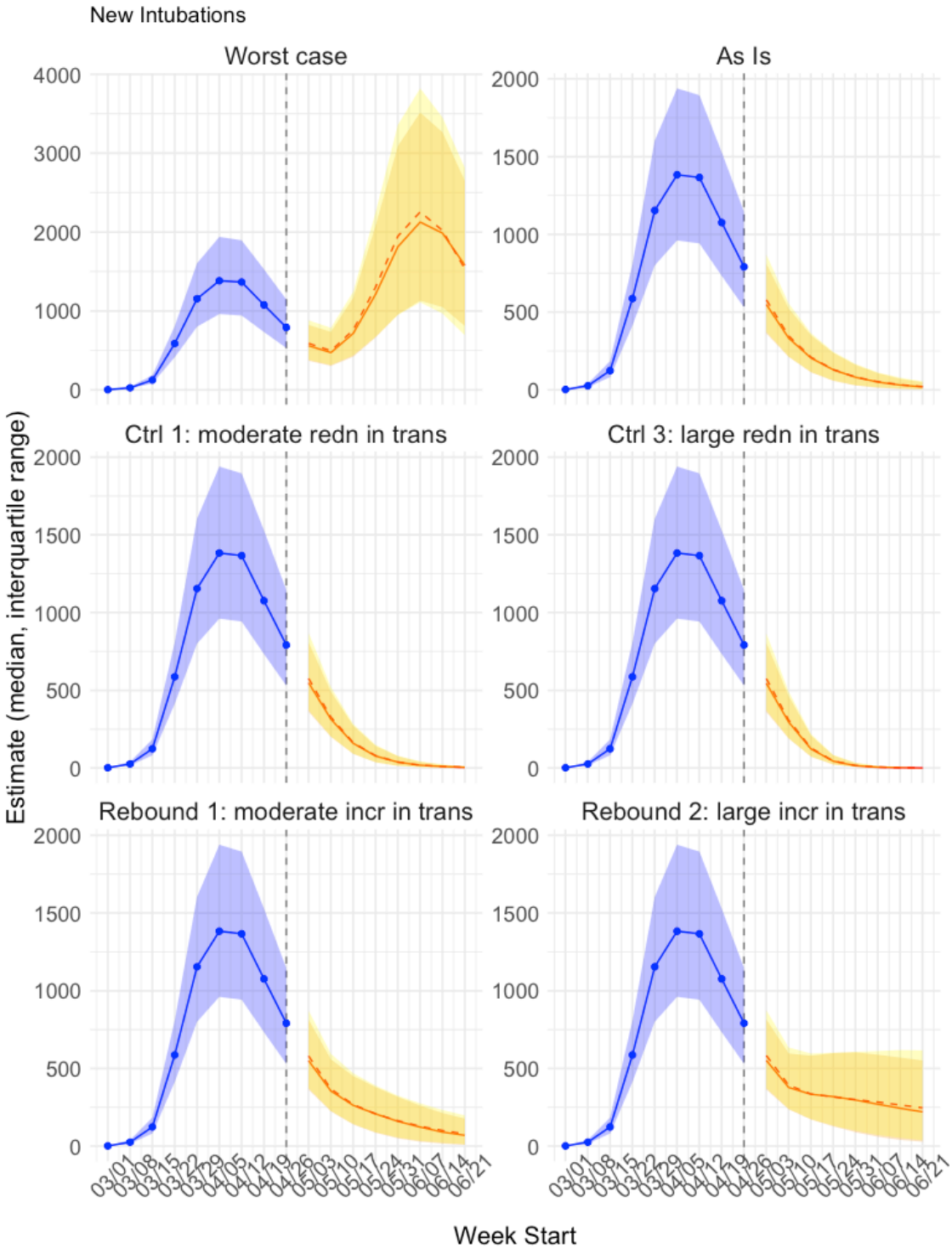

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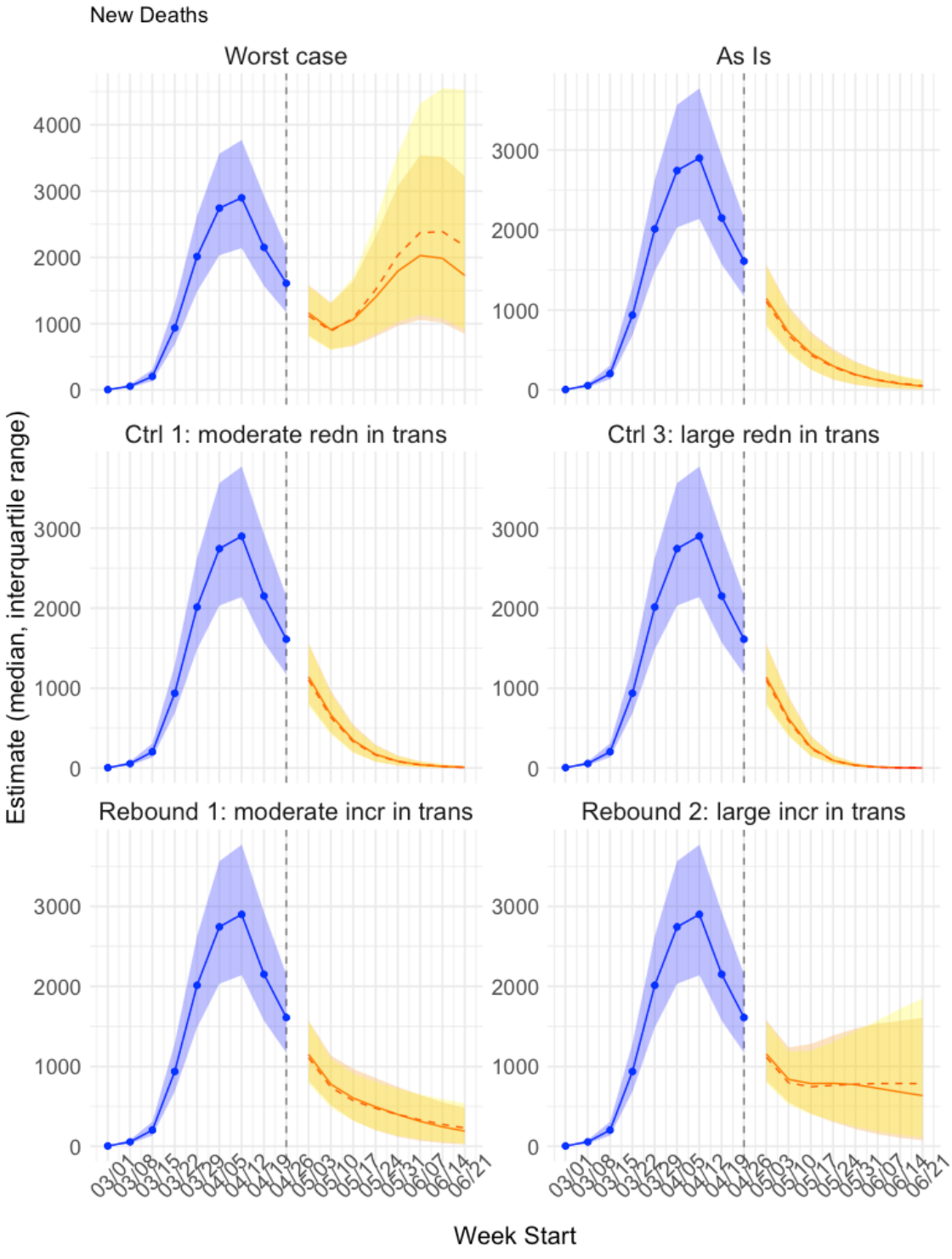

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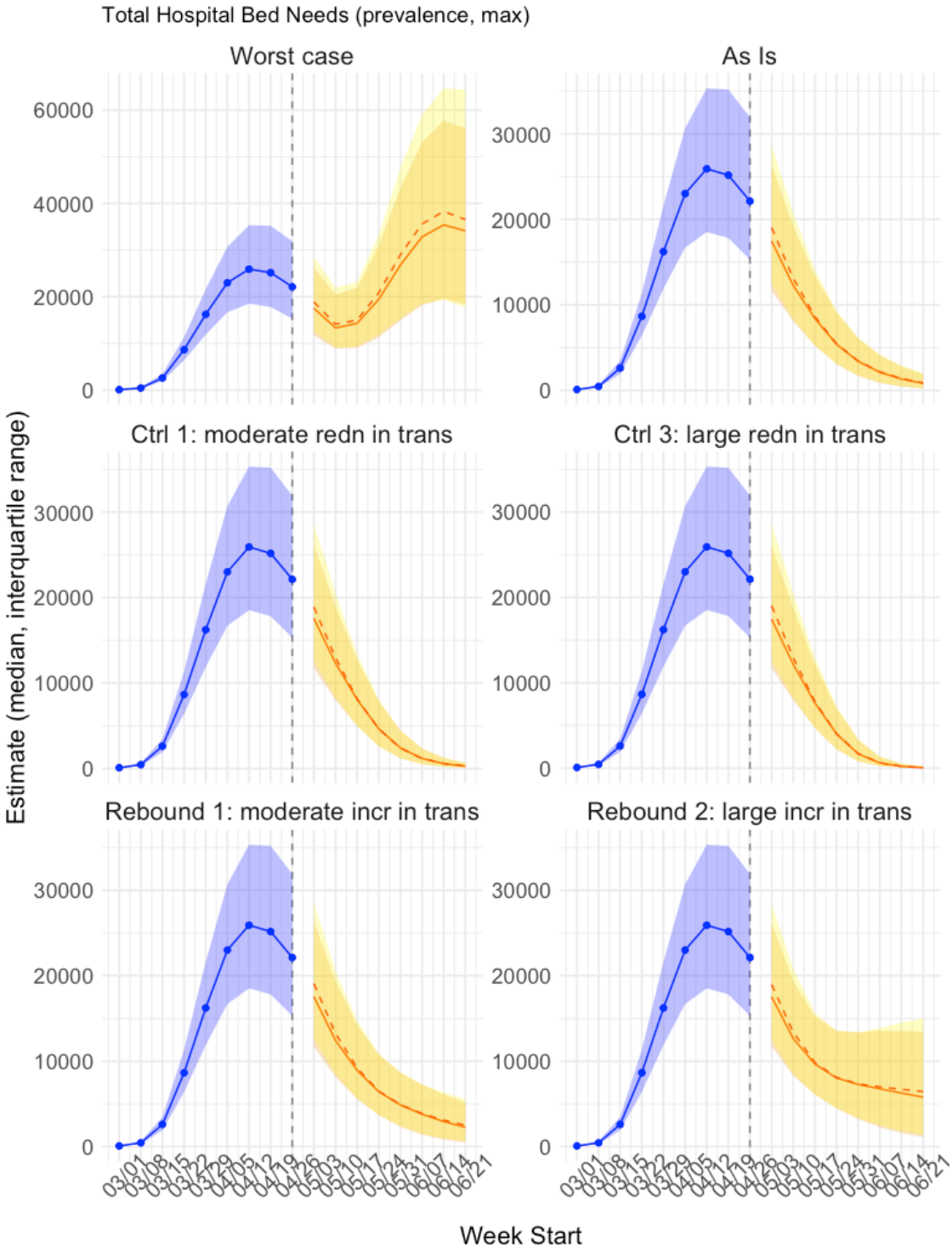

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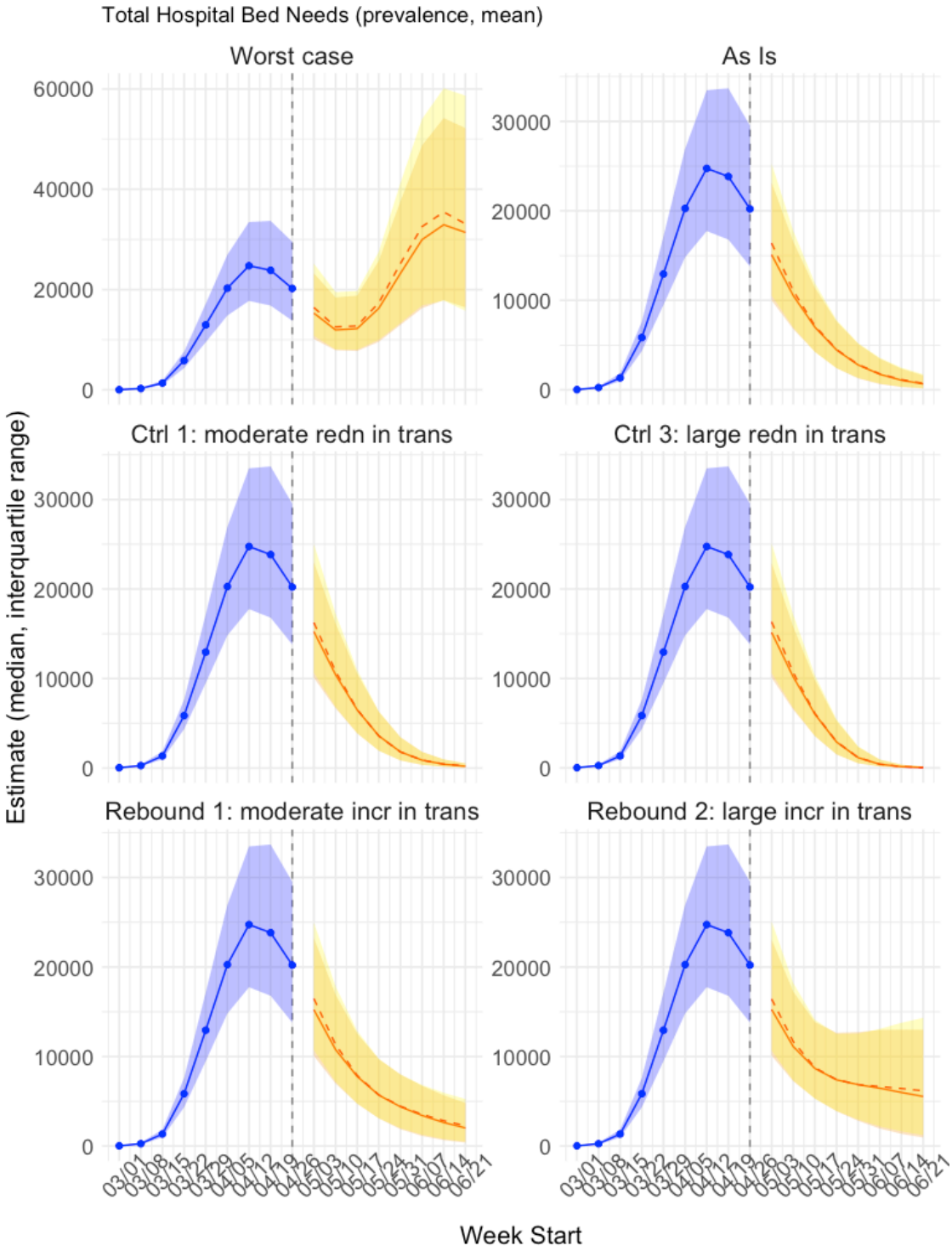

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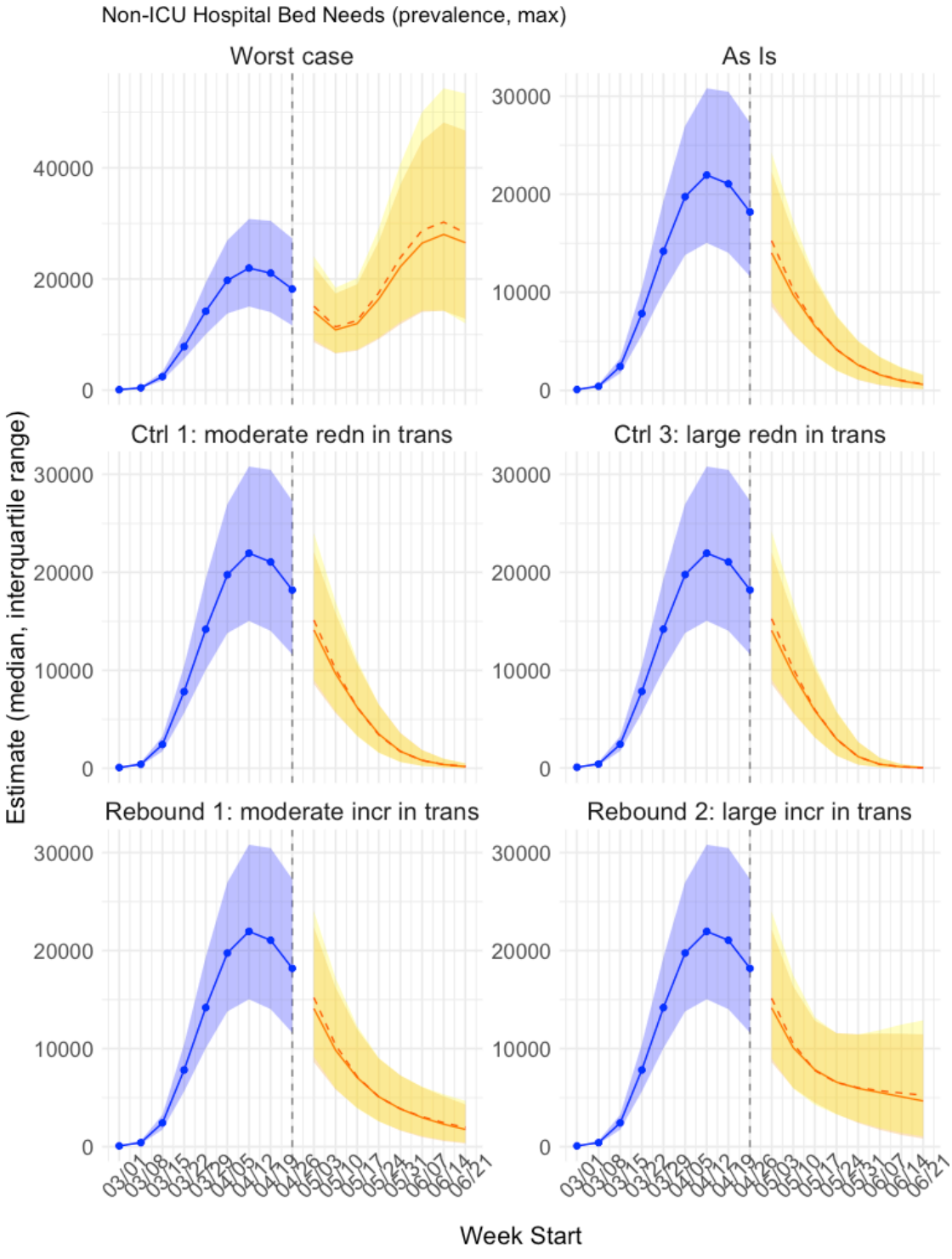

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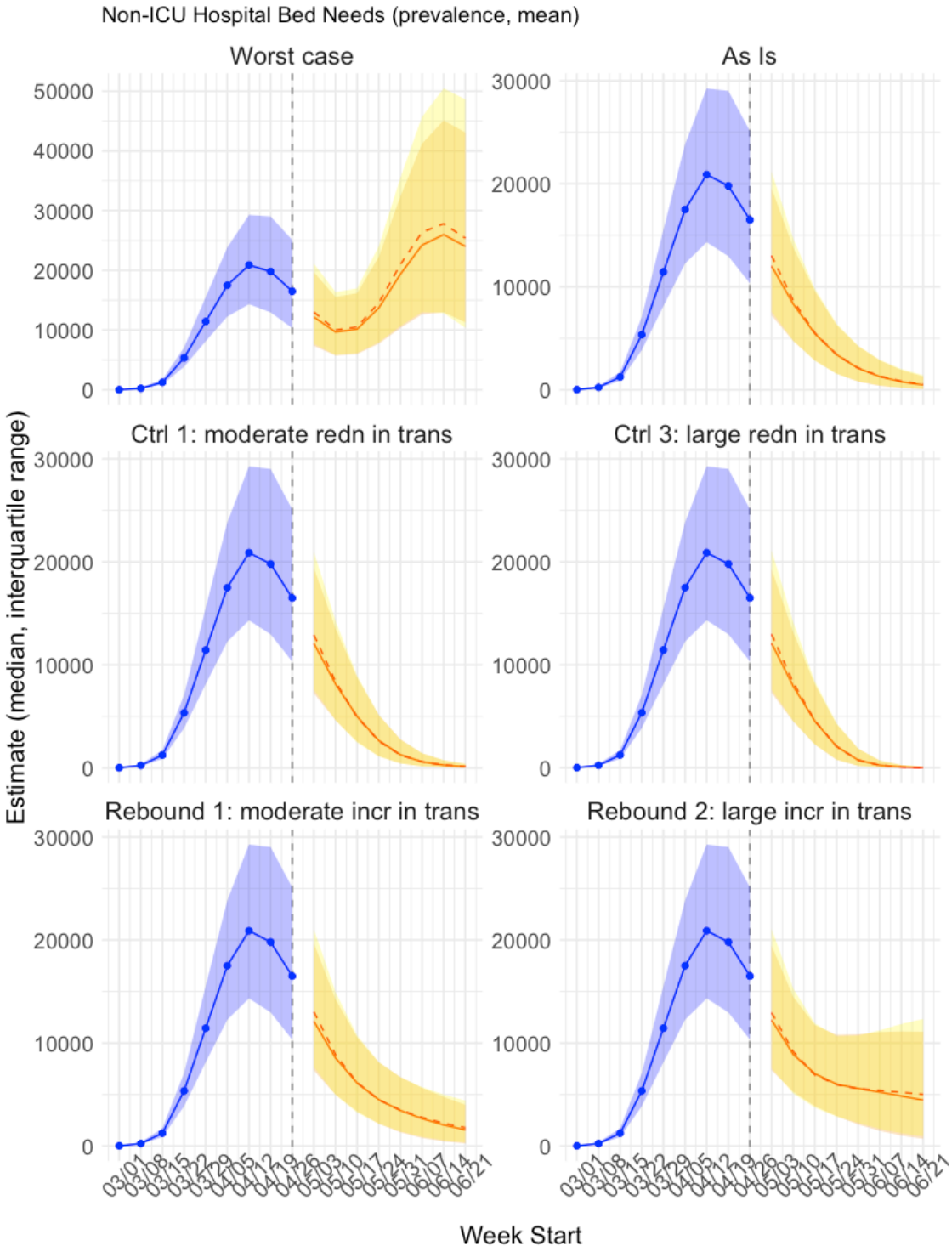

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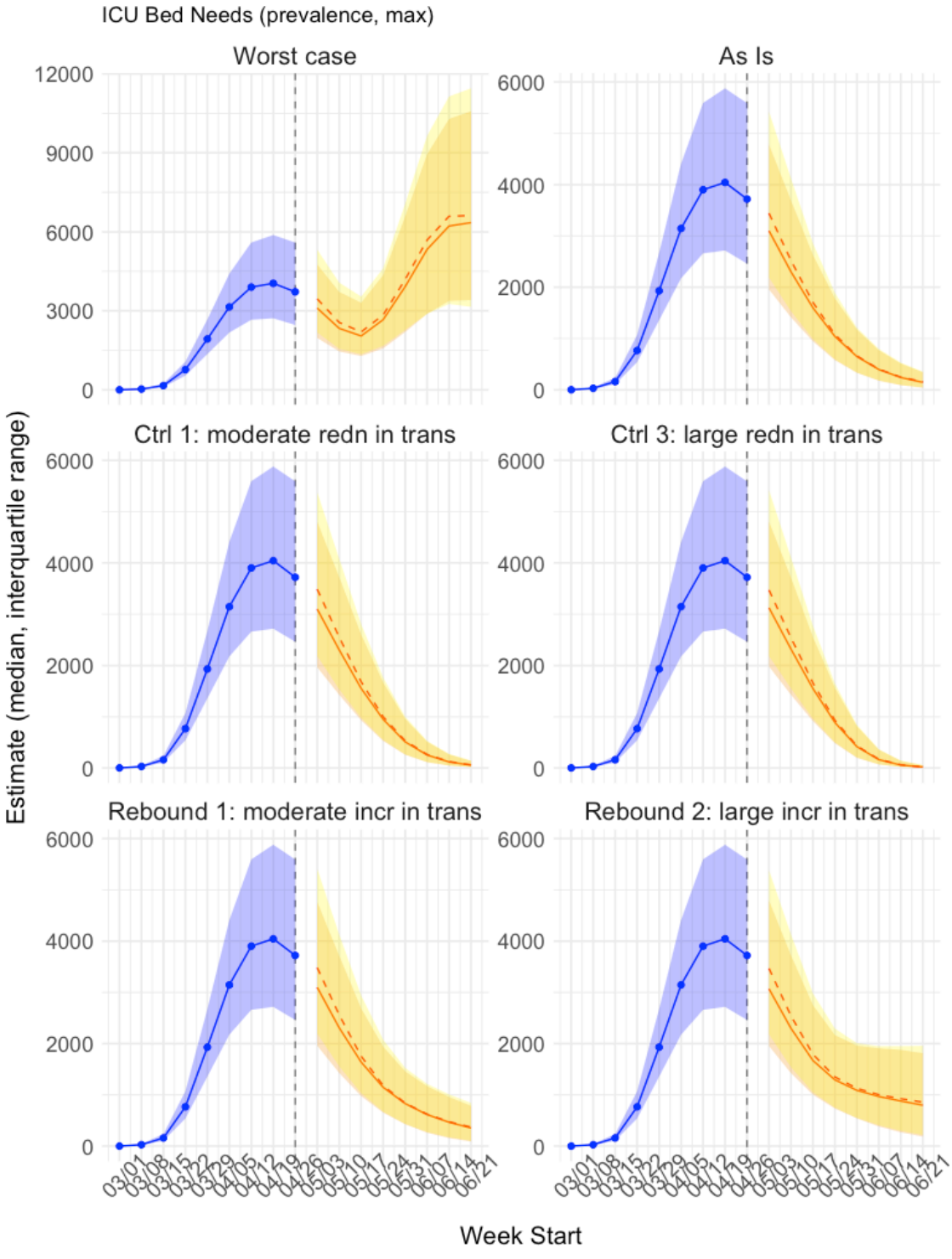

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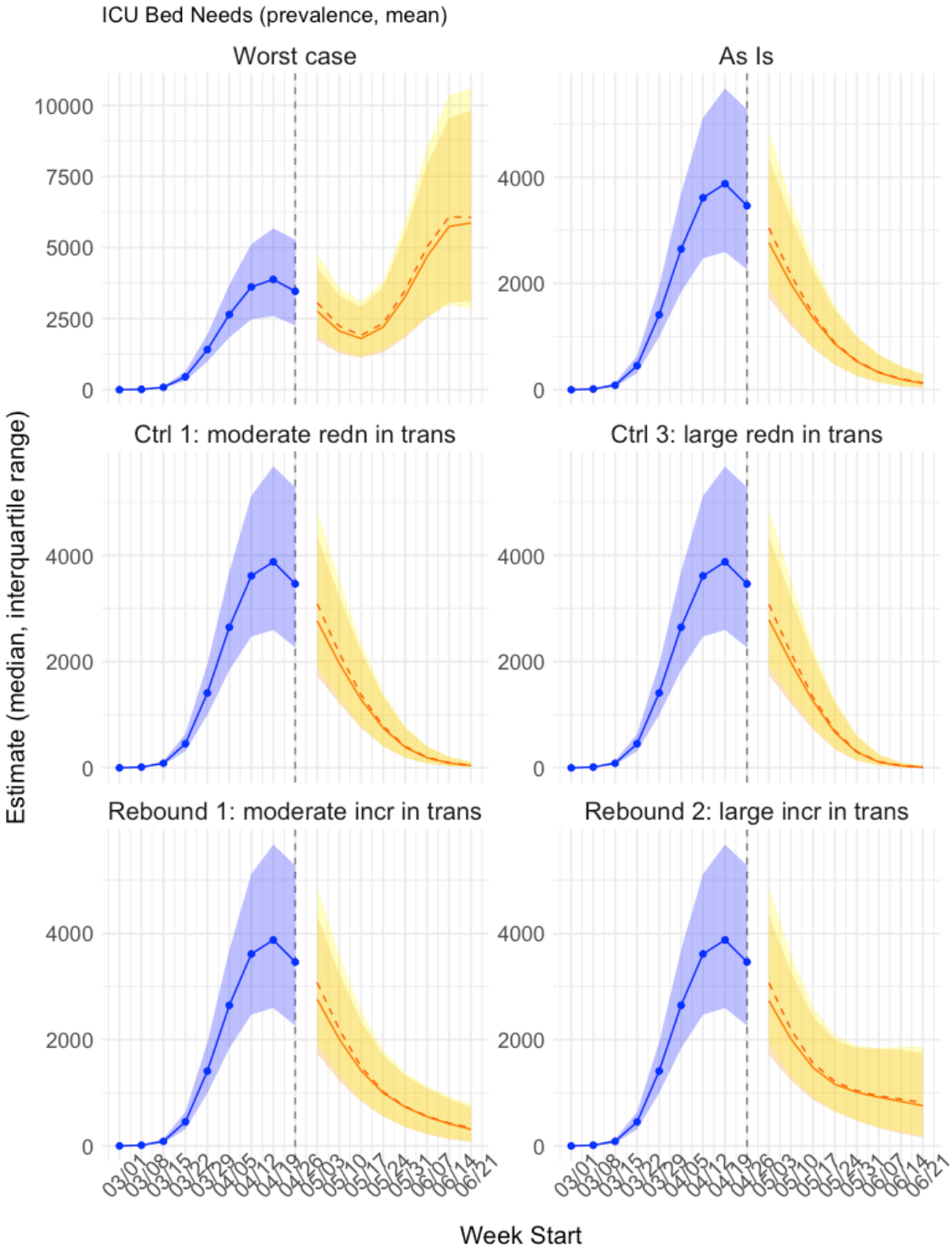

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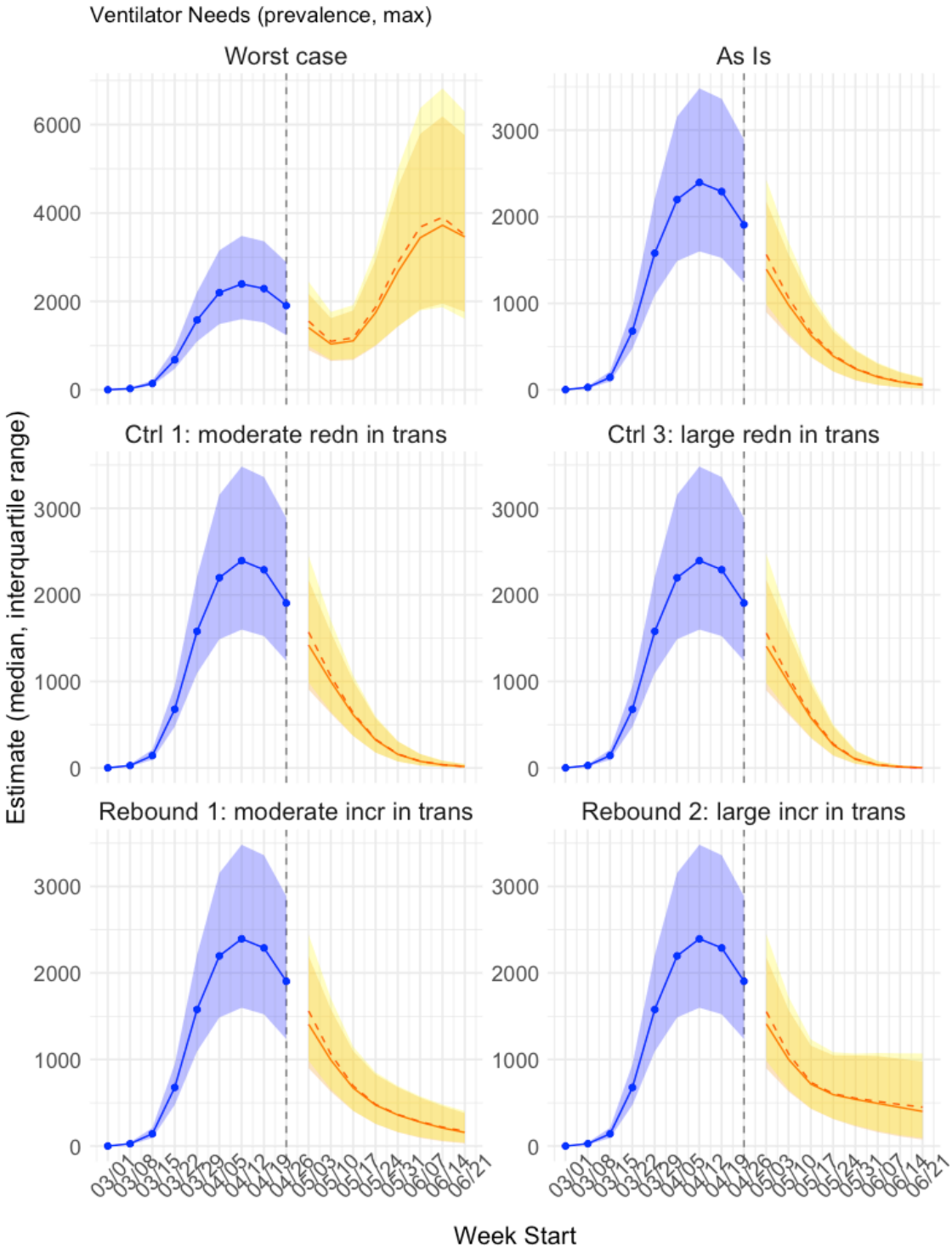

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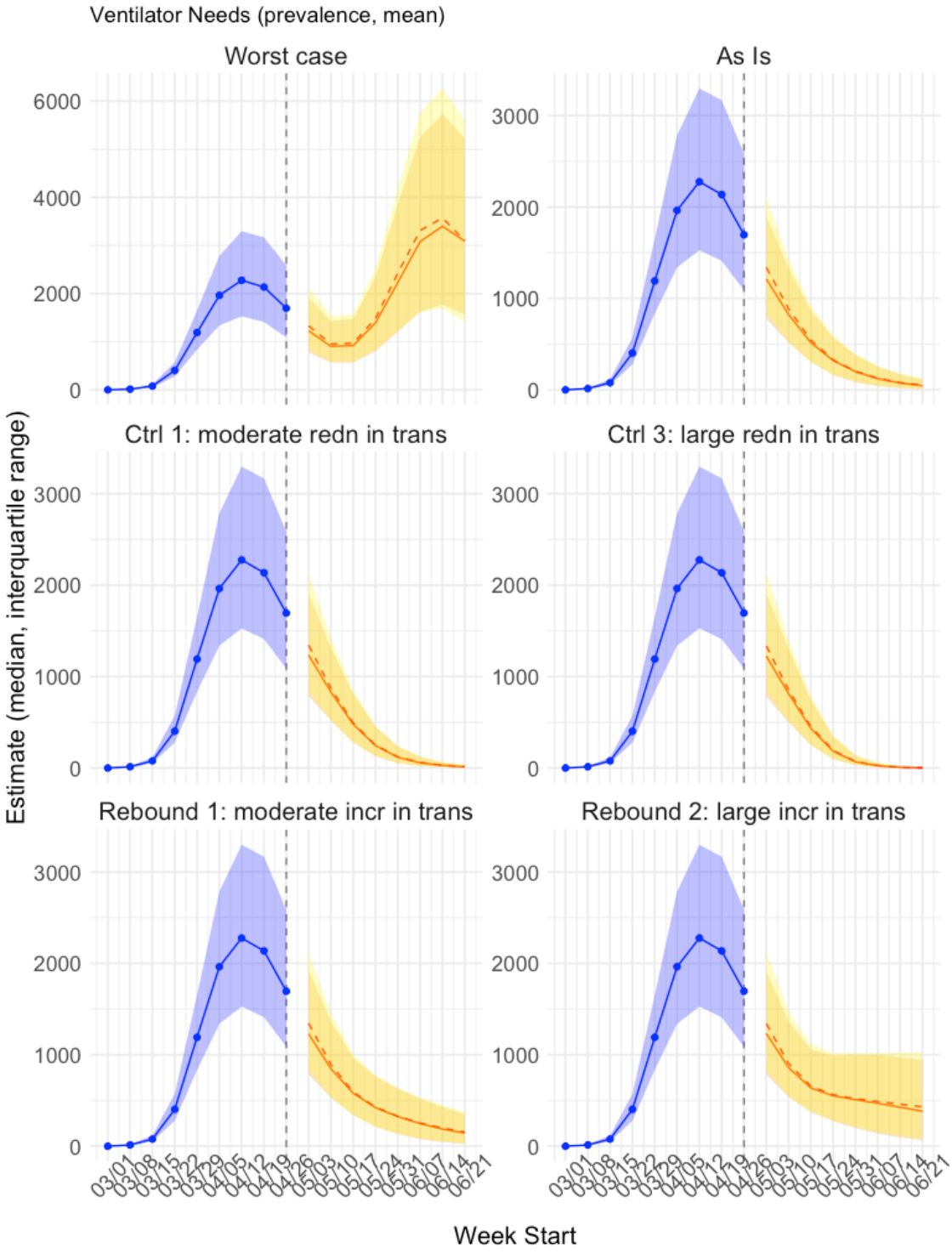

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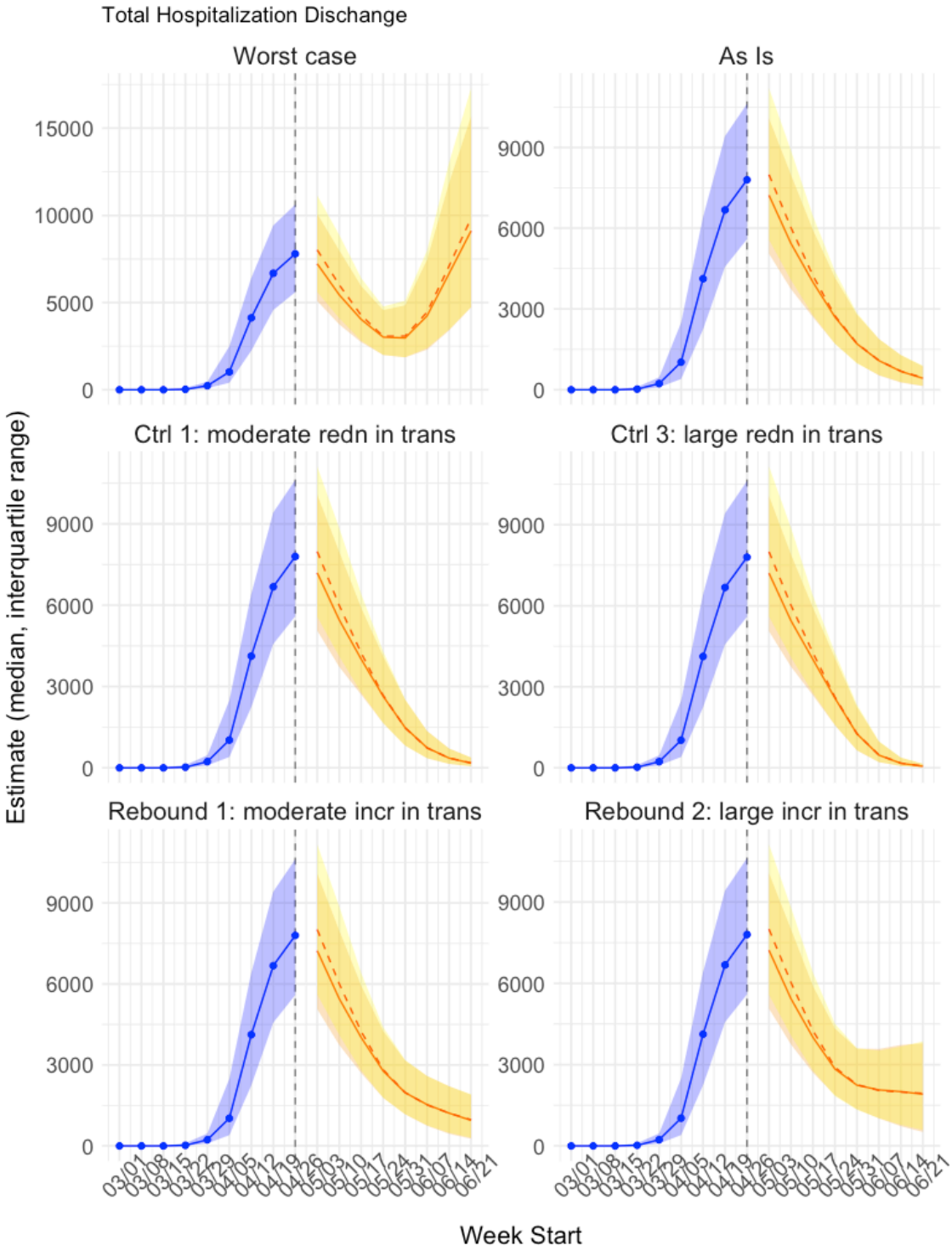

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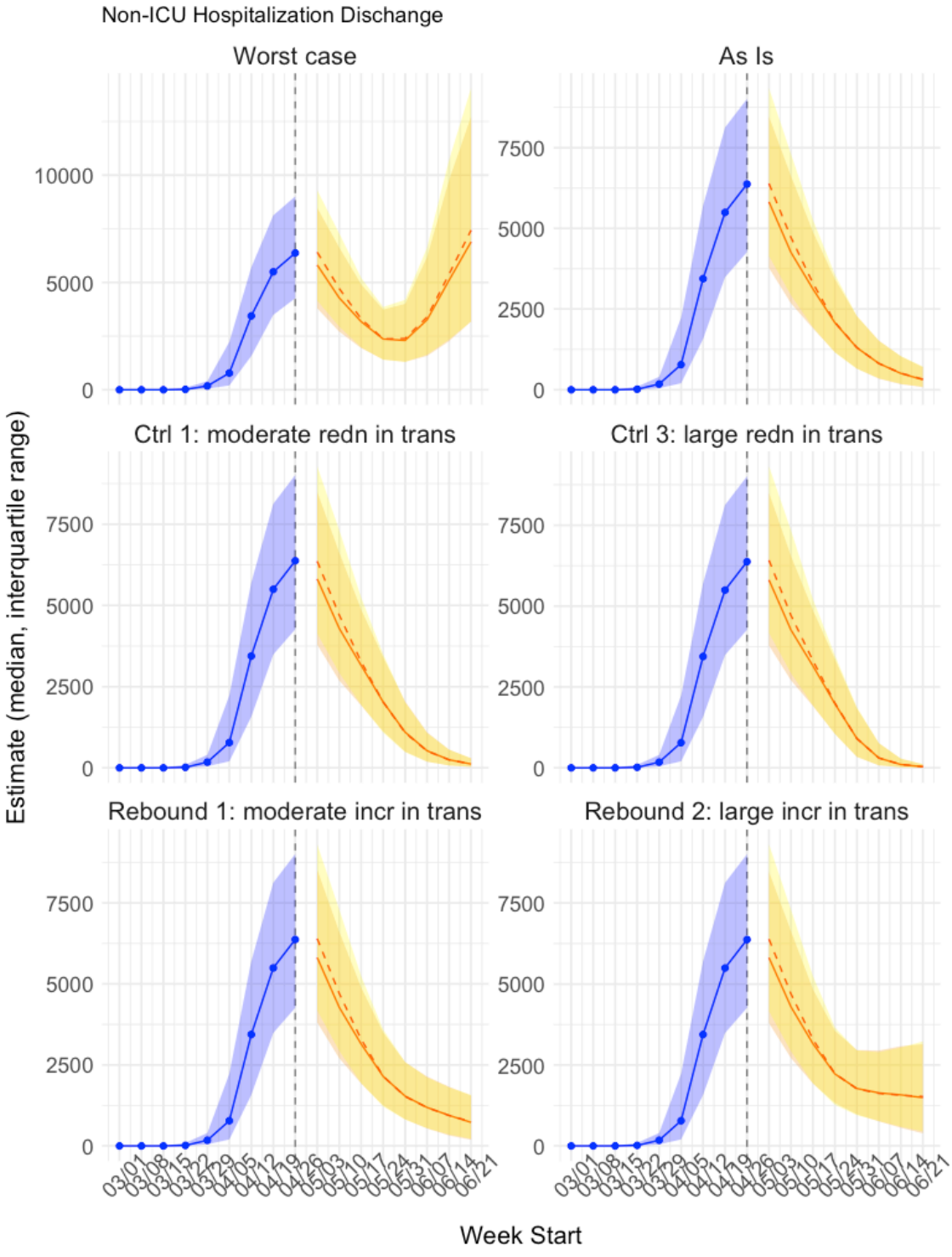

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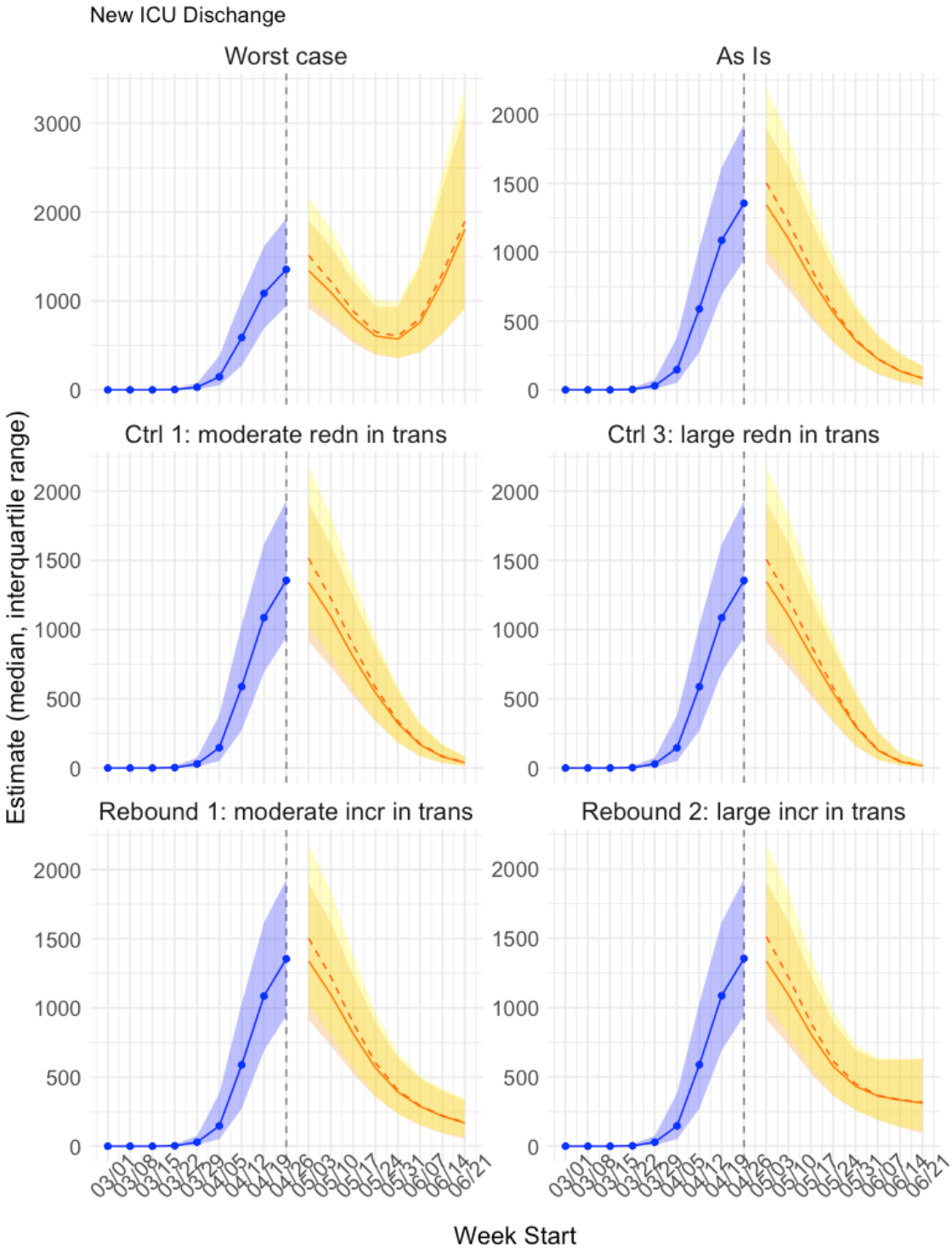

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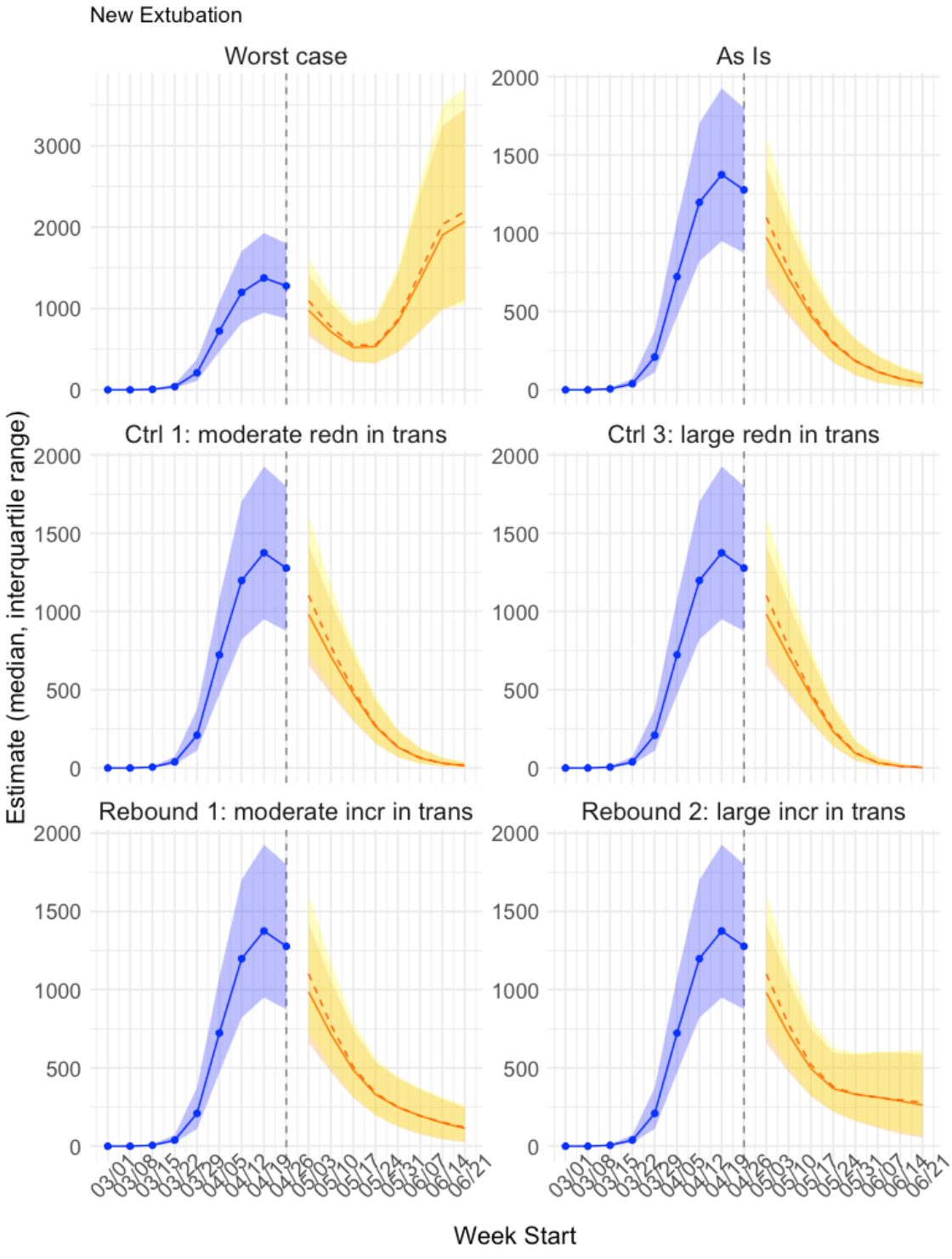

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