Eight-Week COVID19 Projections for New York City

Wan Yang, Sasikiran Kandula, Jeffrey Shaman

Document Date: 8/7/2020

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 from 5/8/20 onwards: the model was trained on both incidence and mortality data (combining covid-19 confirmed and probable deaths). Results in this report were generated using an age-specific, neighborhood-level network model, and aggregated over all age groups and neighborhoods for the City.
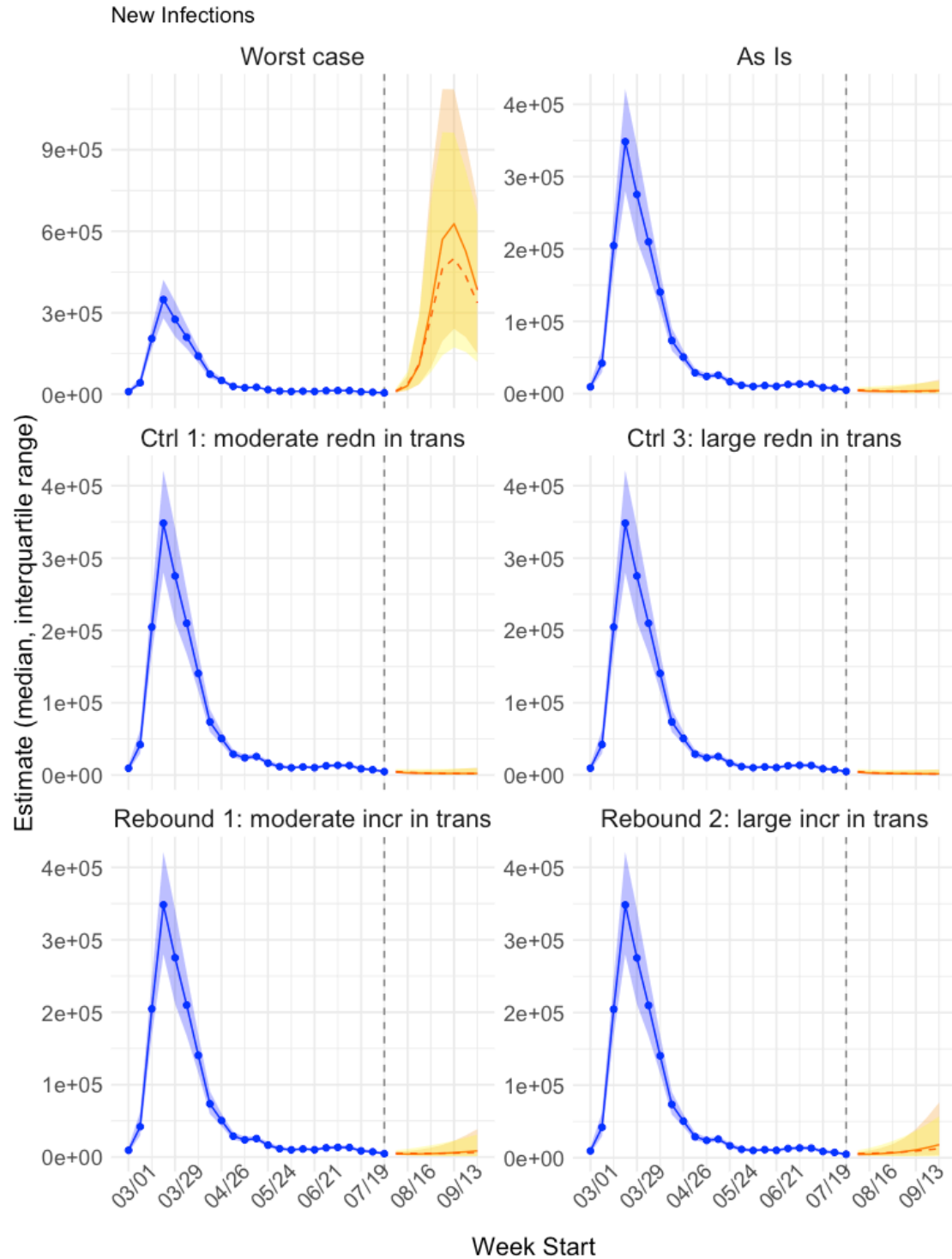
For more details on Methods, see README.pdf

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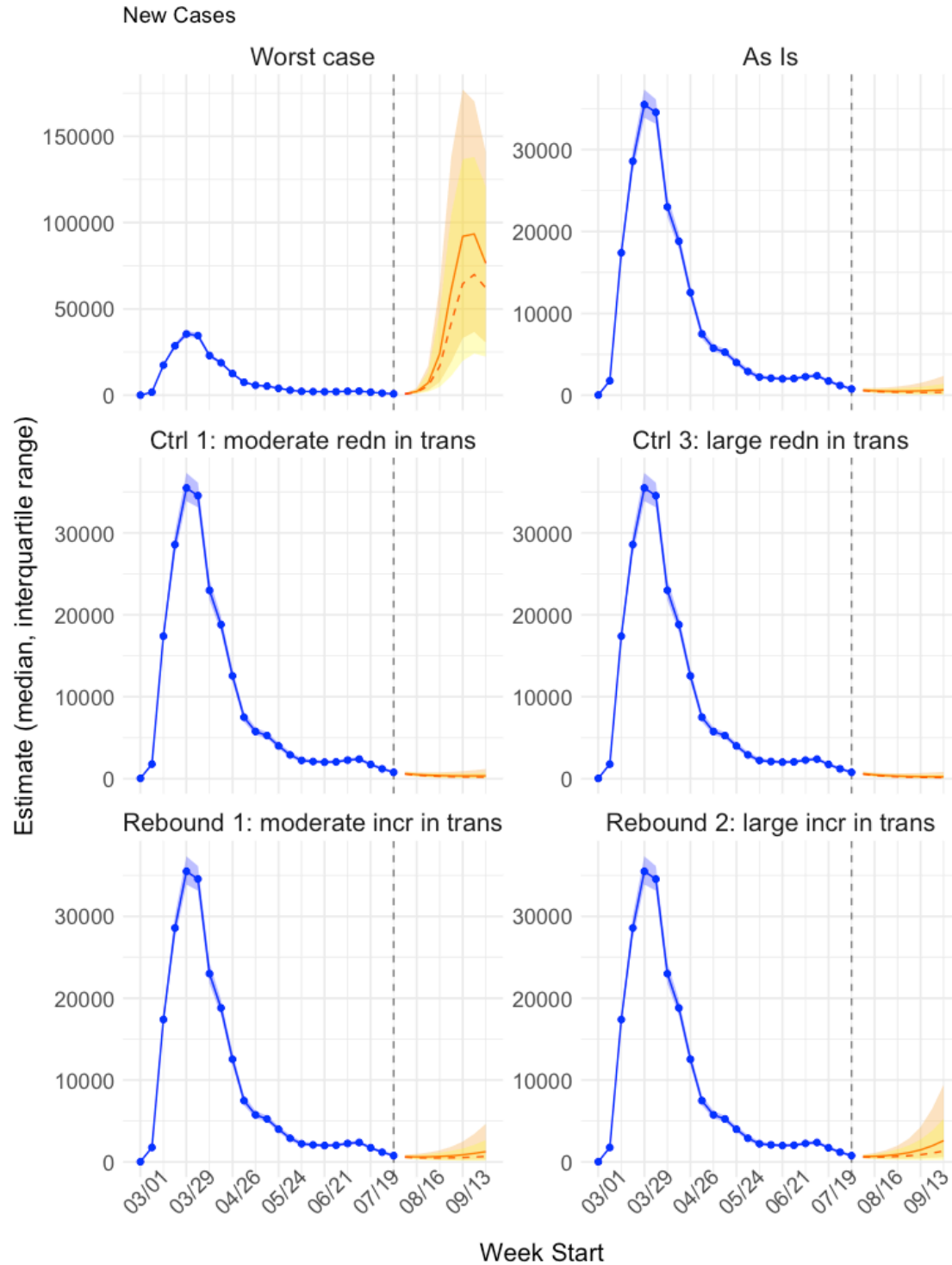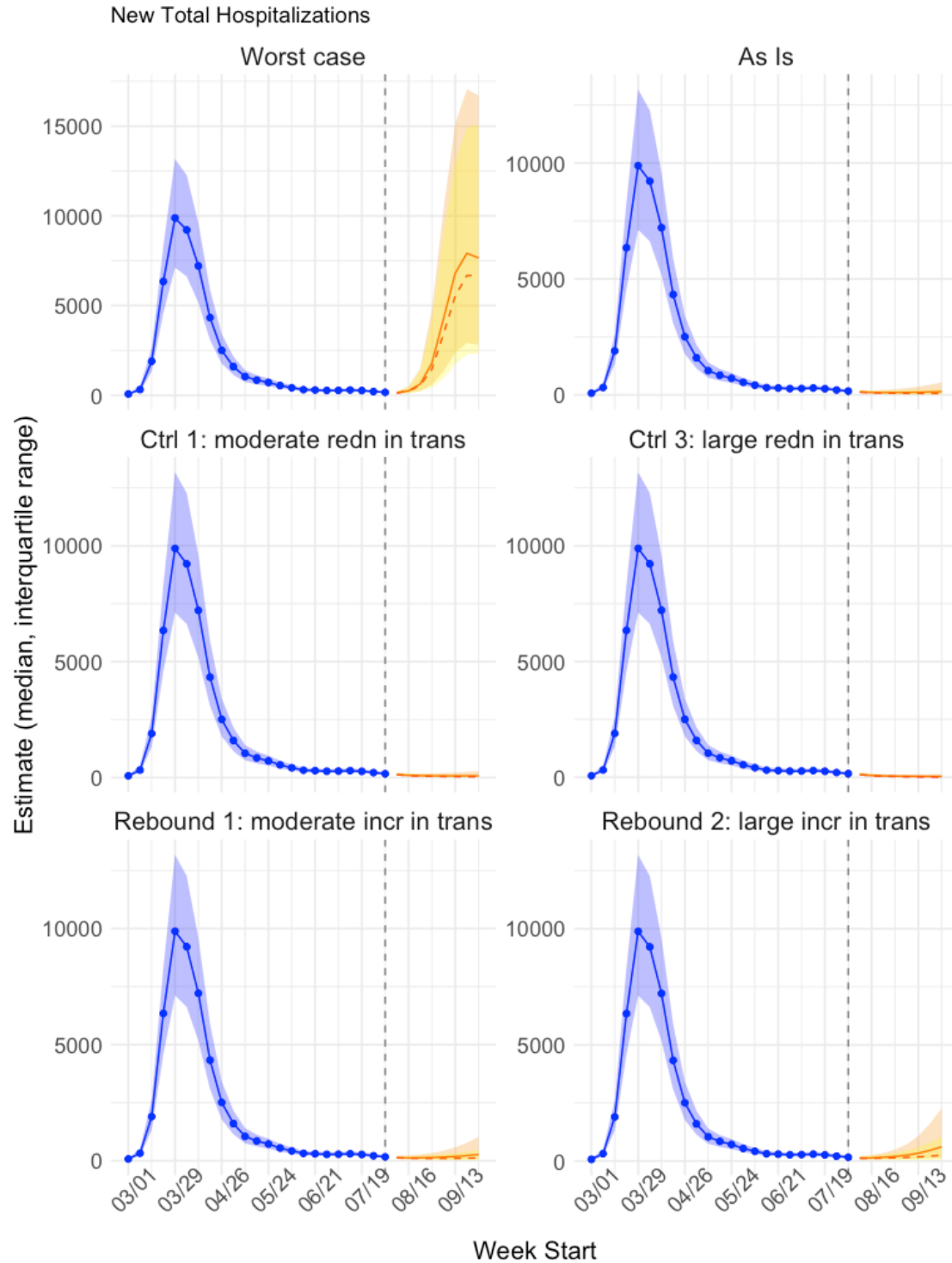
See summary plots below.

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.
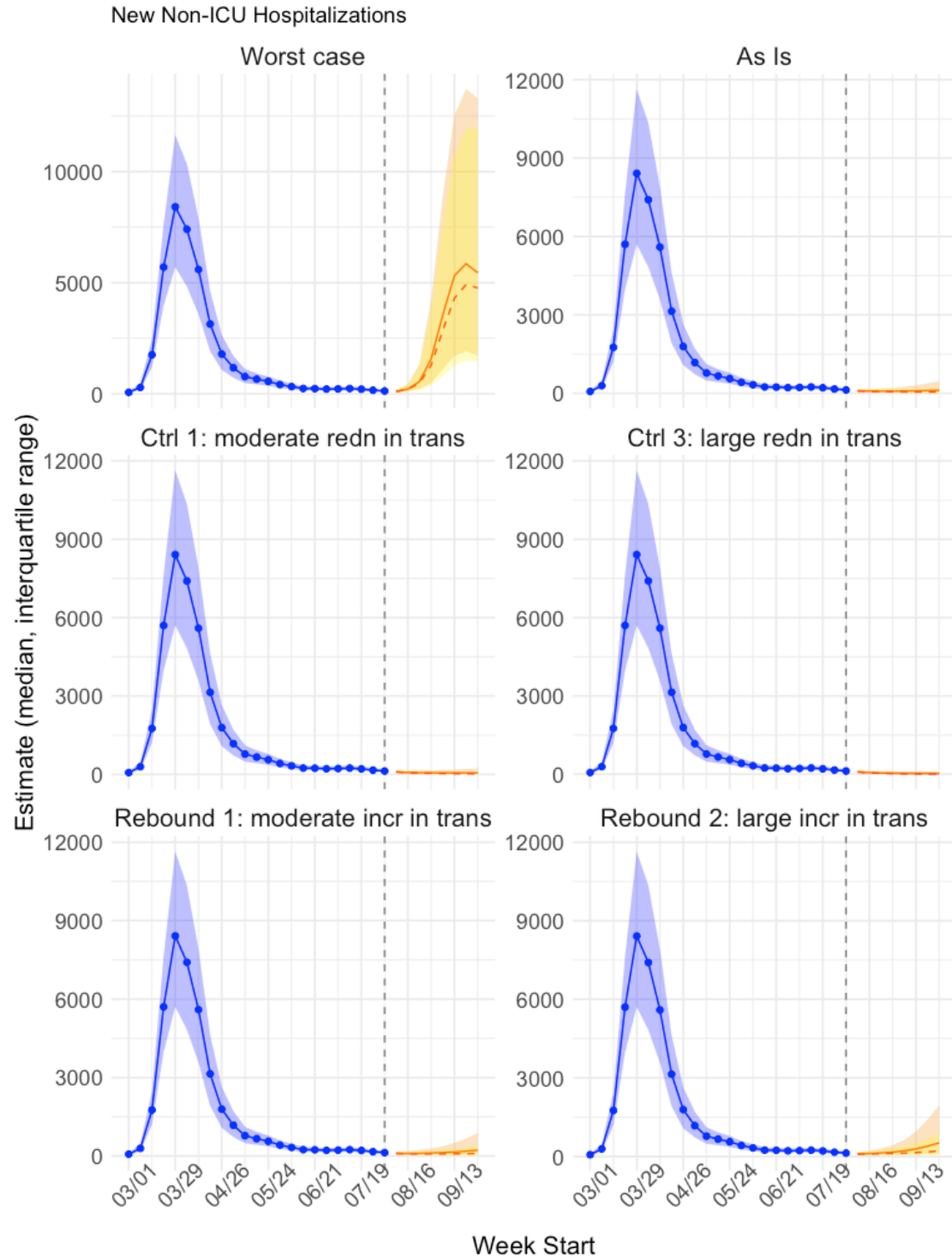
New Cases

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.
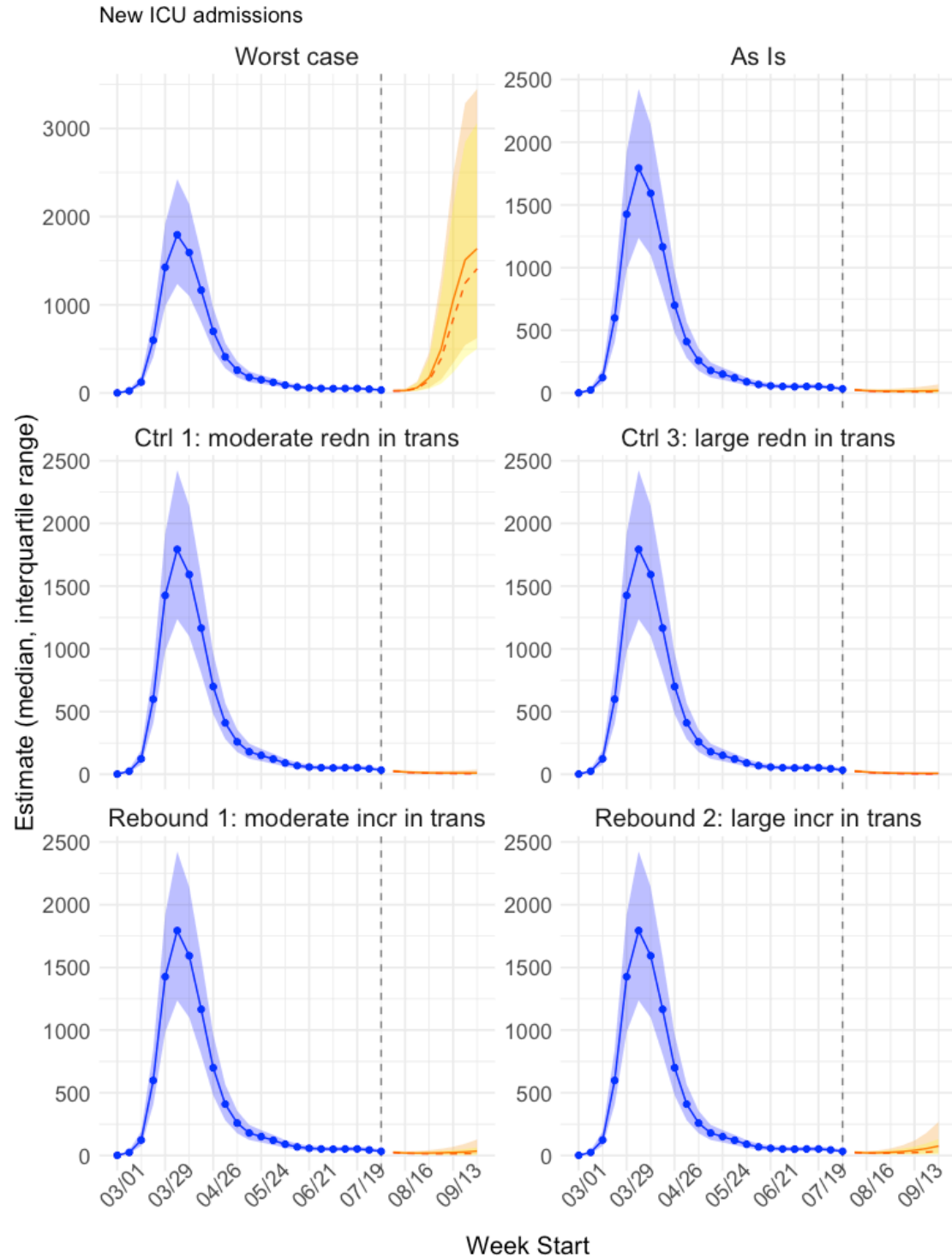
New Total Hospitalizations

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.
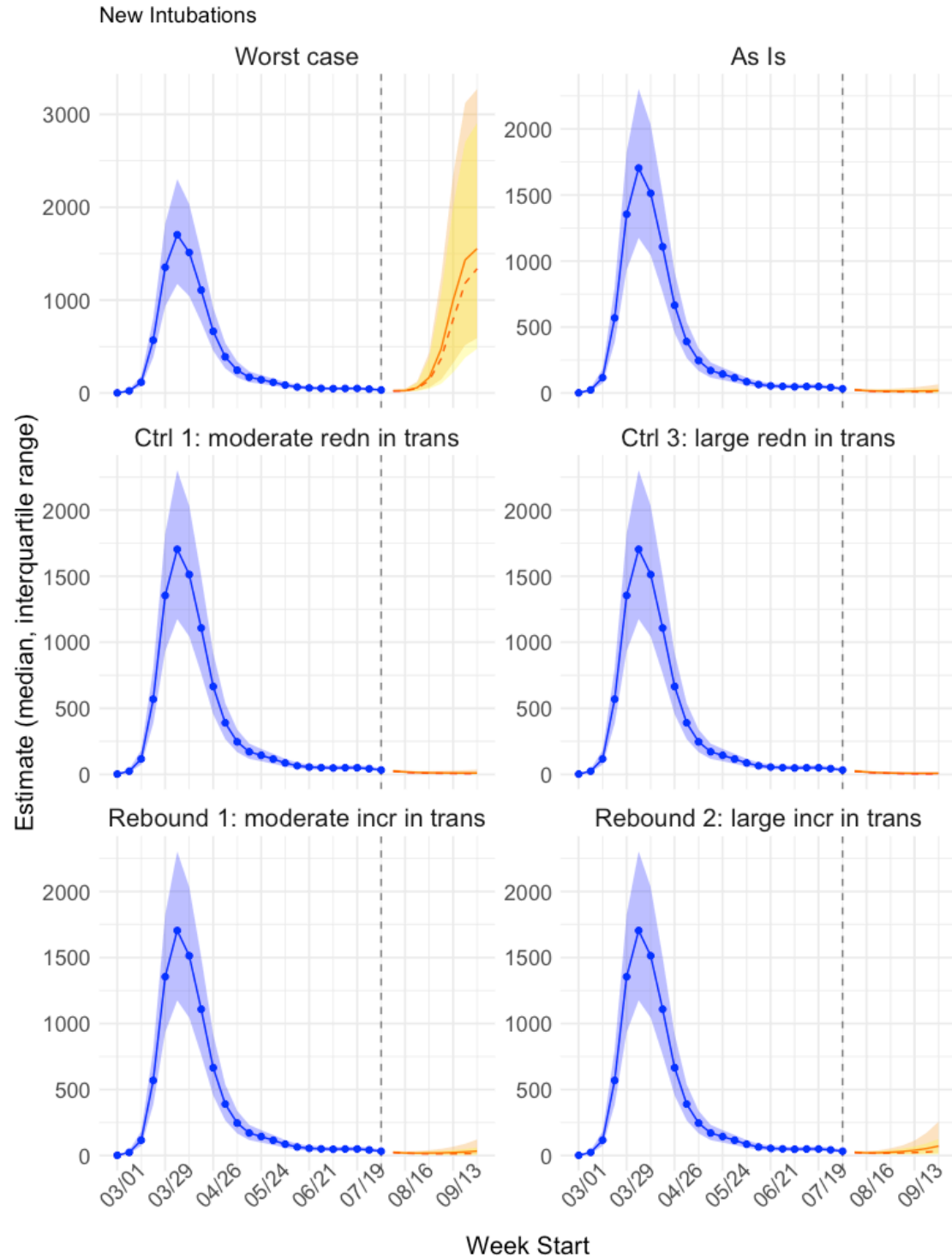
New Non-ICU Hospitalizations

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.
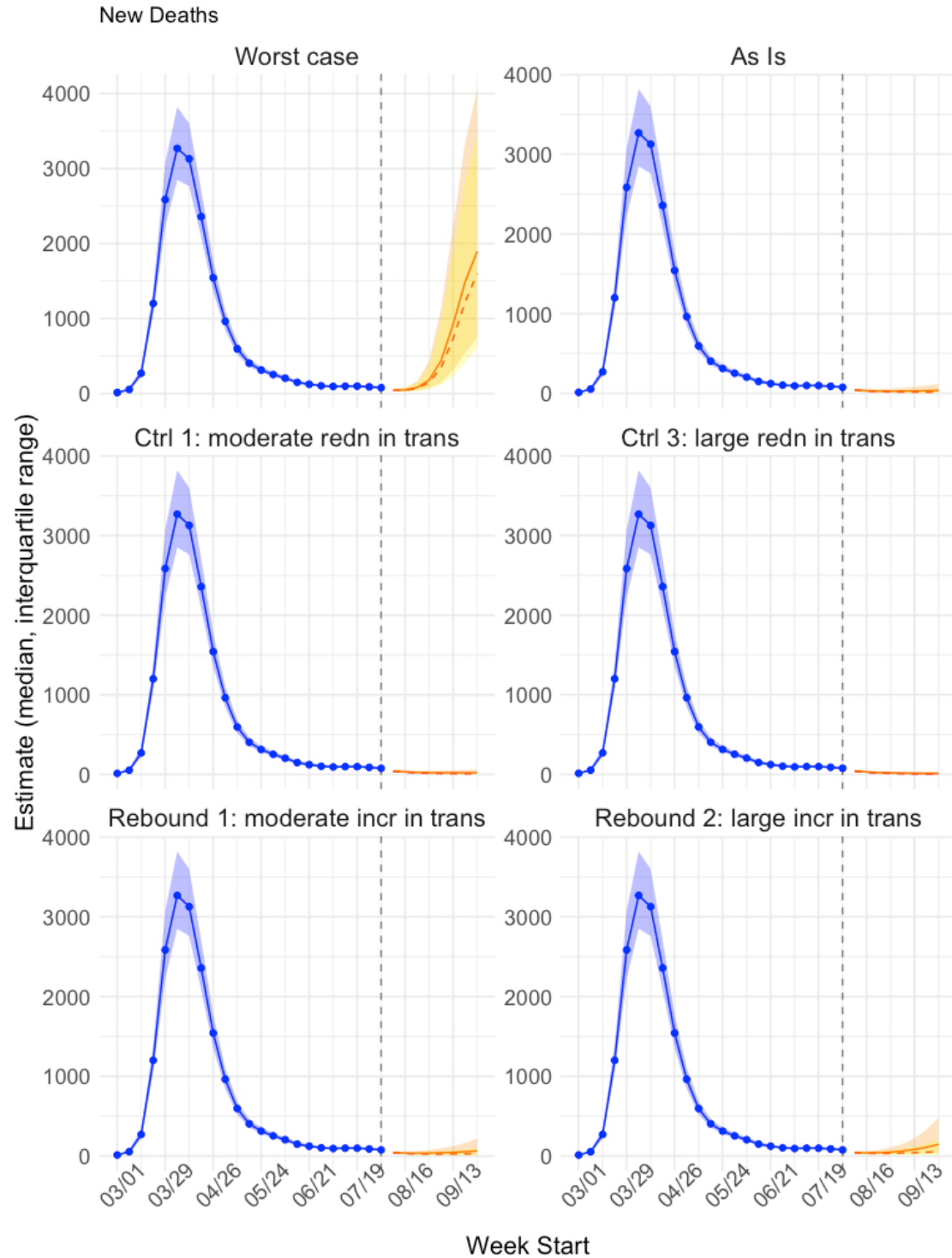
New ICU admissions

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.
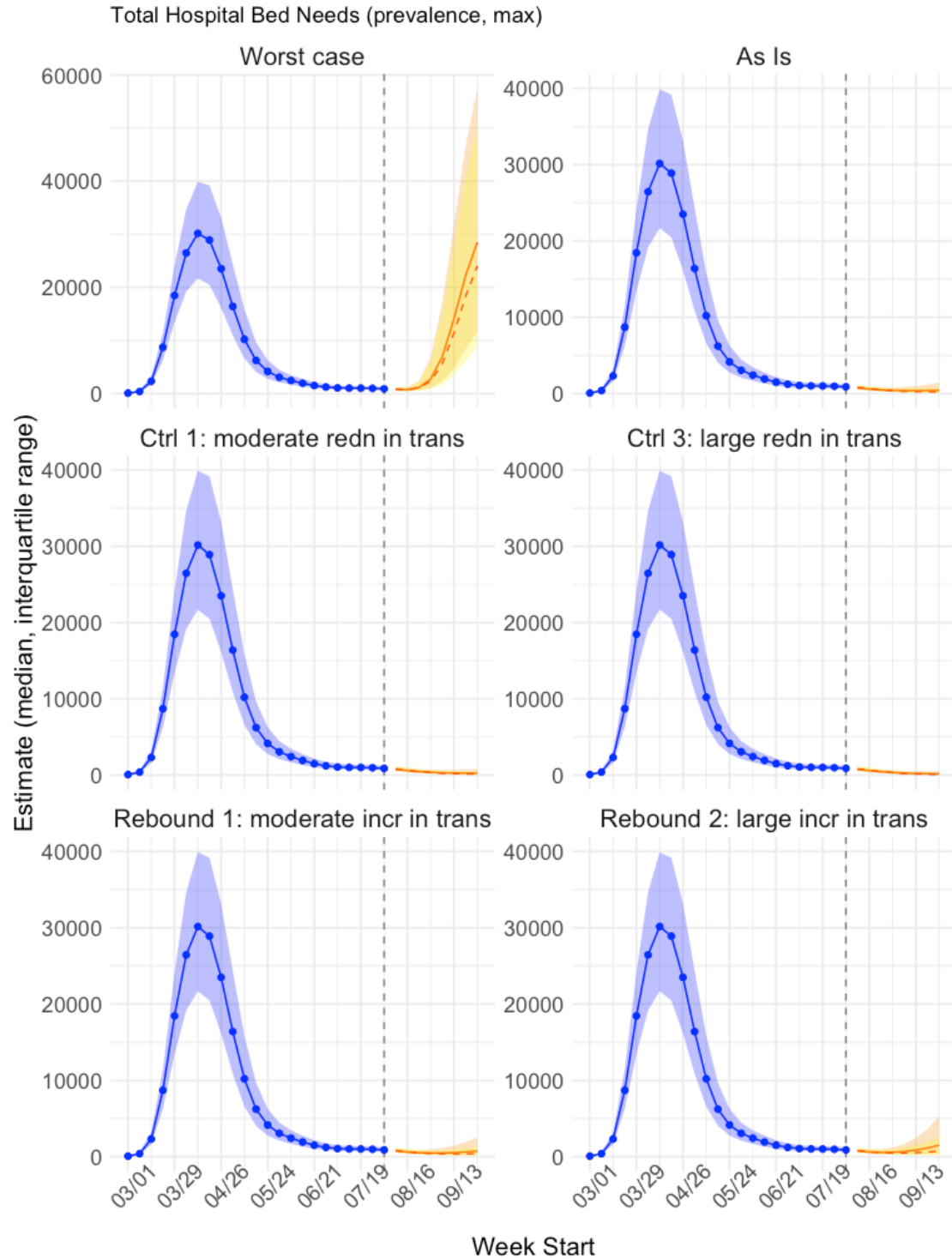
New Intubations

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.
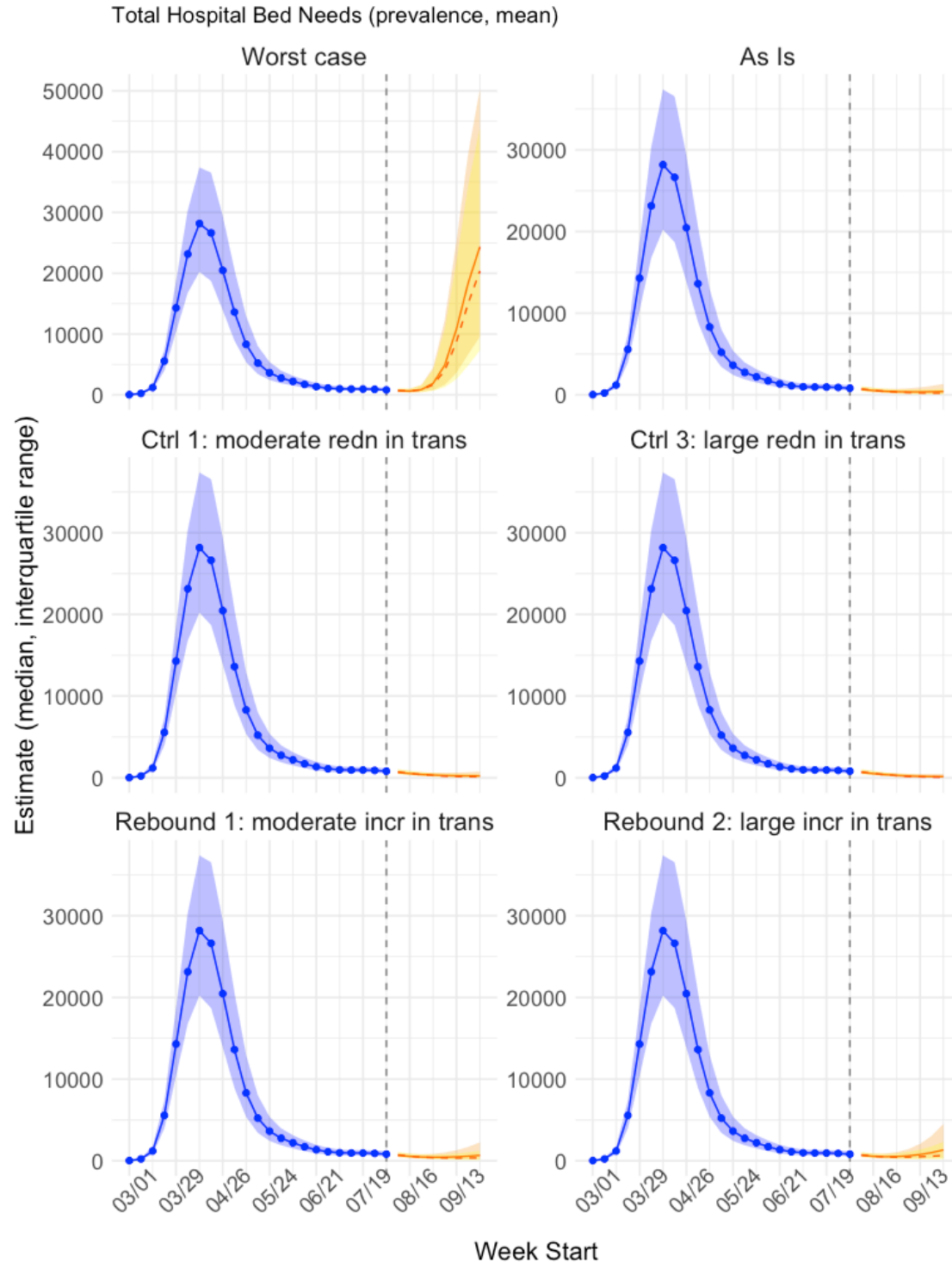
New Deaths

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.
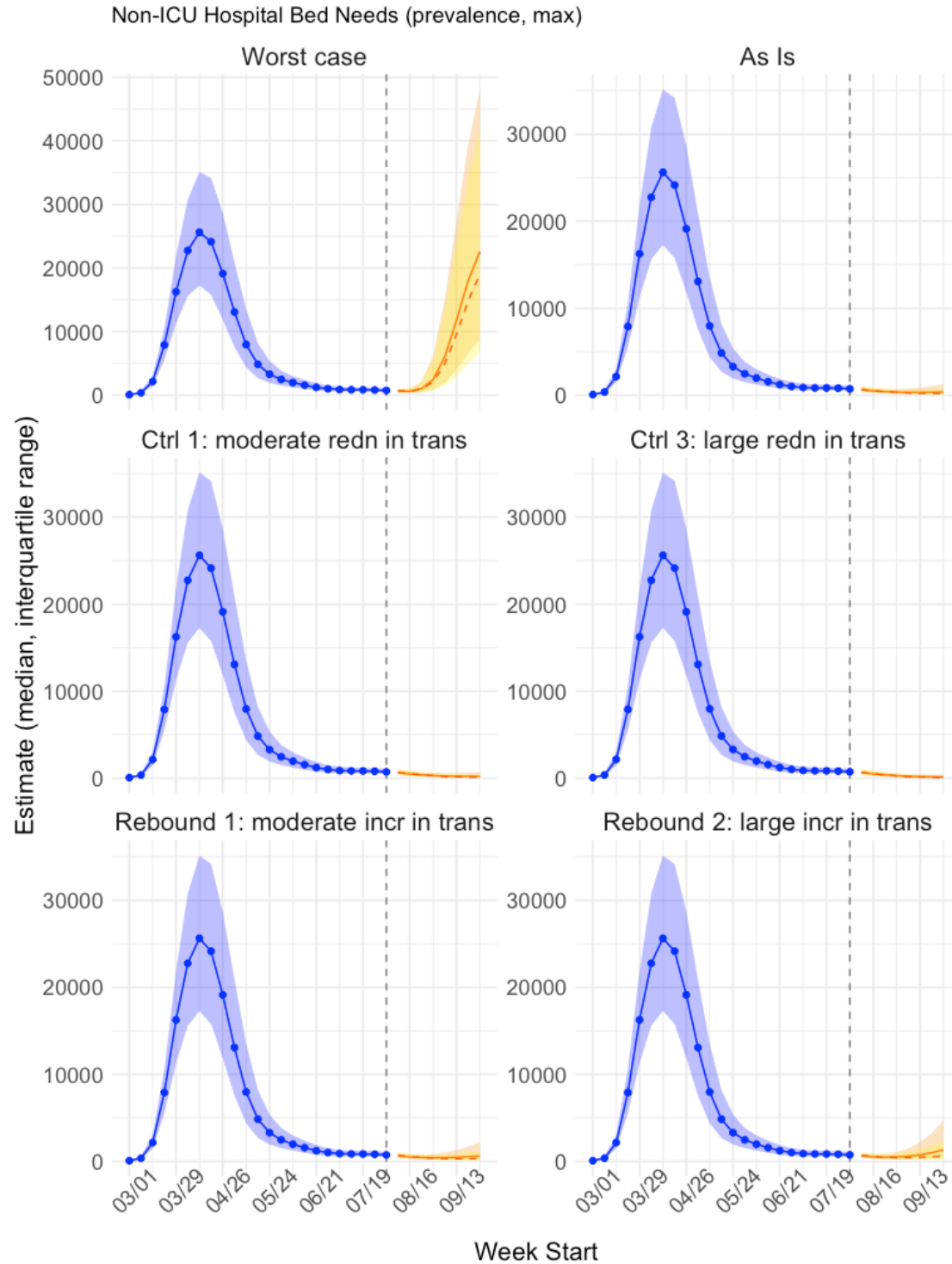
Total Hospital Bed Needs (prevalence, max)

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.
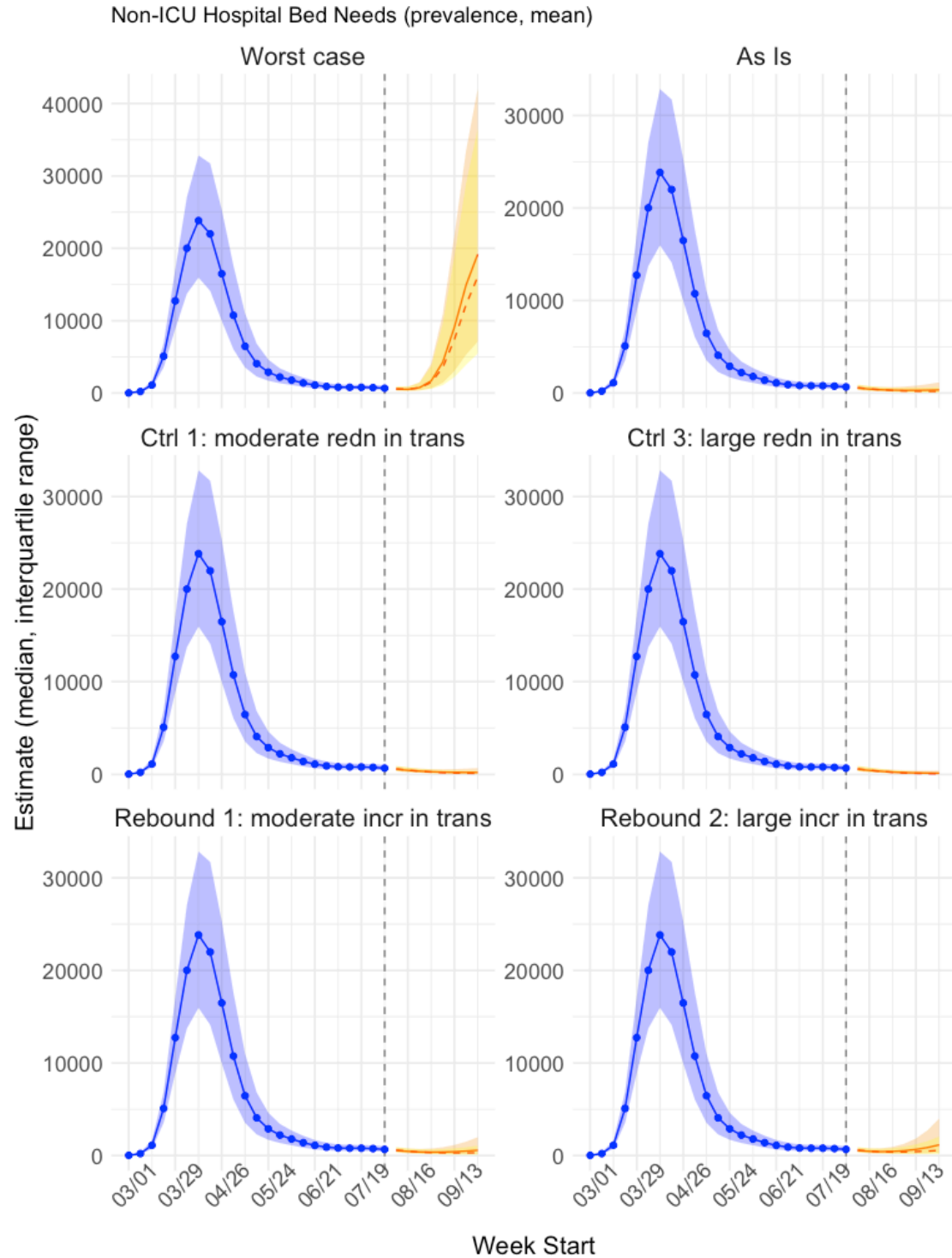
Total Hospital Bed Needs (prevalence, mean)

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.

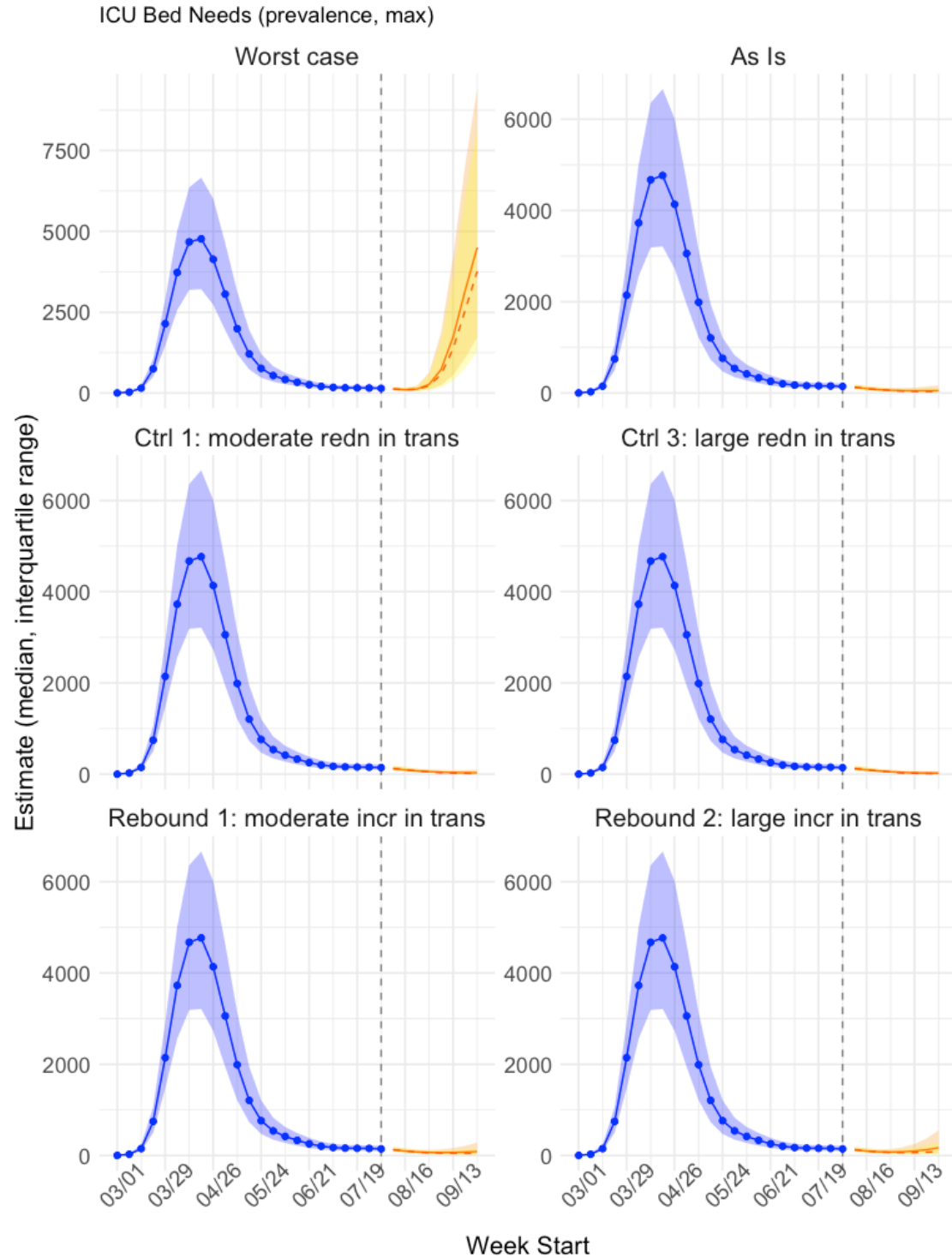## Non-ICU Hospital Bed Needs (prevalence, max)

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.

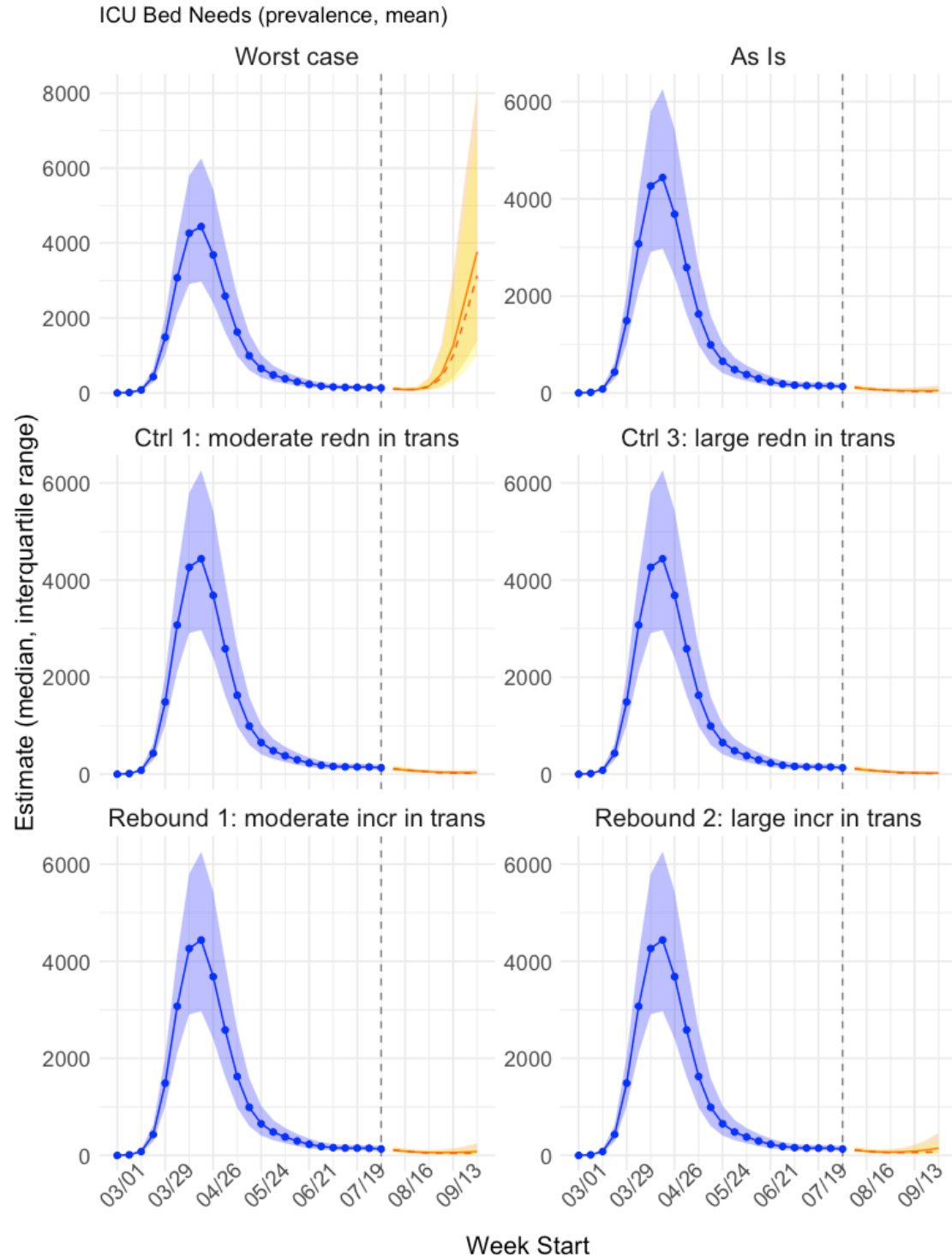# Non-ICU Hospital Bed Needs (prevalence, mean)

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.
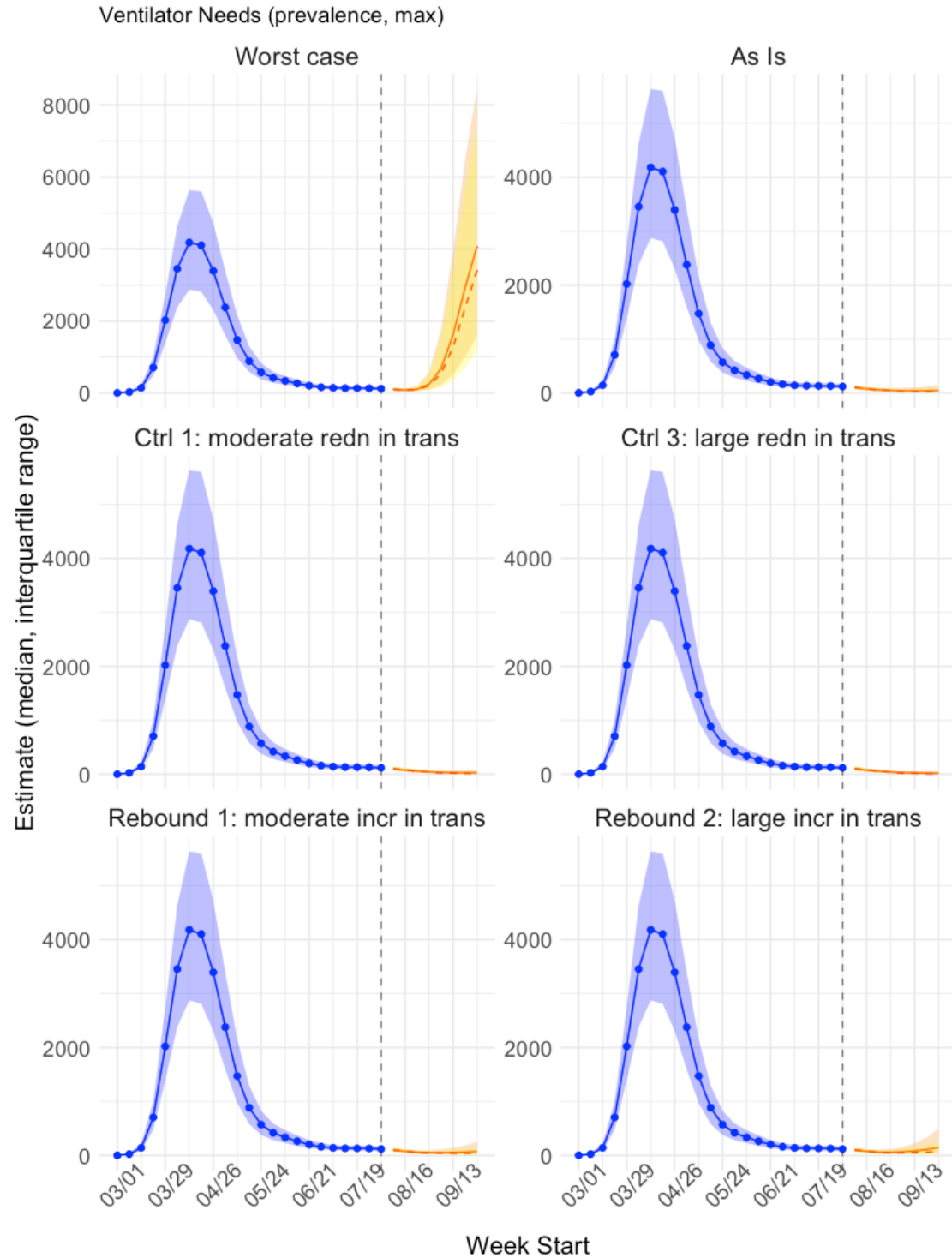
ICU Bed Needs (prevalence, max)

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.
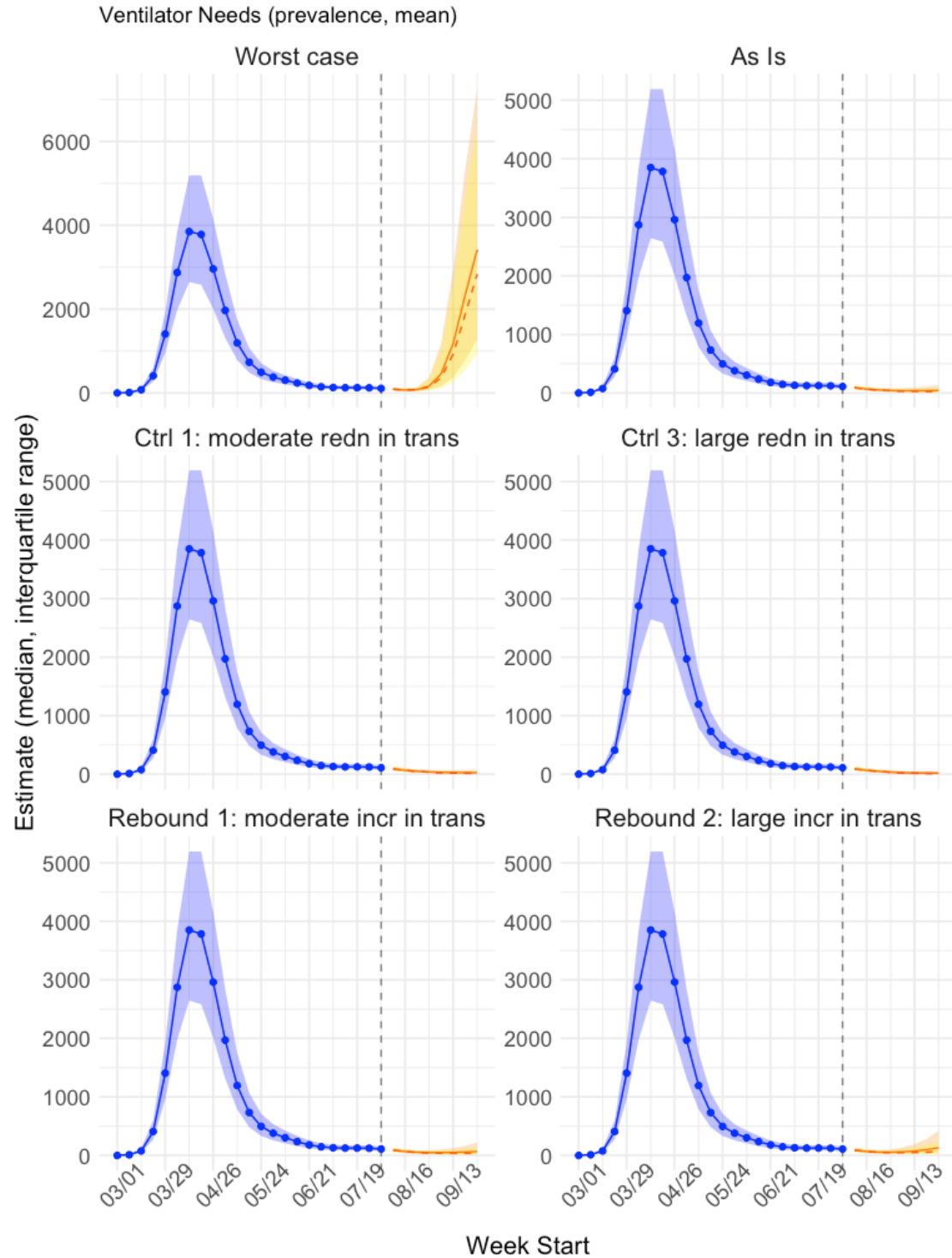
ICU Bed Needs (prevalence, mean)

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.
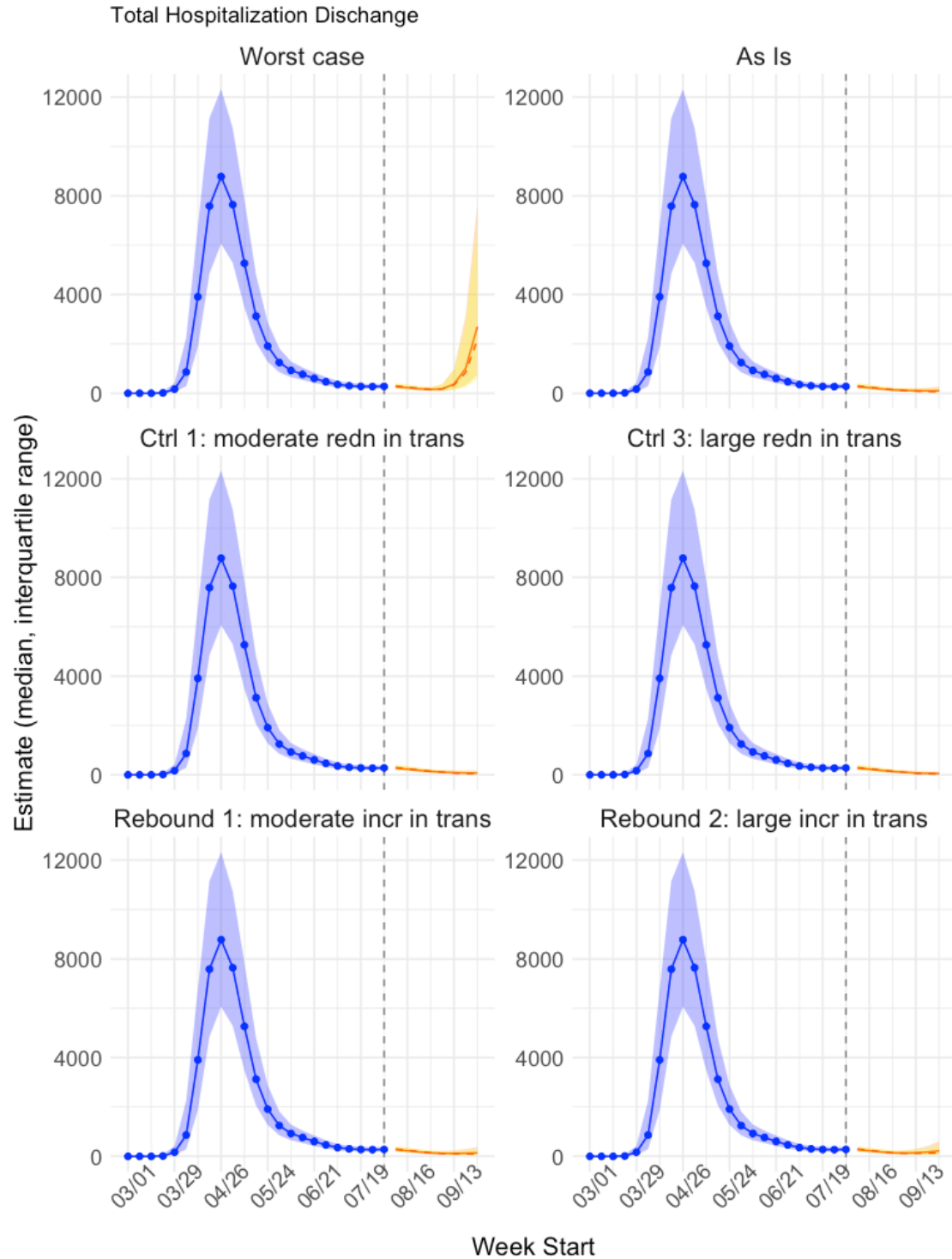
Ventilator Needs (prevalence, max)

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.
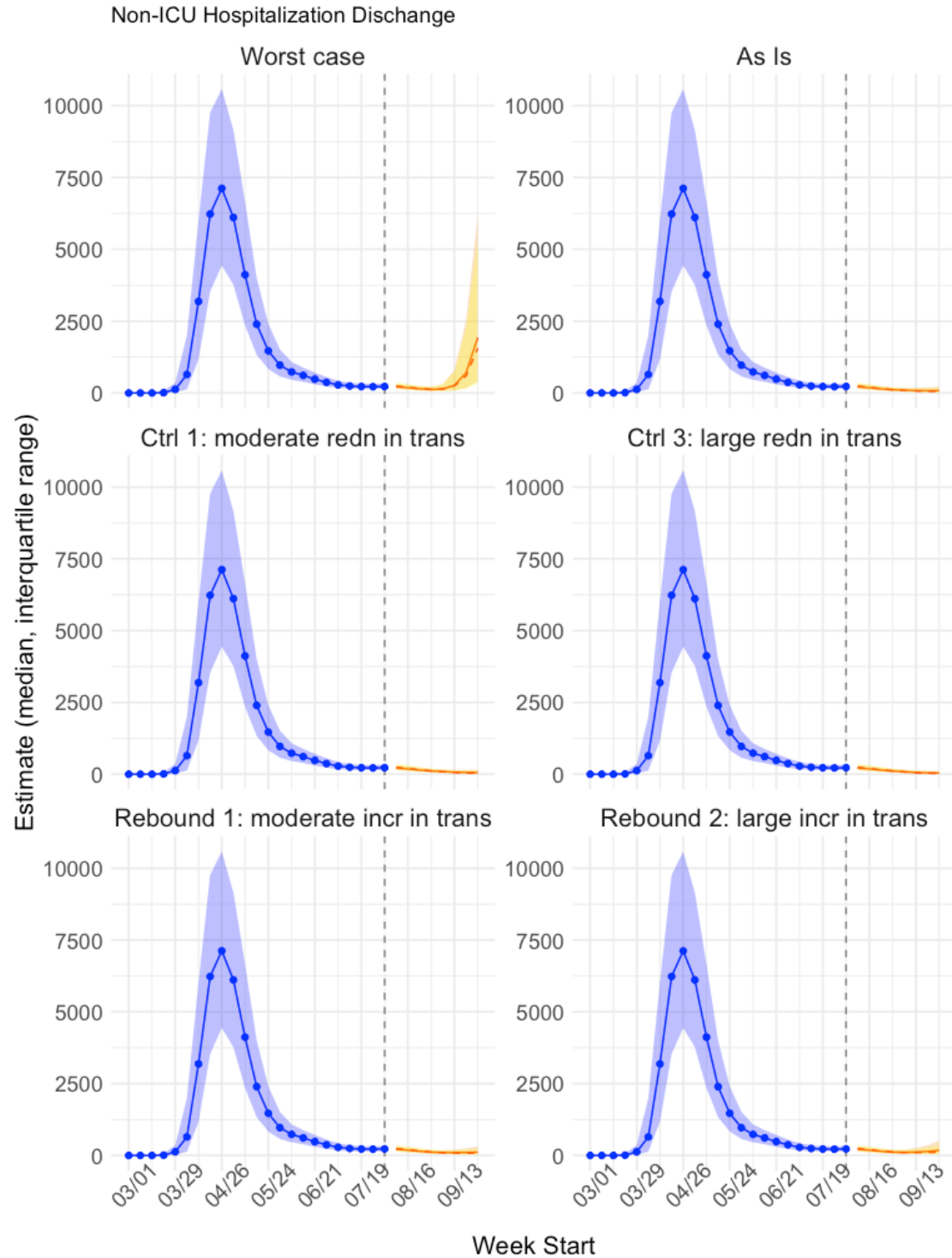
Ventilator Needs (prevalence, mean)

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.
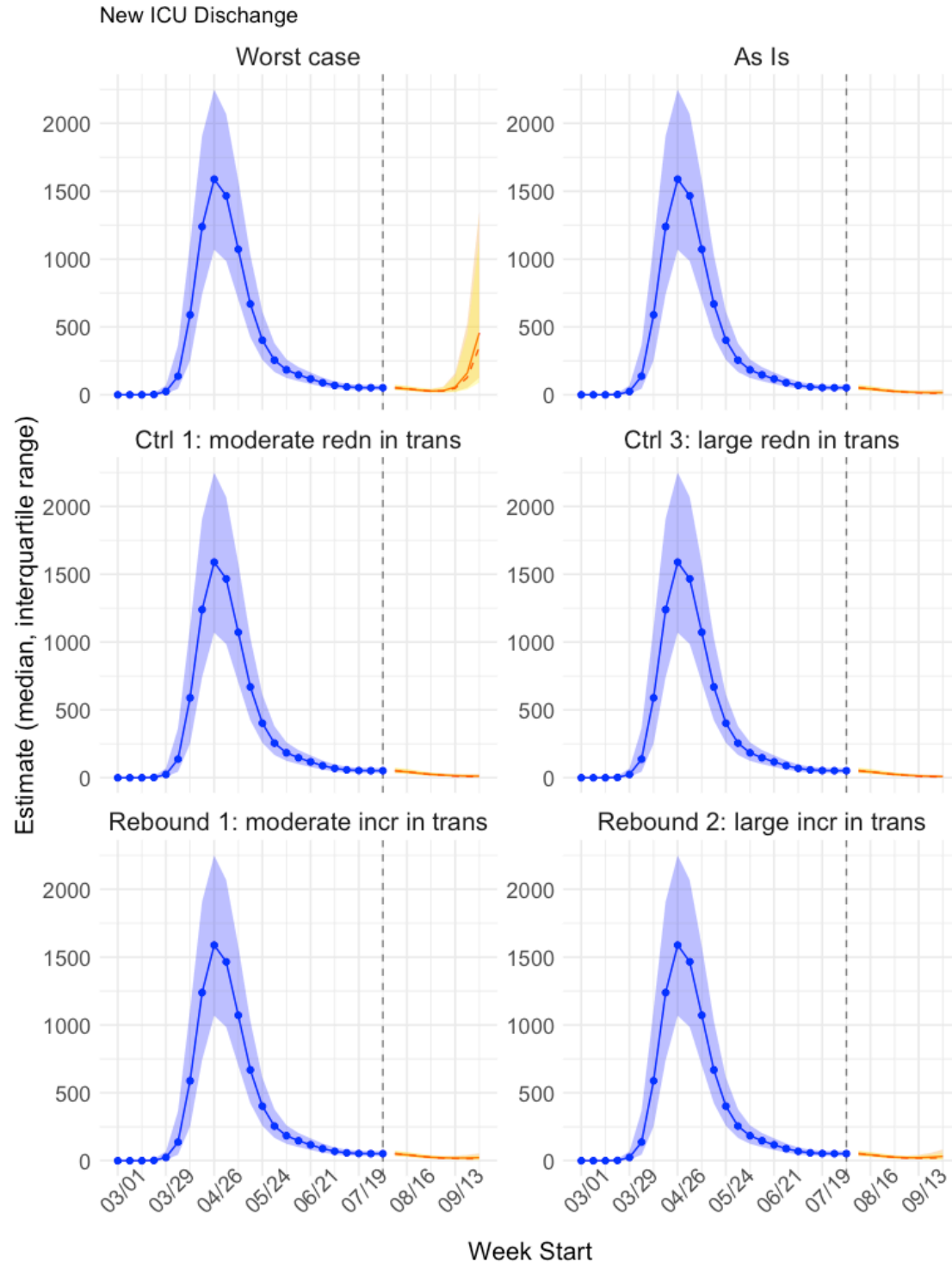
Total Hospitalization Dischange

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.

Non-ICU Hospitalization Dischange

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)
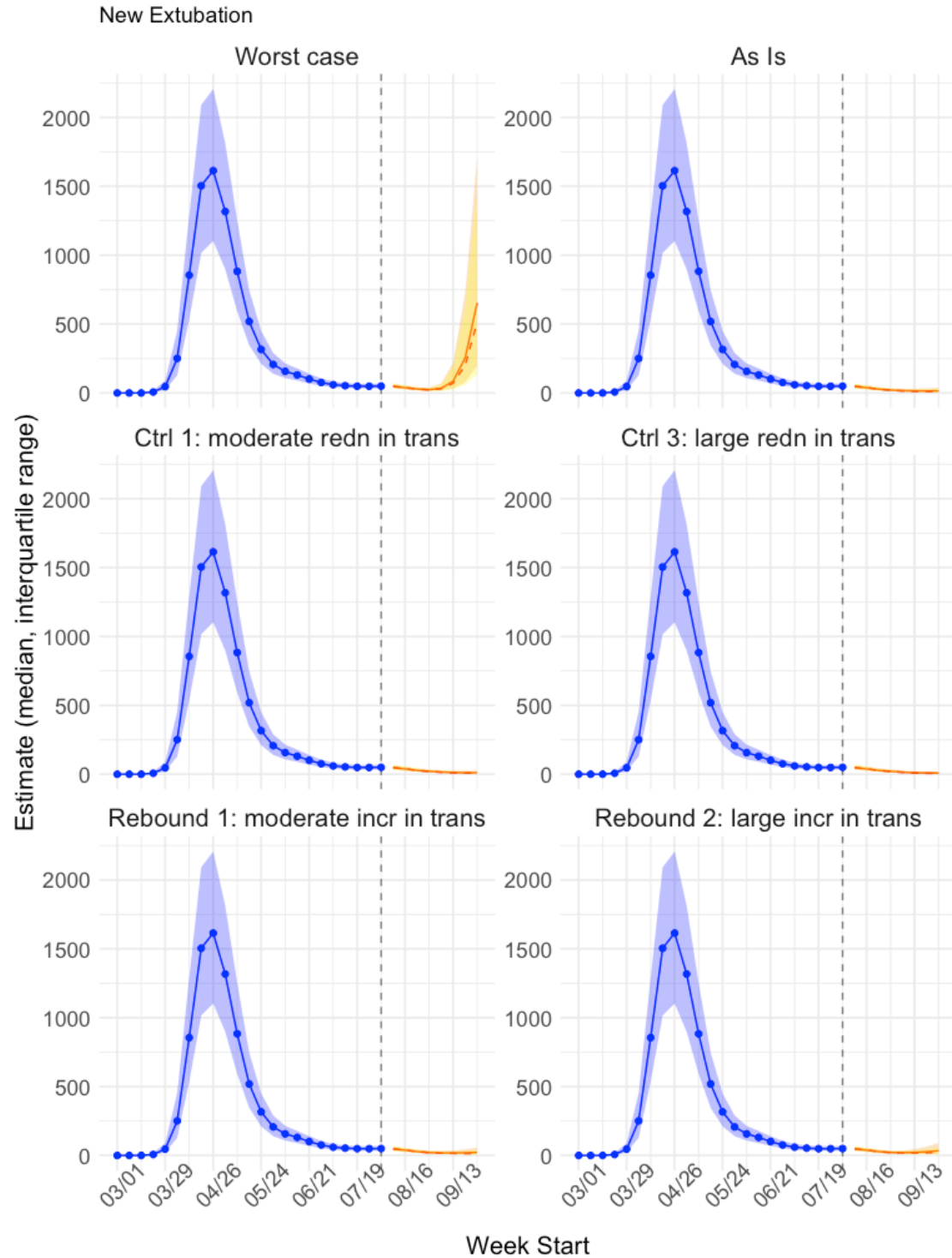
Week Start

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

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. 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 Extubation

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.