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. Additional model update for this week's projections: the model was also trained on both incidence and mortality data (combining covid-19 confirmed and probable deaths).

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 5/8/20:

1) Estimated Rt, the real-time reproductive number, for the week of 5/3/20 was 0.51 (IQR: 0.35 – 0.64), which accounted for the depletion of susceptibles (i.e., seroprevalence—assuming people are immune after recovery). Estimated Rt for the week was 0.64 (IQR: 0.44 – 0.79) if seroprevalence is ignored. Note both estimates indicate strong reductions in transmissibility over the last few weeks.
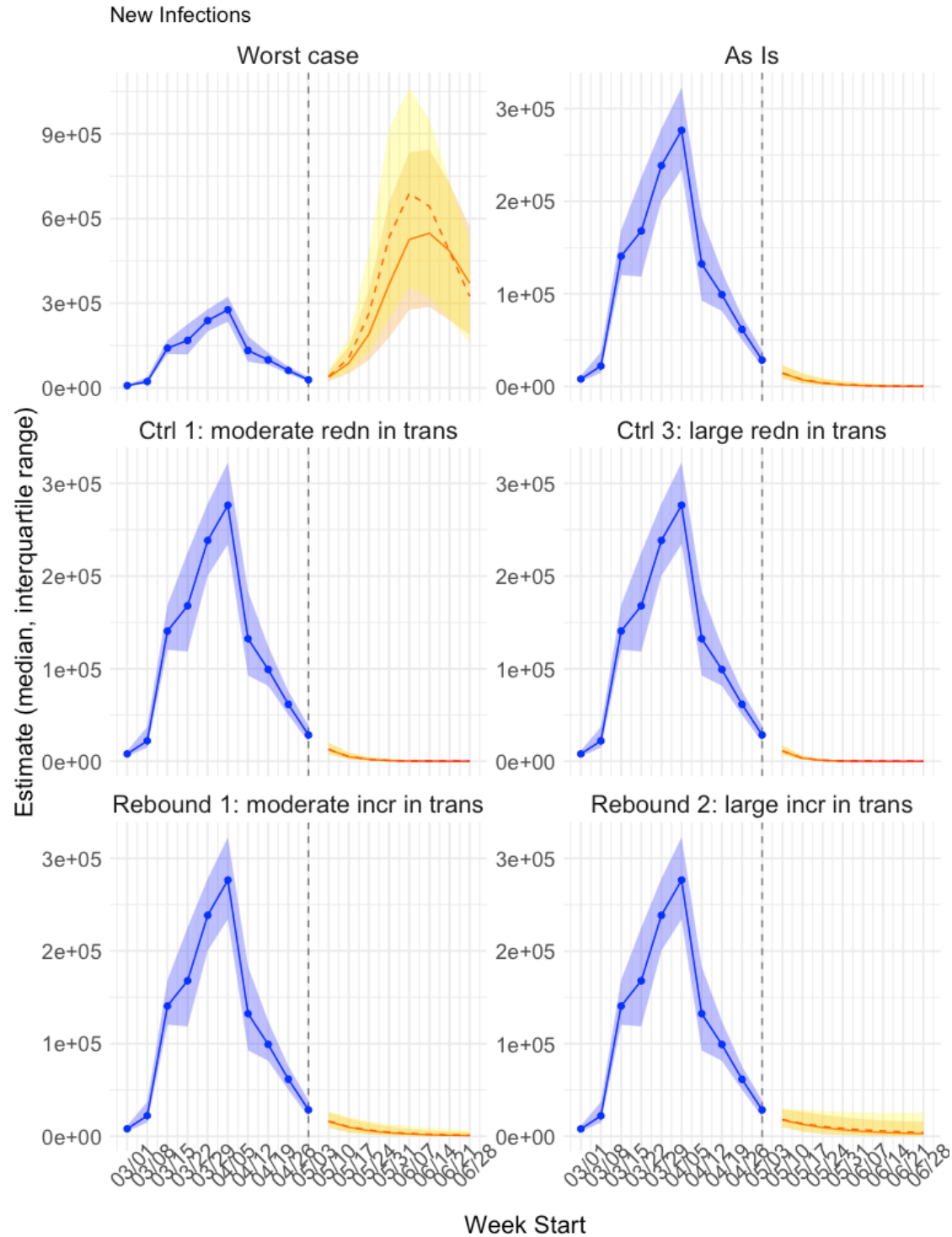
2) For this week's projections, we trained the model system using both incidence and mortality data (combining covid-19 confirmed and probable deaths). With this change, inferred peak infection rate thus far was 2-3 weeks later than previously inferred. There is however, large uncertainty surrounding these new estimates, due to a number of factors. First, the distribution of time-to-death may have changed during the course of the pandemic, which was not accounted for in our current model system. Second, both incidence data and mortality data are revised from time to time, and revision may be more substantial for mortality data; as such, the use of mortality data may not necessarily improve the accuracy of model-inference.
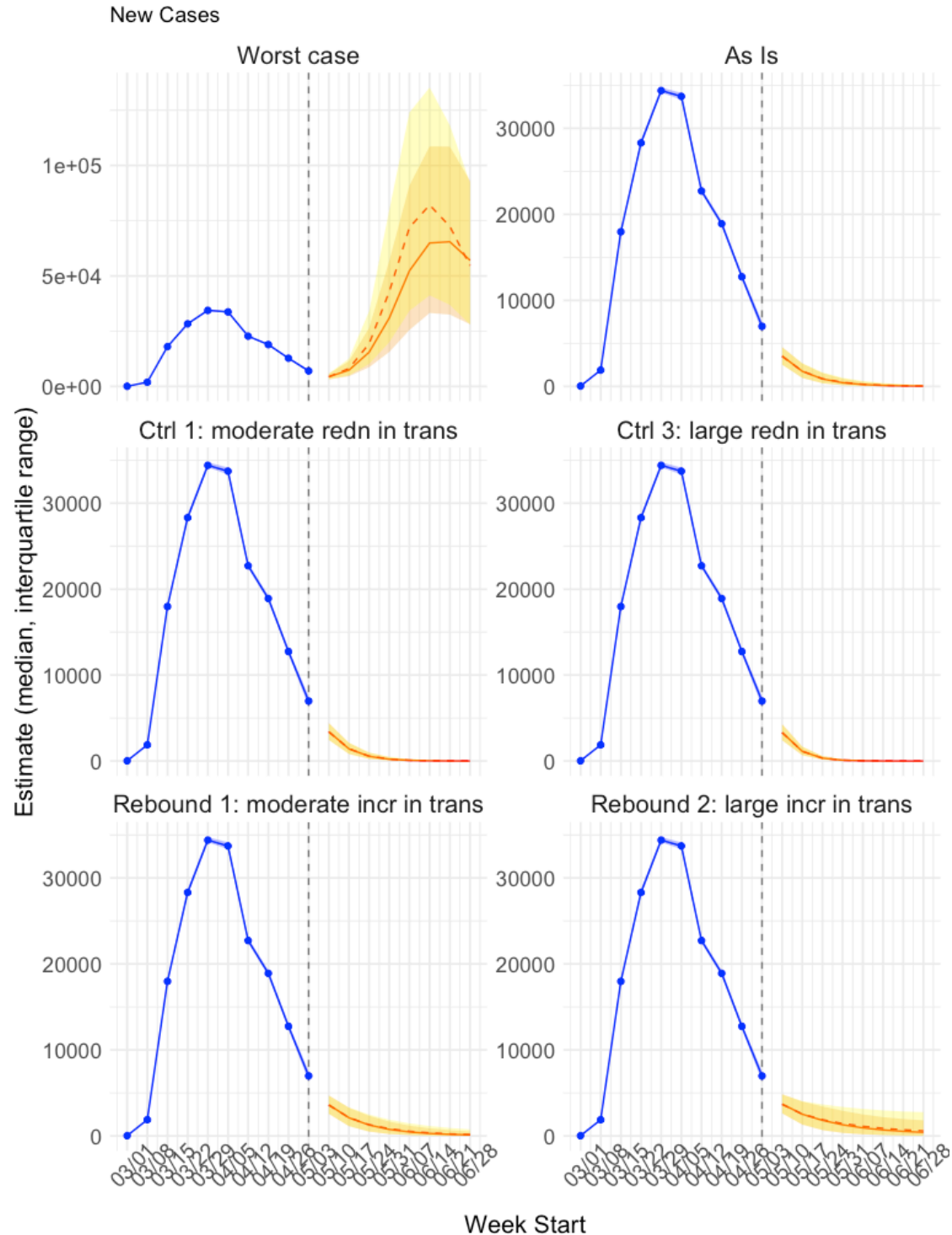

Acknowledgement: We thank the NYC Department of Health and Mental Hygiene (DOHMH) for sharing of data and allowing this public posting. And we thank Columbia Mailman School of Public Health for high performance computing.

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
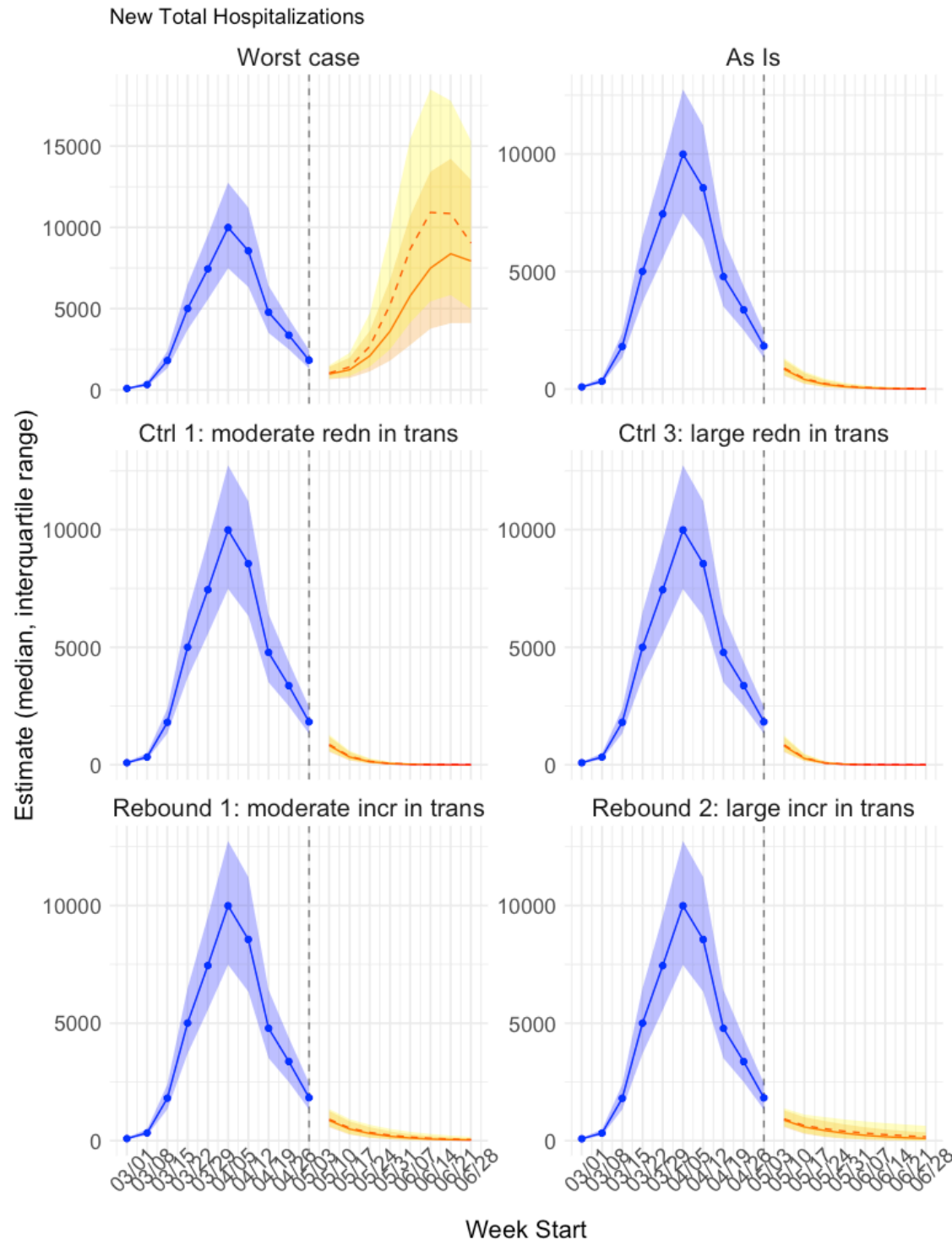
getting tested and then reported in the surveillance system (~2-7 days). In addition, how the epidemic would unfold also depend largely on behavior changes over time.
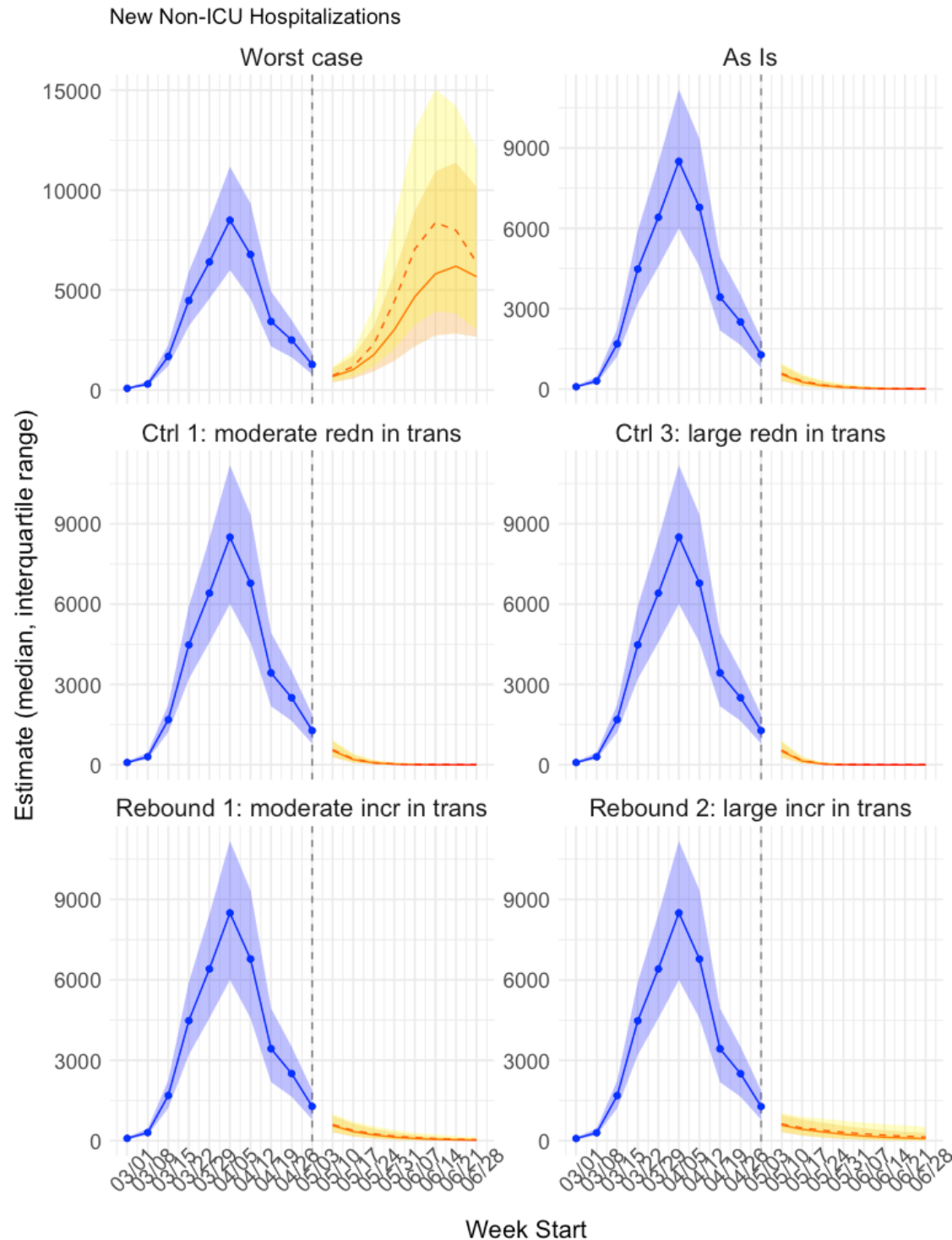
New Infections

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.
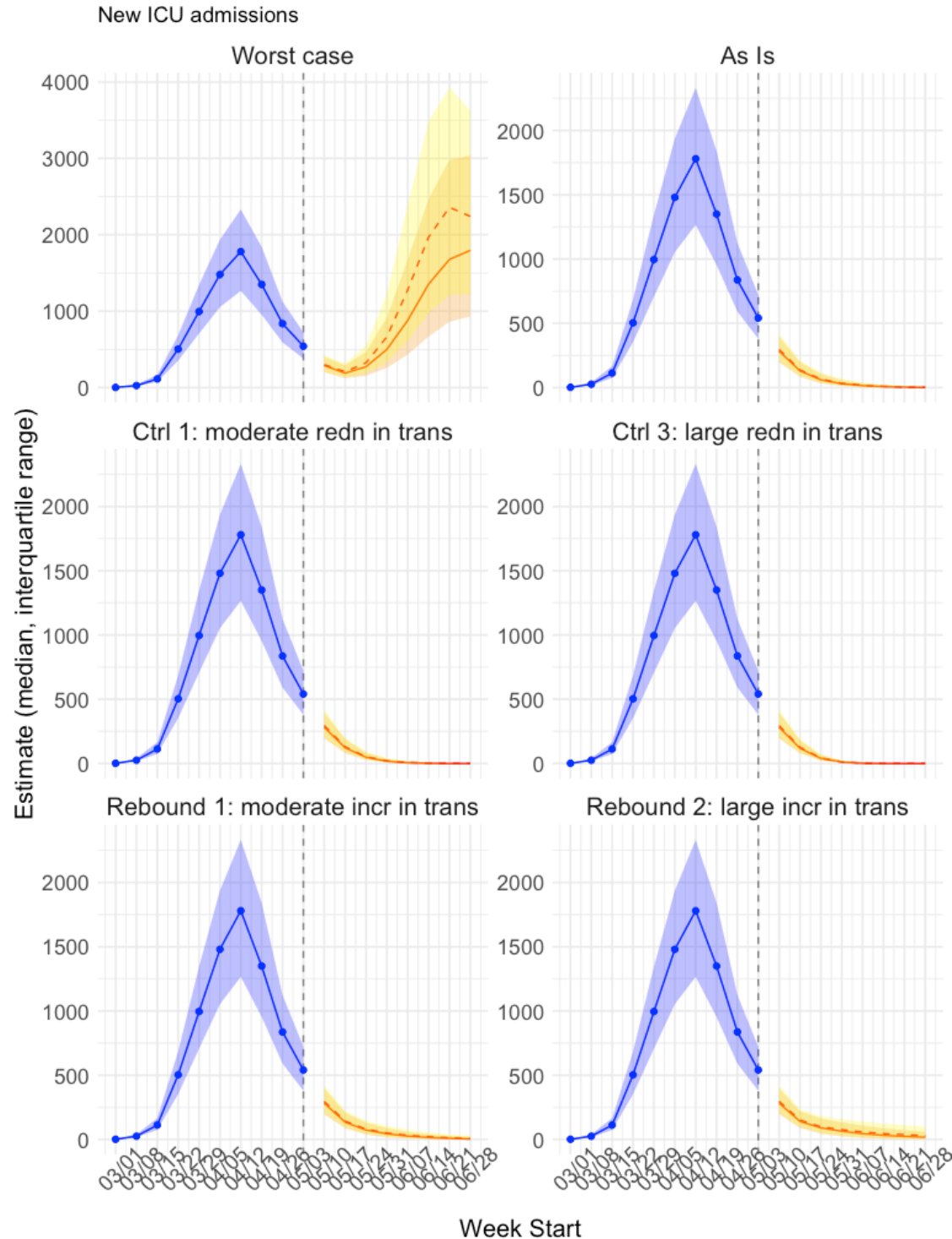
New Cases

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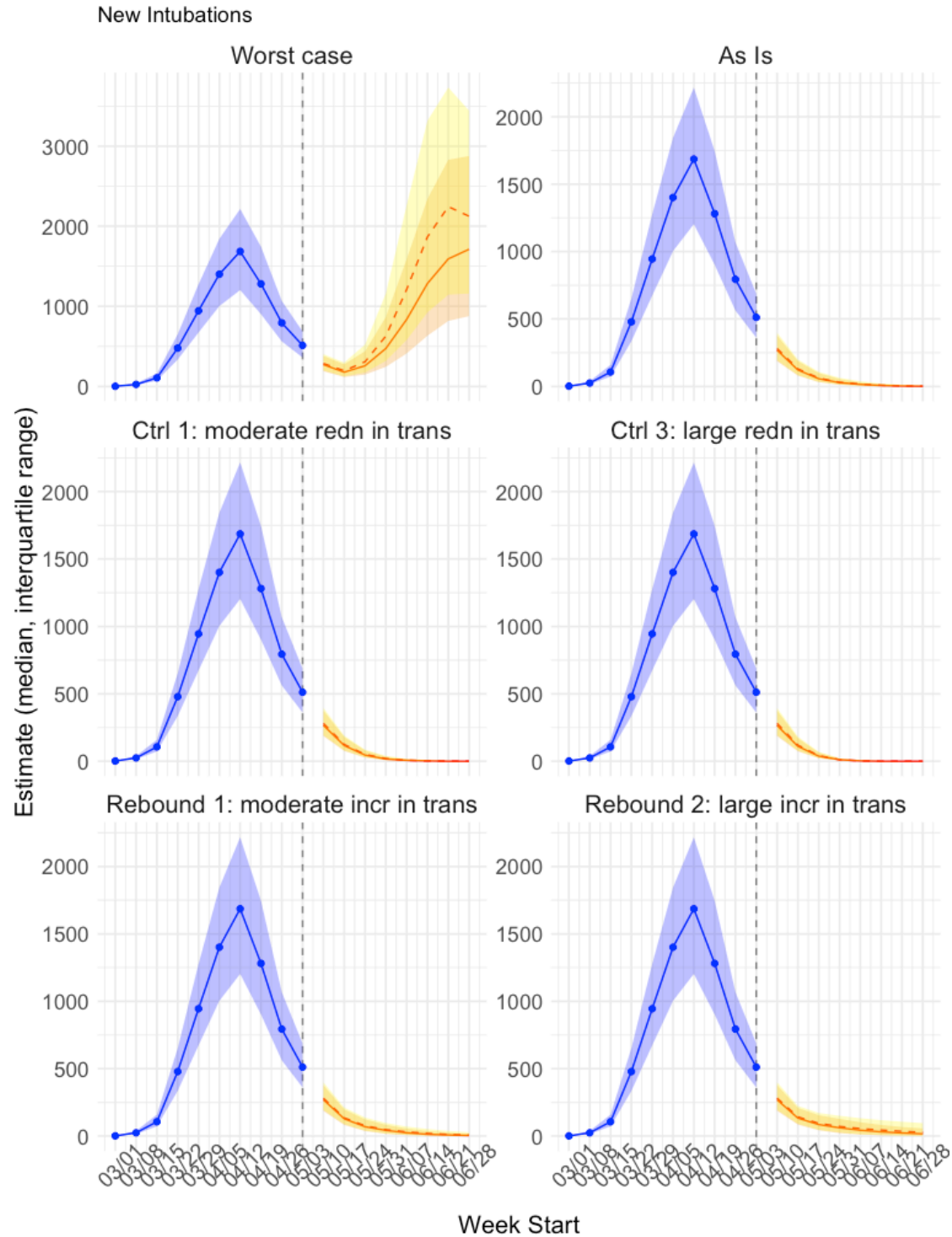
New Total Hospitalizations

Projected number for the next 8 weeks under different control scenarios.
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New Non-ICU Hospitalizations

Projected number for the next 8 weeks under different control scenarios.
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New ICU admissions

Worst case

As Is

Ctrl 1: moderate redn in trans

Ctrl 3: large redn in trans

Rebound 1: moderate incr in trans

Rebound 2: large incr in trans

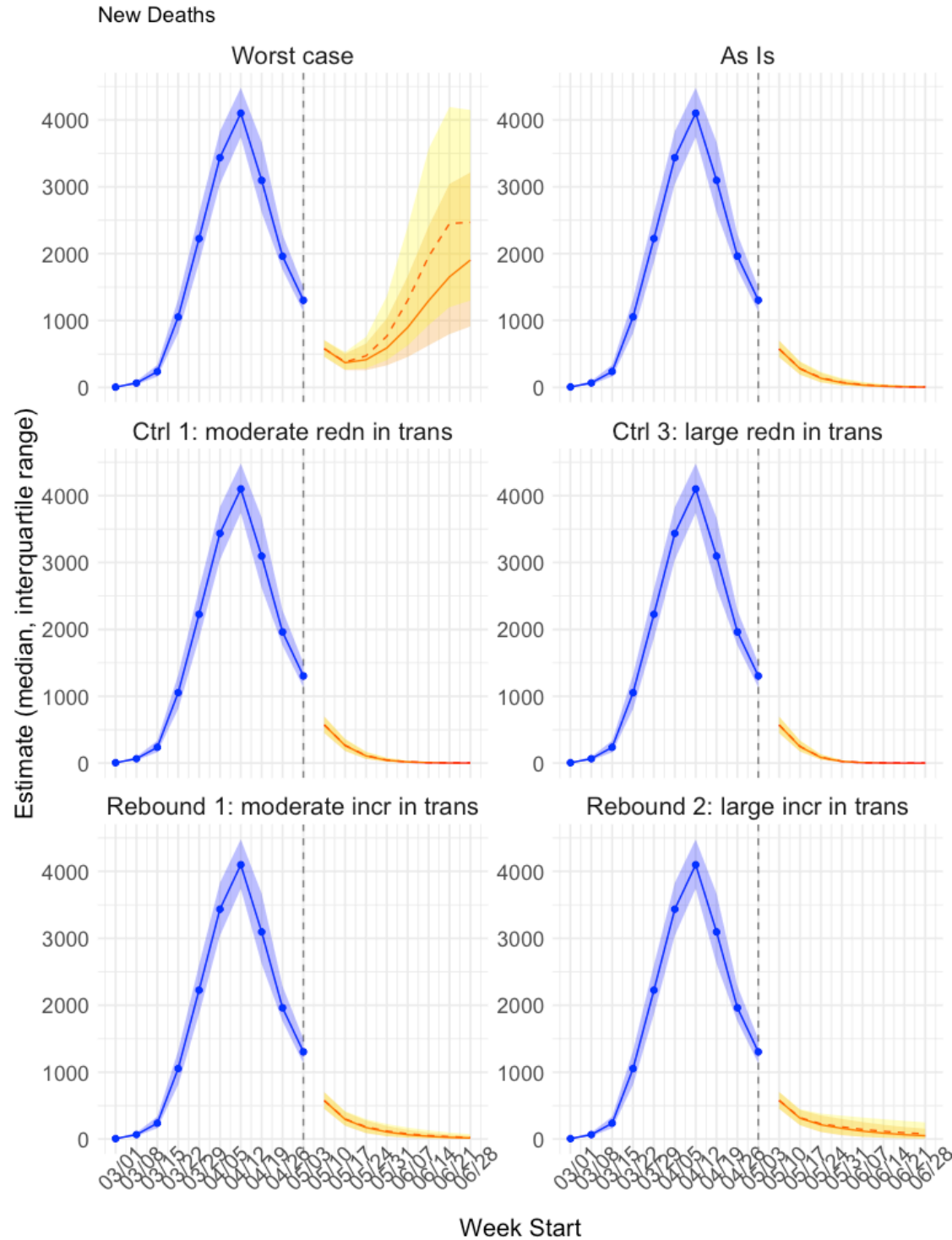Estimate (median, interquartile range)

Week Start

Projected number for the next 8 weeks under different control scenarios.
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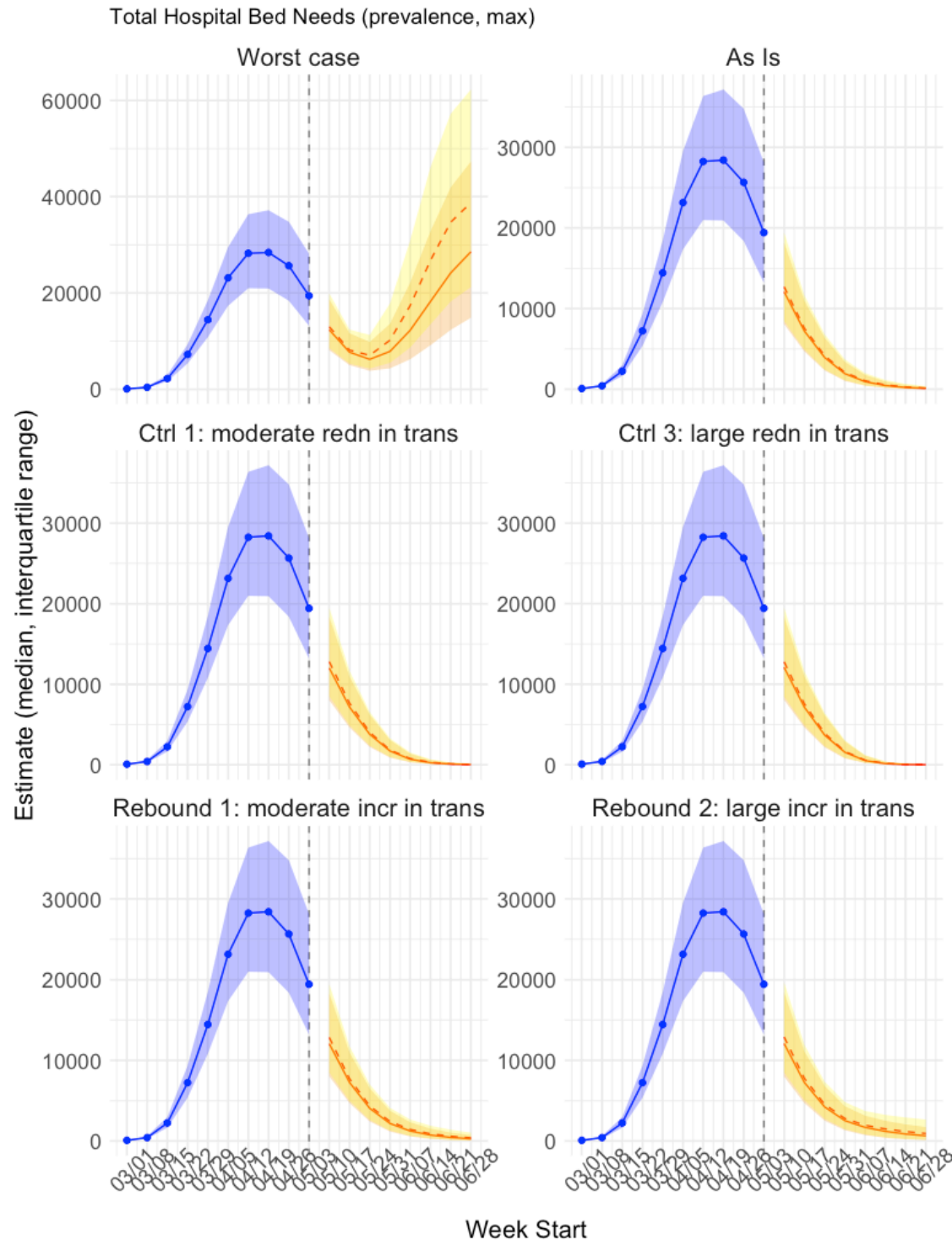
New Intubations

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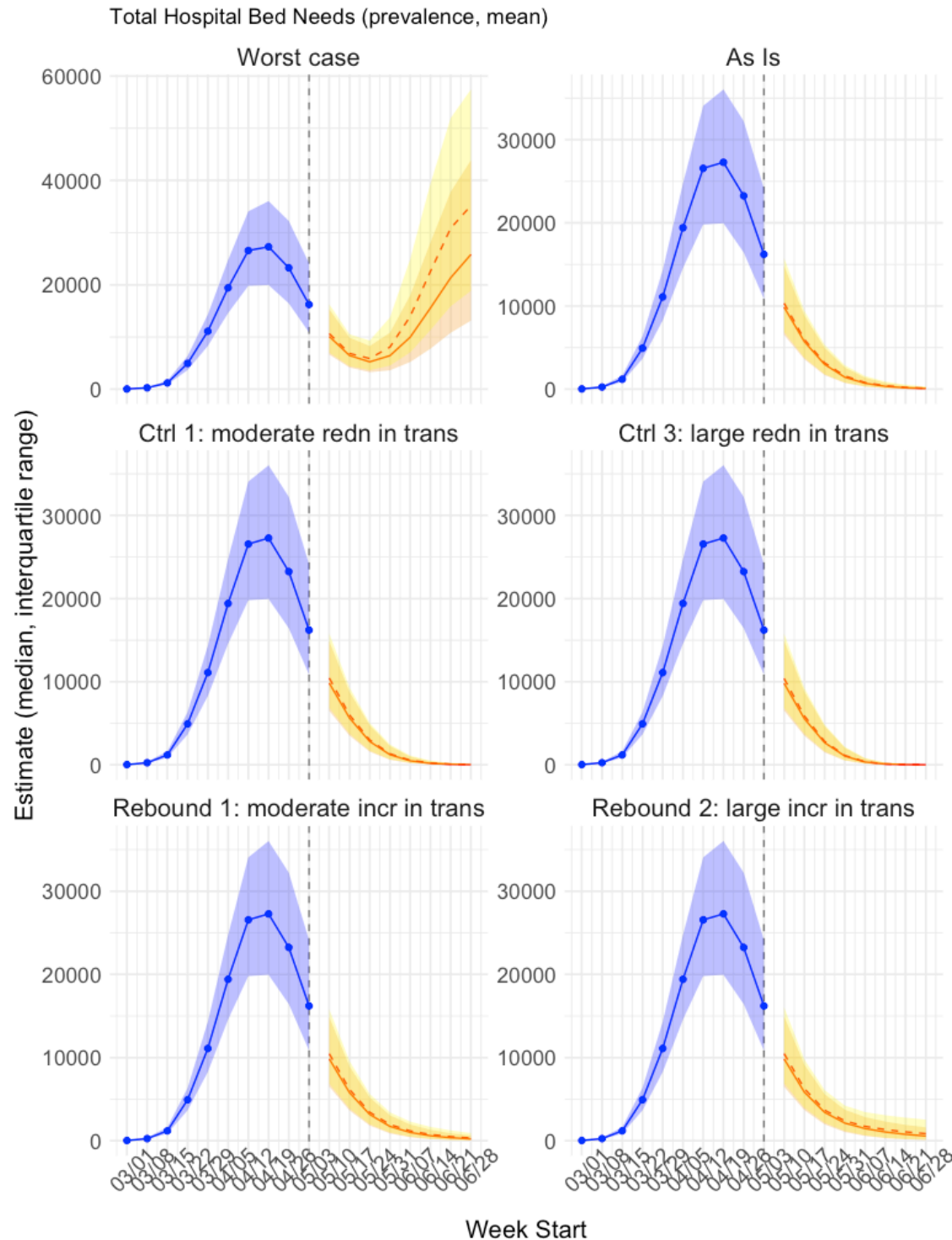
New Deaths

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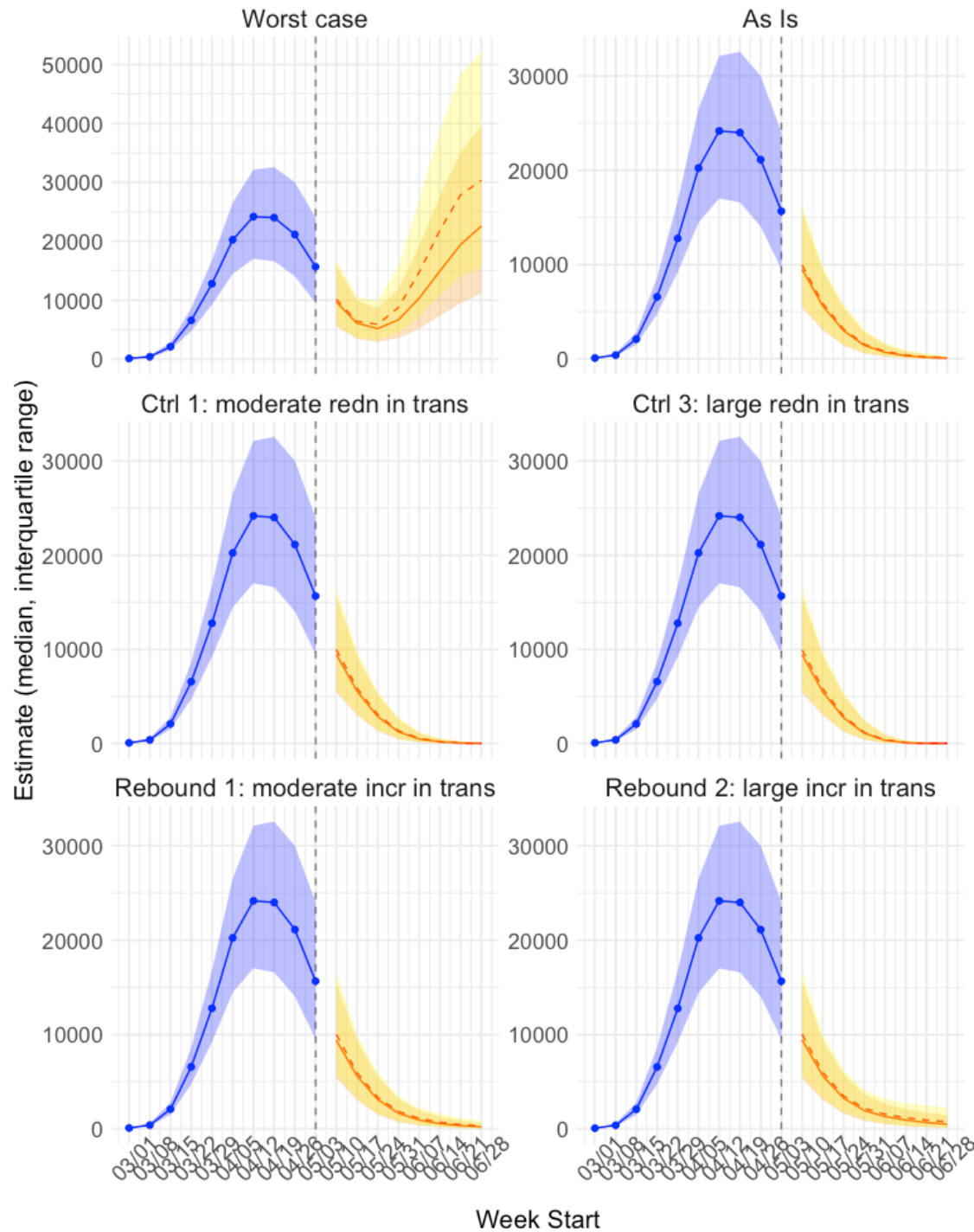## Total Hospital Bed Needs (prevalence, max)

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.

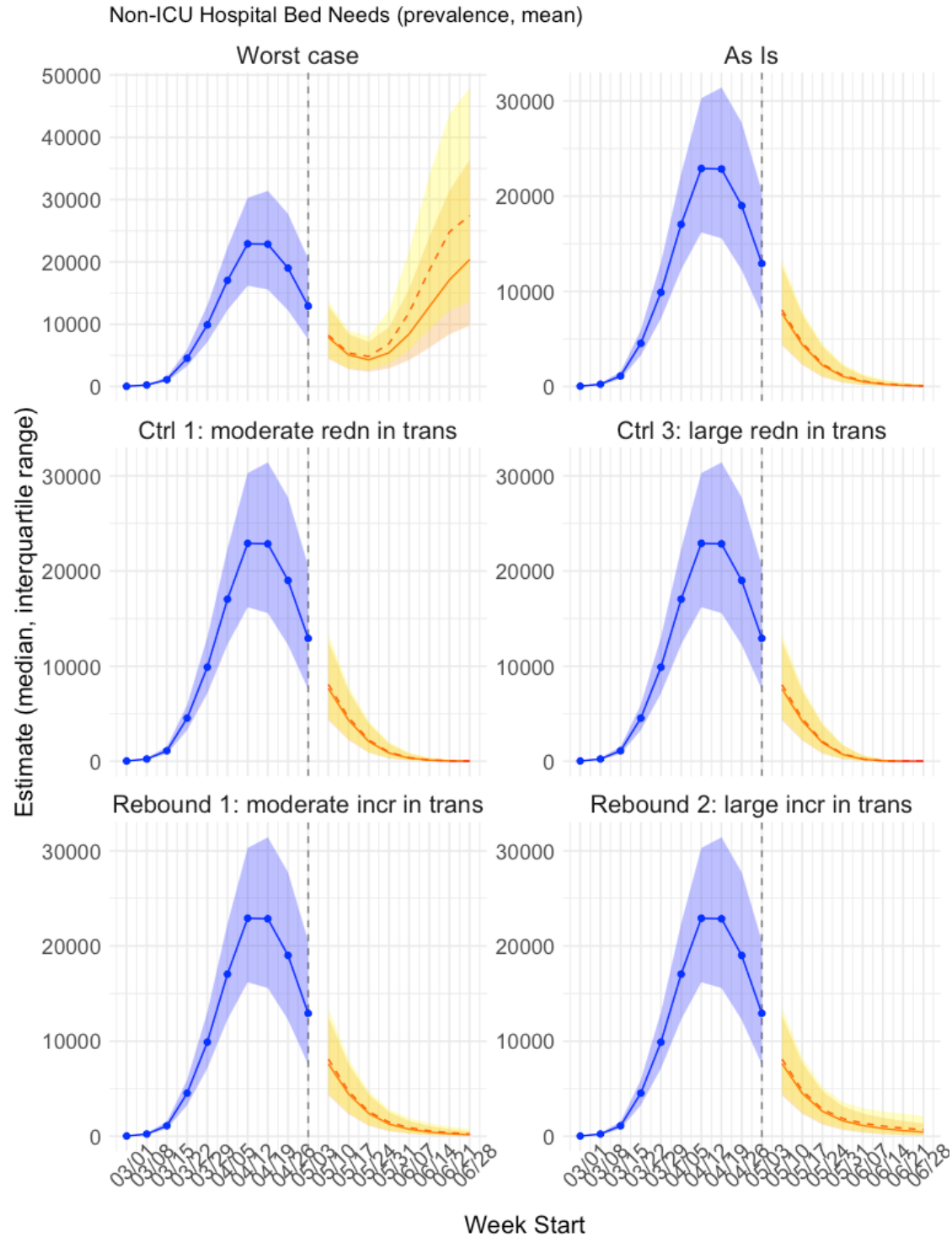## Total Hospital Bed Needs (prevalence, mean)

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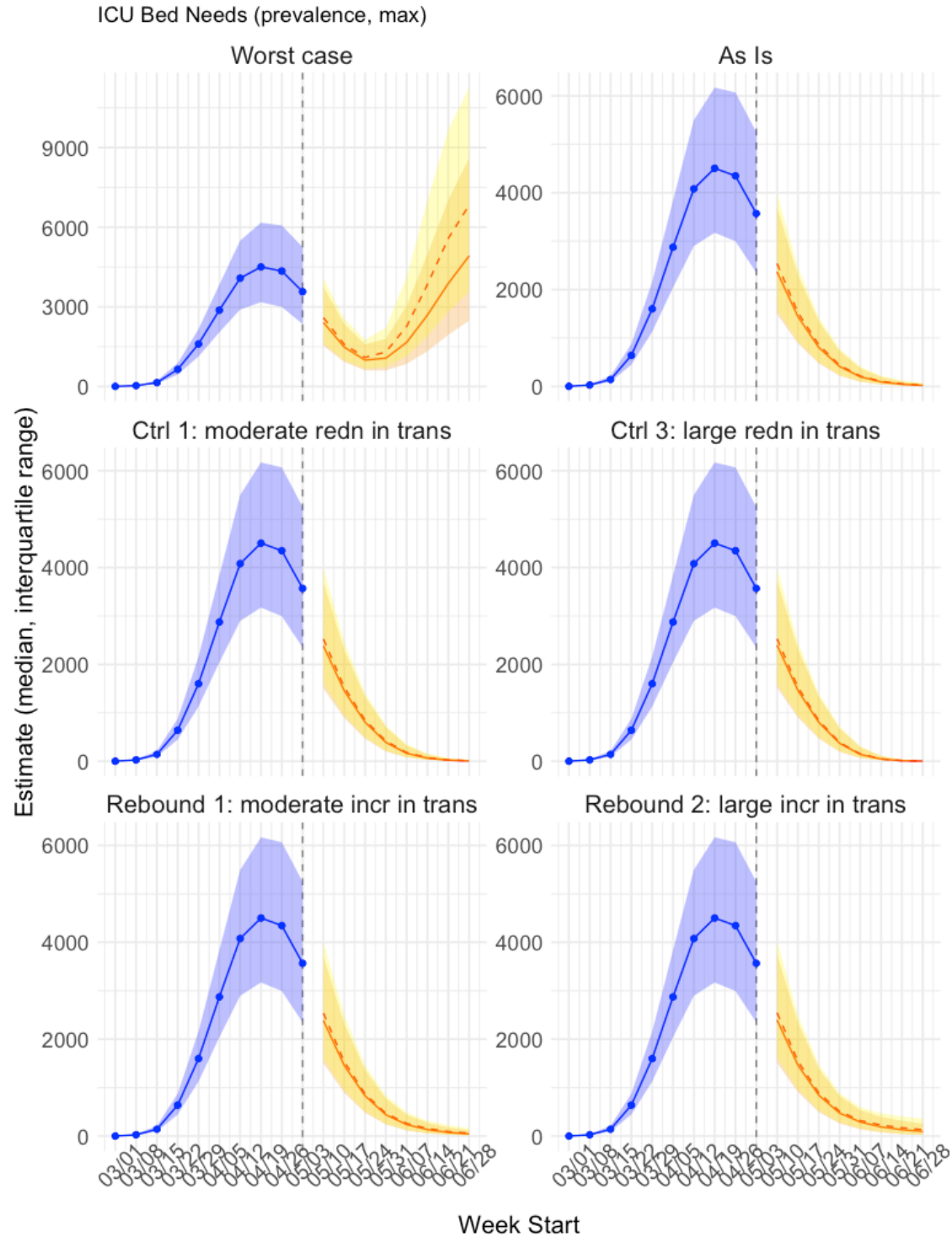seasonality (in yellow). Dates are the first day (i.e. Sunday) of the week.

Non-ICU Hospital Bed Needs (prevalence, max)

Projected number for the next 8 weeks under different control scenarios.
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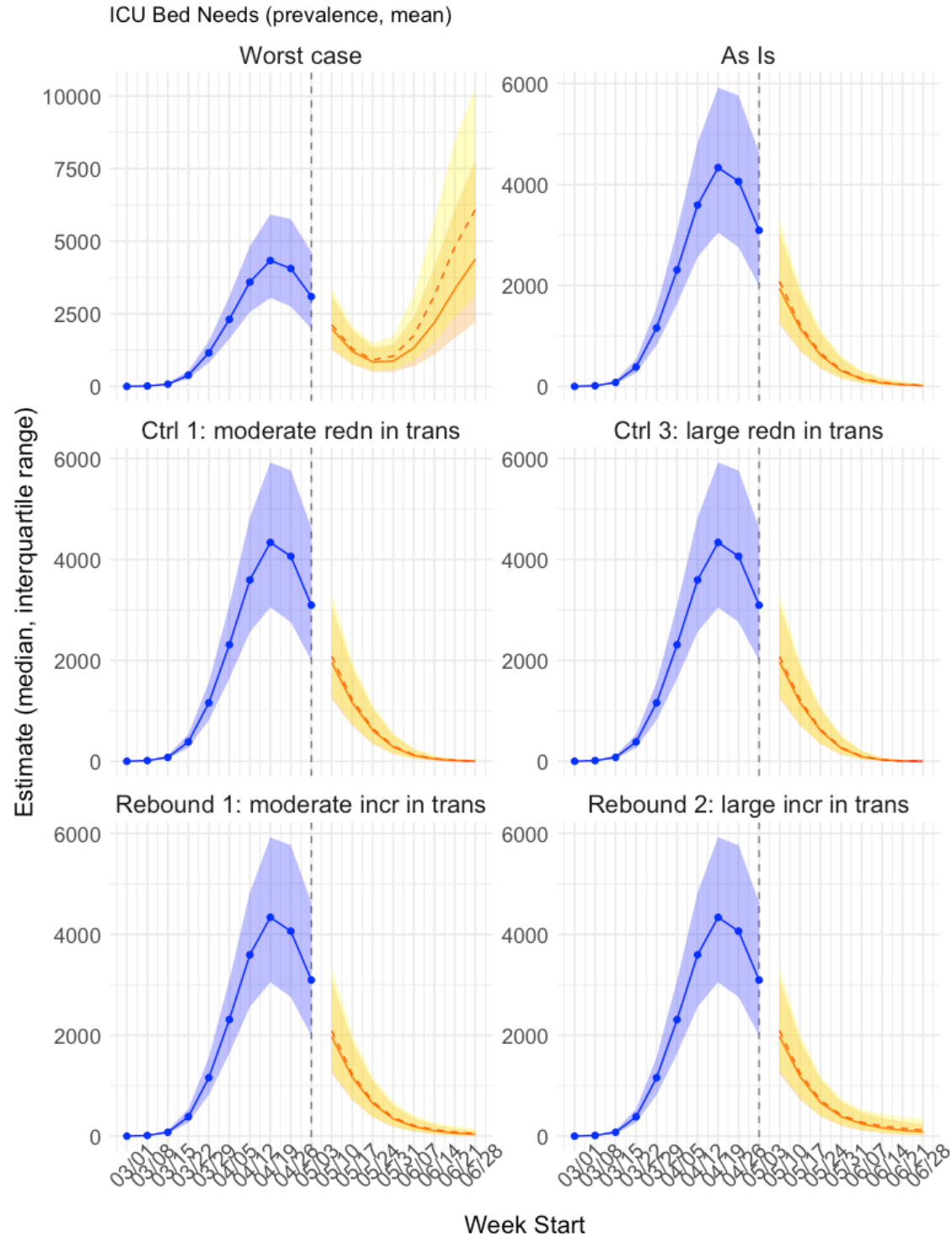Non-ICU Hospital Bed Needs (prevalence, mean)

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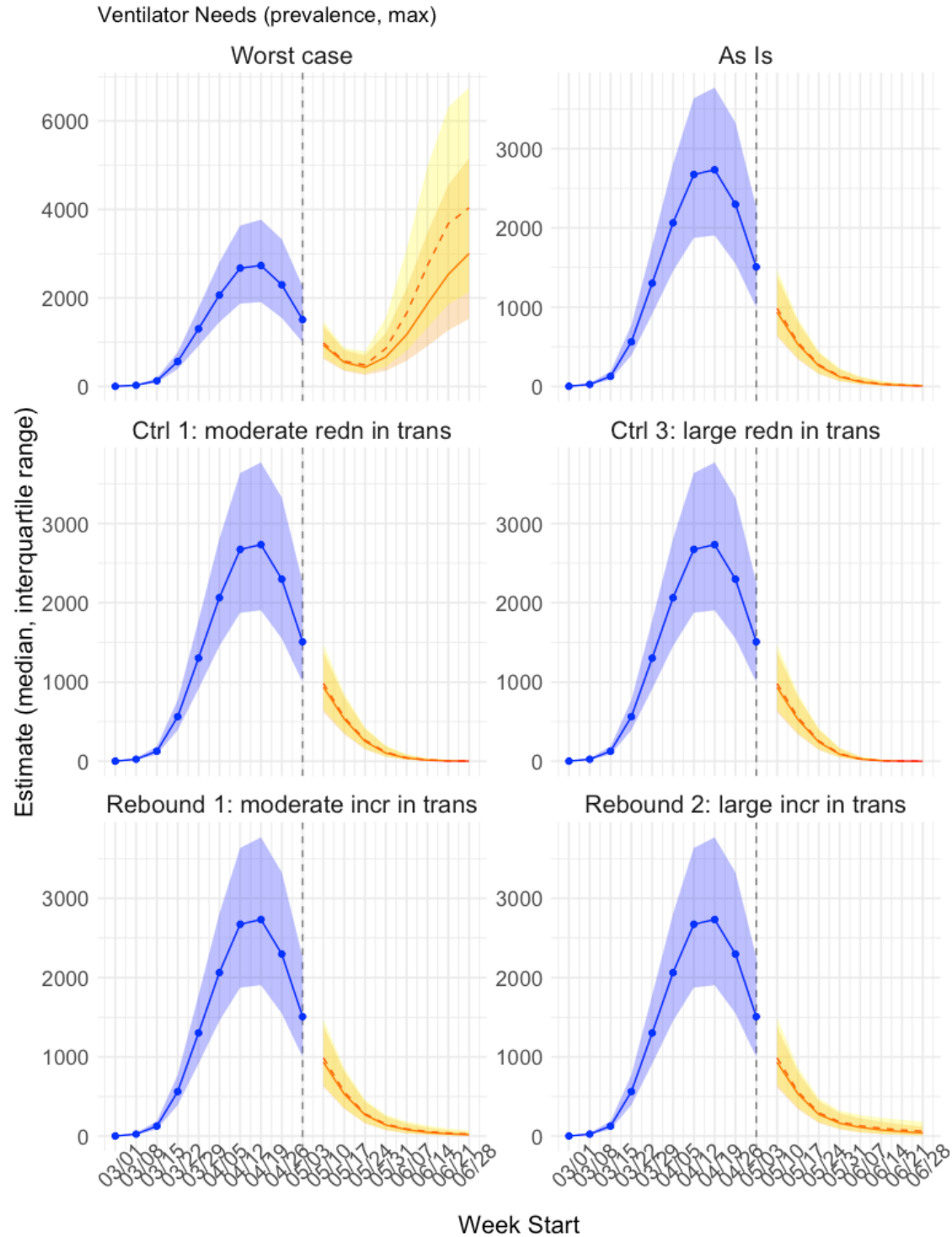
ICU Bed Needs (prevalence, max)

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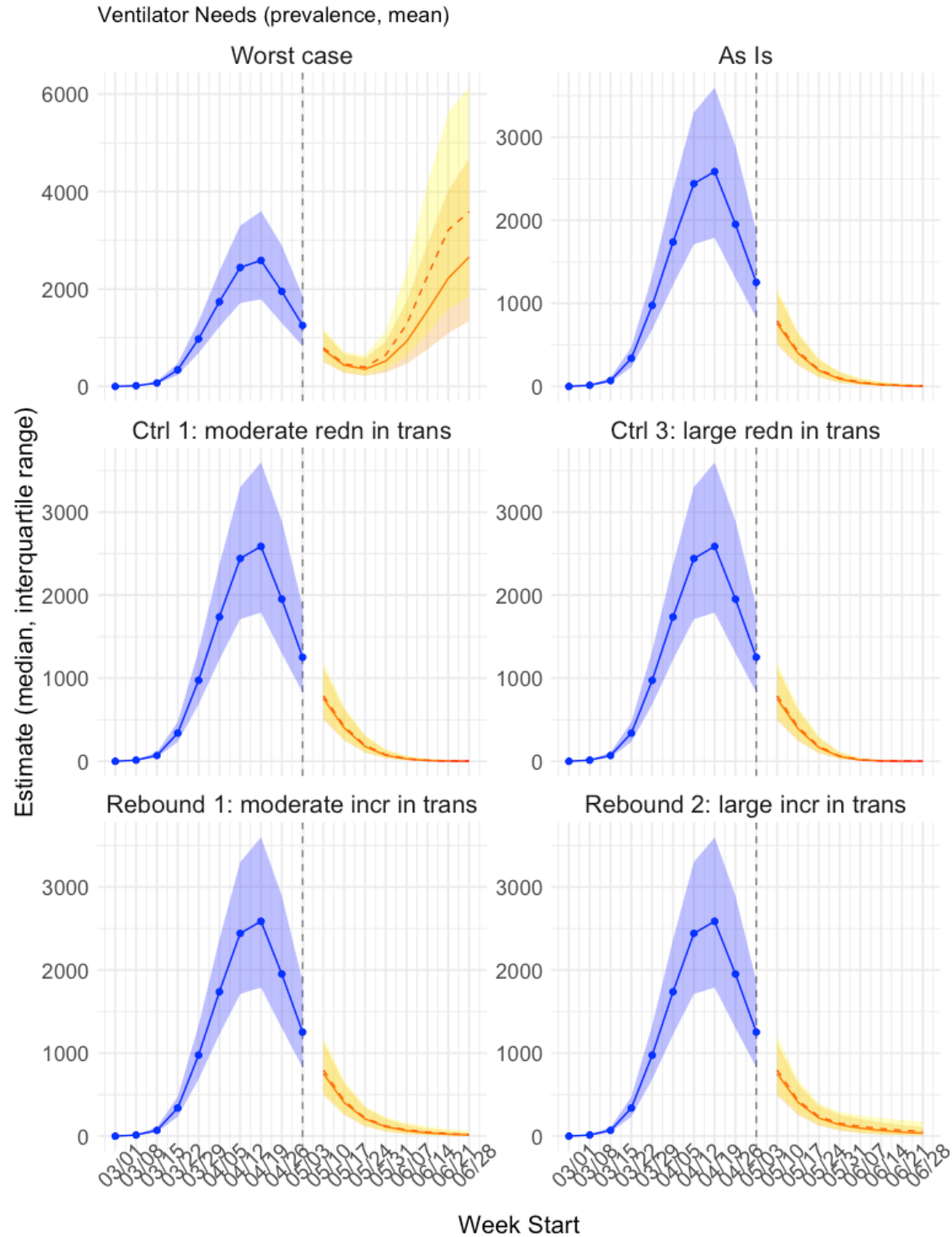
ICU Bed Needs (prevalence, mean)

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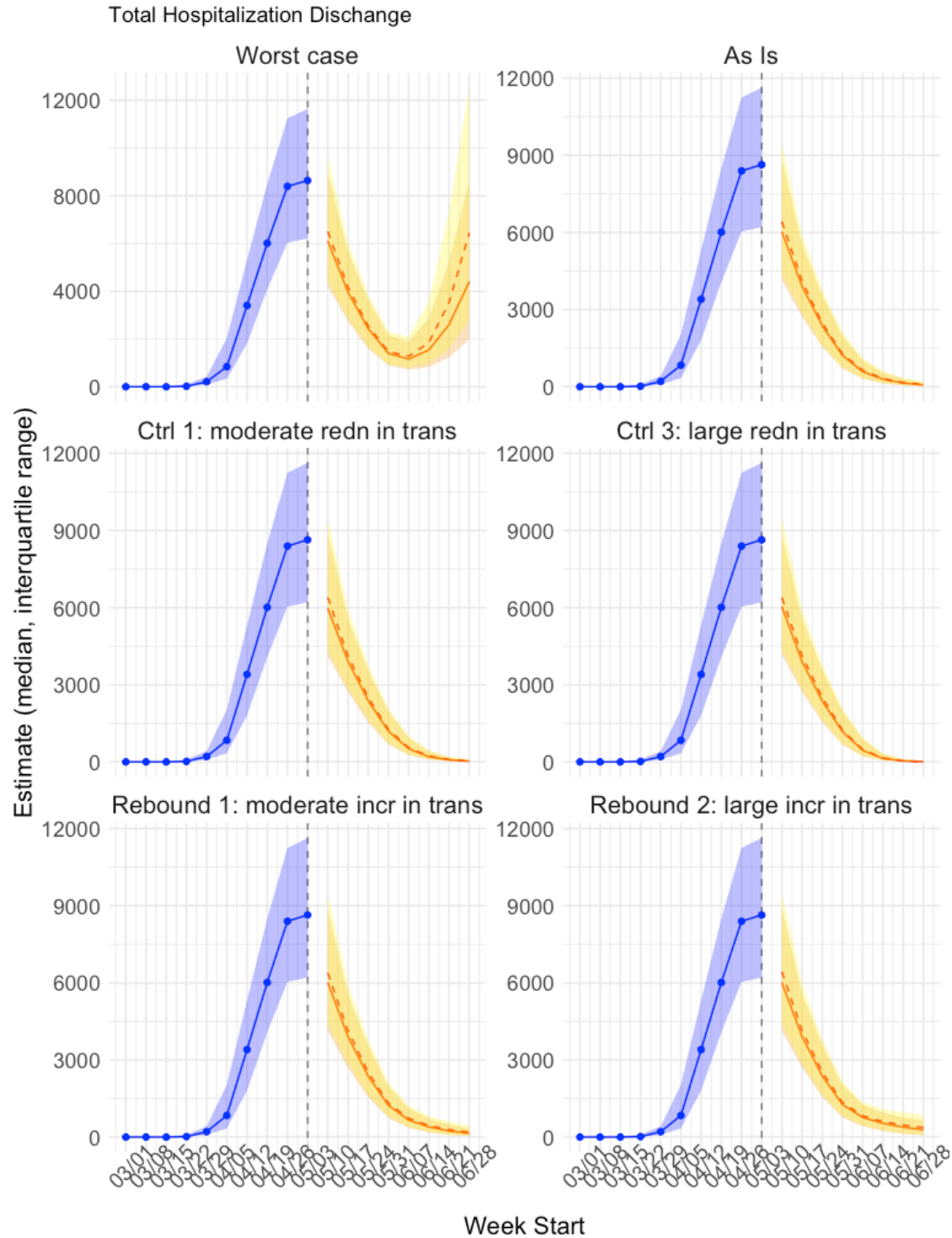
Ventilator Needs (prevalence, max)

Projected number for the next 8 weeks under different control scenarios.
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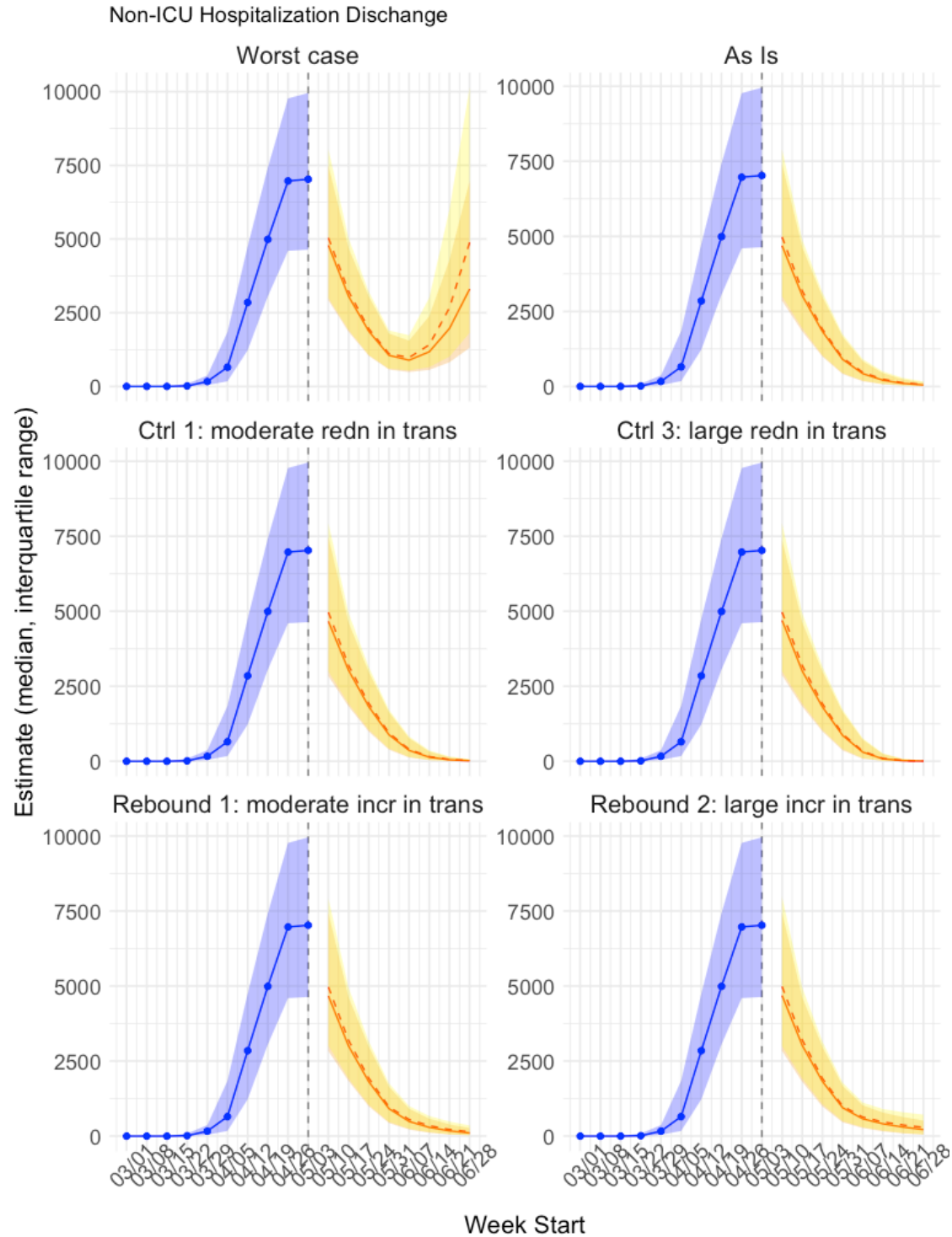
Ventilator Needs (prevalence, mean)

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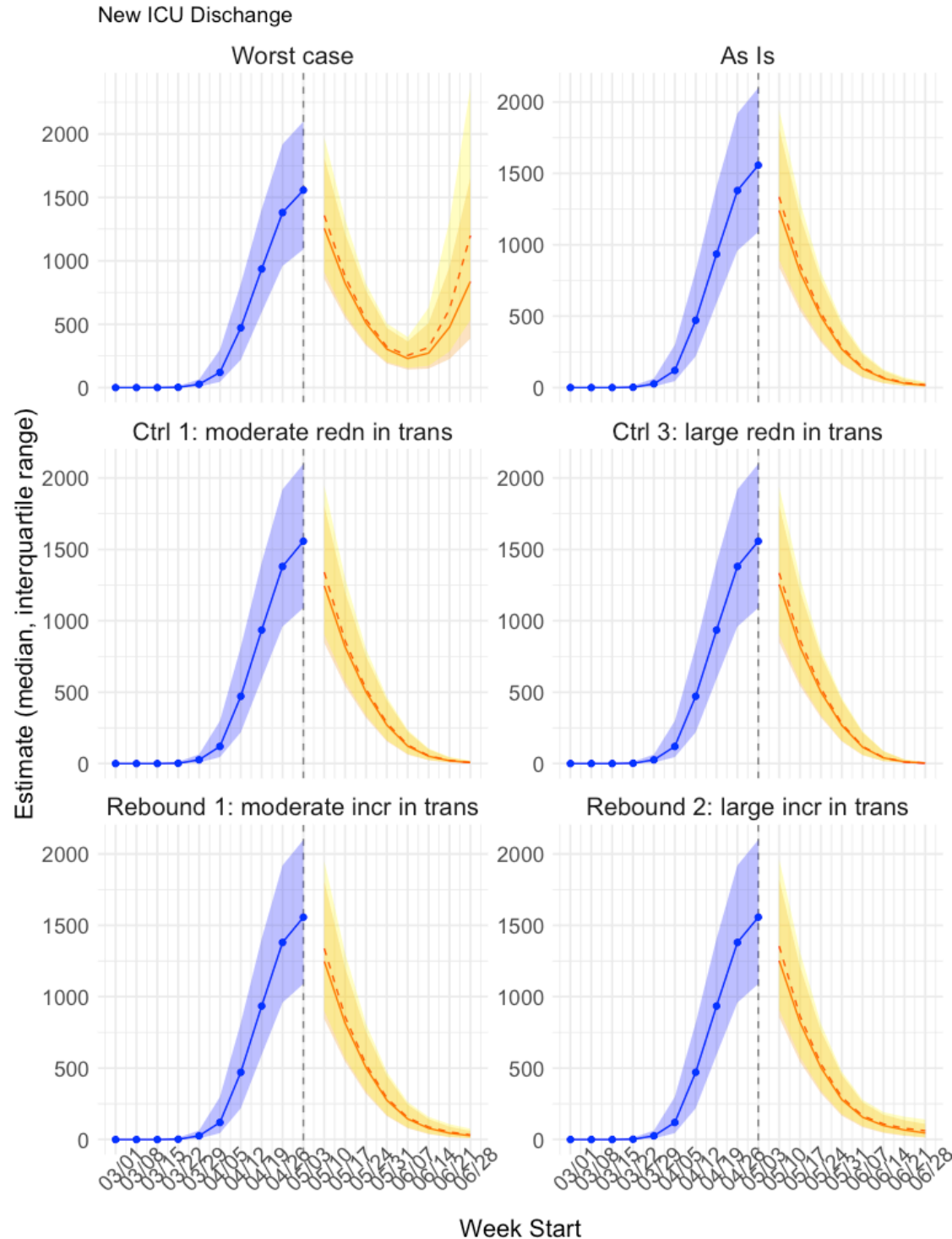
Total Hospitalization Discharge

Projected number for the next 8 weeks under different control scenarios.
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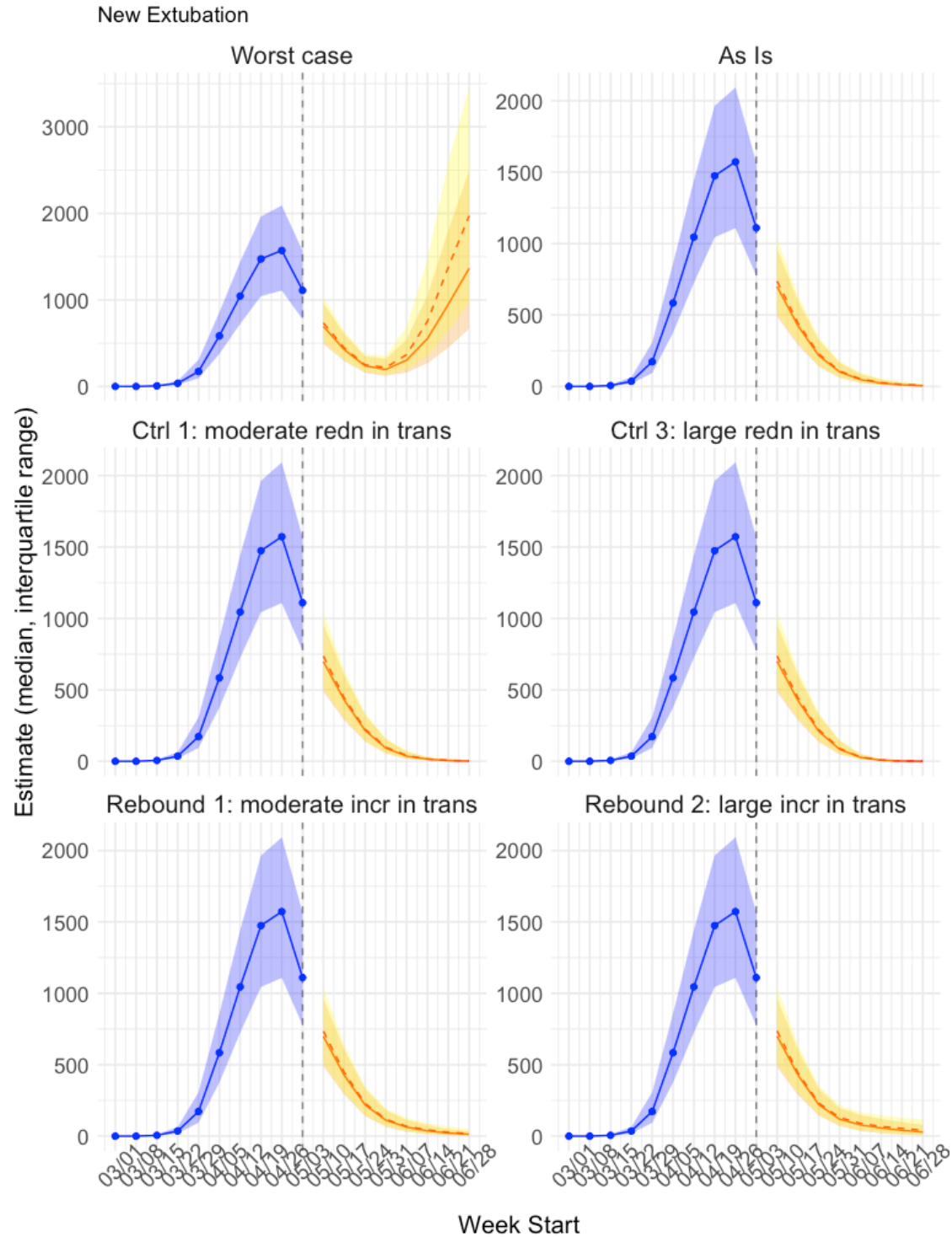
Non-ICU Hospitalization Dischange

Projected number for the next 8 weeks under different control scenarios.
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New ICU Dischange

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New Extubation

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