

# COVID-19 Scenario Modeling Hub Report

23 November, 2022

Scenario Modeling Hub Team<sup>1</sup>

## Executive Summary

In a new round of projections, the Scenario Modeling Hub evaluated the trajectory of COVID-19 during October 30, 2022 to April 29, 2023 (26-weeks), under different assumptions about the uptake of bivalent boosters and the immune escape properties of circulating variants. Six teams contributed to national and state-specific projections. Our ensemble results are based on the untrimmed LOP approach. Detailed scenario descriptions and setting assumptions are provided [here](#).

## Key Takeaways from the Sixteenth Round

- In scenarios considering moderate immune escape variants (scenarios A and C: level 5 variants, corresponding to a 25% immune escape to BA5) hospitalizations are projected to remain constant or rise moderately this winter, based on the 50% projection interval for ensemble incidences. However, wider intervals admit the possibility of moderate resurgences.
- The rise in hospitalizations is more pronounced in high immune escape variant scenarios (scenarios B and D, level 6/7 variants, corresponding to 50% immune escape). Median hospitalizations are projected to peak in December 2022 in these scenarios. Further, the upper bound of the 50% PI reaches approximately the level of the peak of the Delta wave from summer 2021.
- There is a possibility of a second rise in hospitalizations in early Spring (March-April 2023) in the most pessimistic scenario of high immune escape and low coverage. The late predominance of immune escape variants and heterogeneity of individual simulations in two of the 6 participating models explains this potential rise.
- High booster uptake (similar to the uptake of the flu vaccine) is expected to reduce cumulative hospitalizations by 26-31% and deaths by 32-34% on average over the projection period. This is compared to a lower booster coverage, which is indexed on the uptake of the first booster campaign in winter 2021-22. There is substantial heterogeneity between models in the estimated benefits of expanded coverage.
- Weekly incident deaths are projected to follow the same general patterns as hospitalizations. In the worst case scenario D (low booster coverage and high immune escape), weekly deaths would not exceed 50% of the Omicron peak, based on the 50% PI.
- In the most optimistic scenario (high booster coverage, moderate immune escape), we project 555,000 cumulative hospitalizations (95%PI, 97,000-1,195,000) over the 26-week projection period, and 47,000 cumulative deaths (95%PI, 0-221,000). In the most pessimistic scenario (low booster coverage, high immune escape), we project 959,000 cumulative hospitalizations (95%PI, 179,000-3,382,000) and 128,000 deaths (95%PI, 26,000-241,000).
- There is considerable heterogeneity in the trajectories of individual models, so that the median ensemble is not necessarily an accurate reflection of possible epidemic trajectories and timing of peaks. Our conclusions are based on 50% and broader prediction intervals, which better capture the range of trajectories included in the ensemble.
- Based on recent vaccine uptake information, the more pessimistic vaccination scenarios (C and D) appear to be the most plausible.

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<sup>1</sup>Compiled by Justin Lessler, Rebecca Borchering, Emily Howerton, and Claire Smith.

- Immune escape scenarios may be best interpreted as bounding, with high escape scenarios (B and D) seen as less likely based on recent trajectories.
- A few caveats are worth noting:
  - We assumed that the VE of reformulated boosters would be 80% against symptomatic disease with BA5, immediately after vaccination. The efficacy of reformulated boosters against existing and new variants remains unclear, and so does the pace of waning after multiple booster shots and repeat infections.
  - The standing diversity of circulating variants makes it difficult to anticipate which variant, if any, will dominate, the speed at which they will take over, and the epidemiological advantage of different lineages.
  - We considered a single booster campaign in the fall-winter 2022-23.
  - Issues with case ascertainment and delays in death reporting make model calibration difficult for these outcomes. Hospitalizations continue to be a stable outcome.

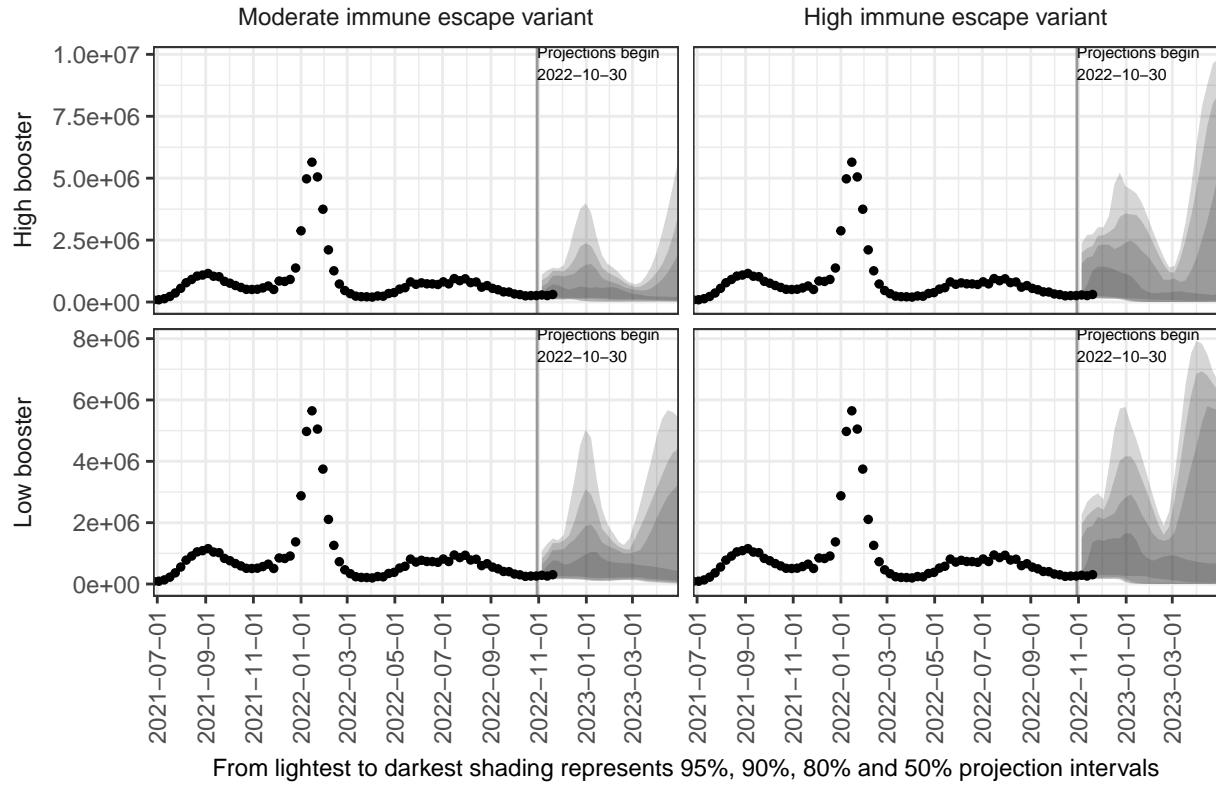
## Round 16 Scenario Specifications

See detailed notes on each scenario below	<p><b>"Level 5" Variants:</b></p> <ul style="list-style-type: none"> <li>• Variants have a 25% immune escape from BA.5.2</li> <li>• Seeding based on combined observed prevalence of Level 5 variants at the start of the projection period. See table below for variant list.</li> <li>• No change in severity given symptomatic infection.</li> </ul>	<p><b>"Level 6/7" Variant:</b></p> <ul style="list-style-type: none"> <li>• Variants have a 50% immune escape from BA.5.2</li> <li>• Seeding based on combined observed prevalence of Level 6 and 7 variants at the start of the projection period. See table below for variant list.</li> <li>• No change in severity given symptomatic infection.</li> </ul>
<b>Accelerating uptake levels of reformulated boosters, with coverage plateauing at 90% of flu vaccination levels by February 1st, 2023</b> <ul style="list-style-type: none"> <li>• Teams are free to use available data and information from previous rollouts as they see fit to define rates.</li> <li>• Teams should assume increasing uptake through October and November as necessary to reach the projected February 1st, 2023 plateau.</li> </ul>	<b>Scenario A</b>	<b>Scenario B</b>
<b>Current uptake levels of reformulated boosters, with coverage plateauing at booster 1 levels by the end of the simulation</b> <ul style="list-style-type: none"> <li>• Teams are free to use available data and information from current and previous rollouts as they see fit to define rates.</li> <li>• Based on current rates, plateau date is flexible as long as it occurs before the end of the simulation (Teams can adjust rates up if needed to achieve adequate coverage by target date)</li> </ul>	<b>Scenario C</b>	<b>Scenario D</b>

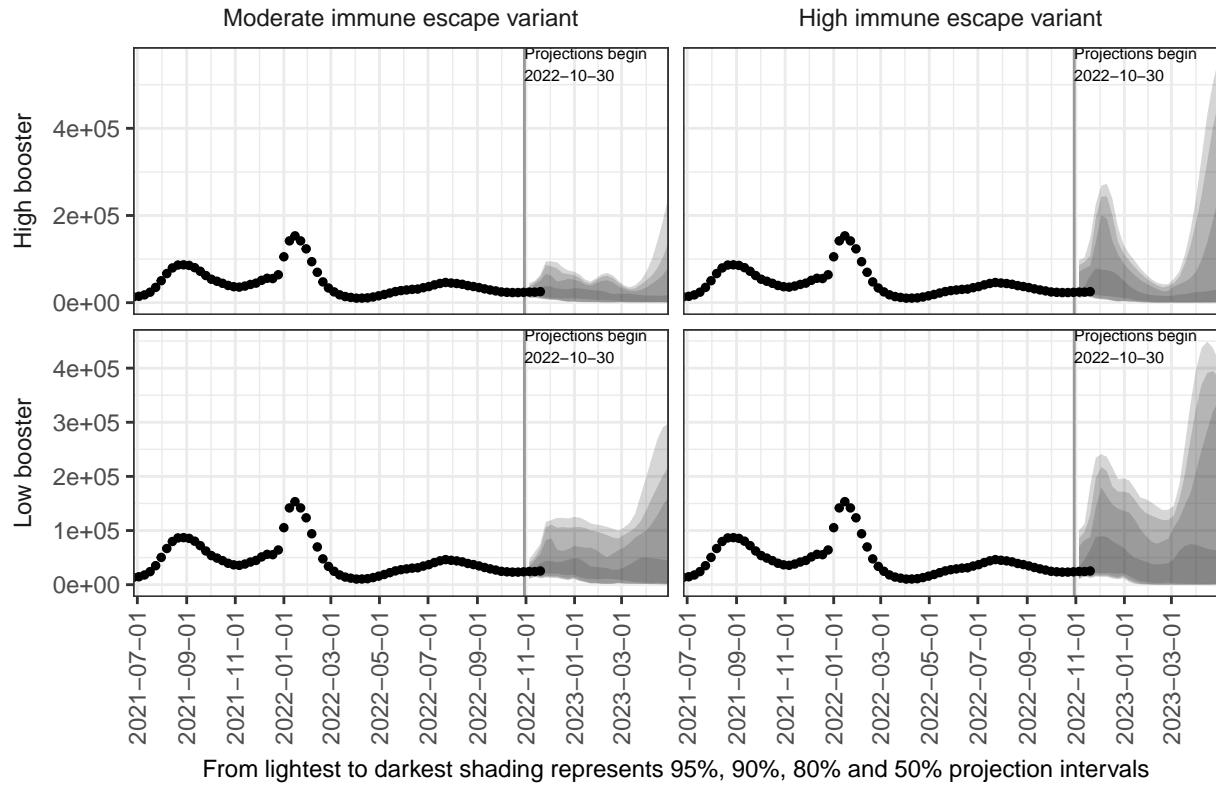
Figure 1: Round 16 Scenario Specifications

## Ensemble projection intervals

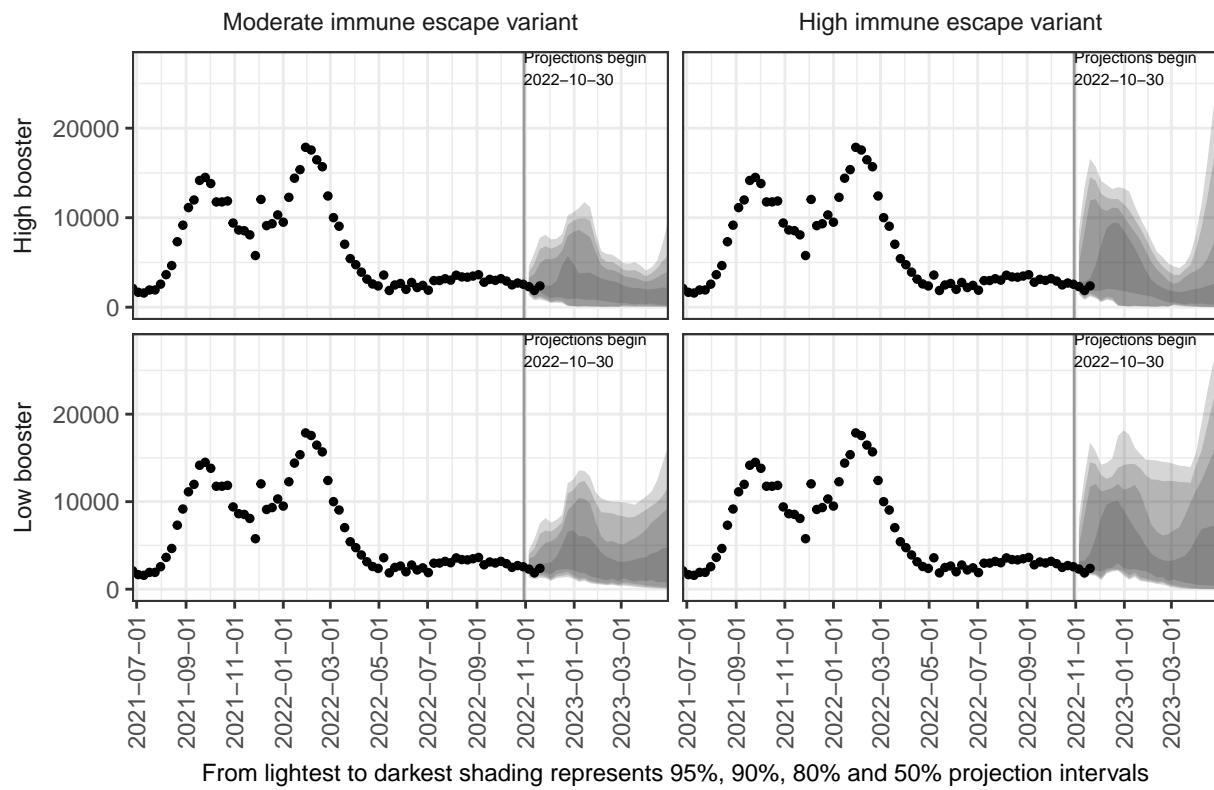
### National ensemble projection intervals – Reported Cases



### National ensemble projection intervals – Hospitalizations

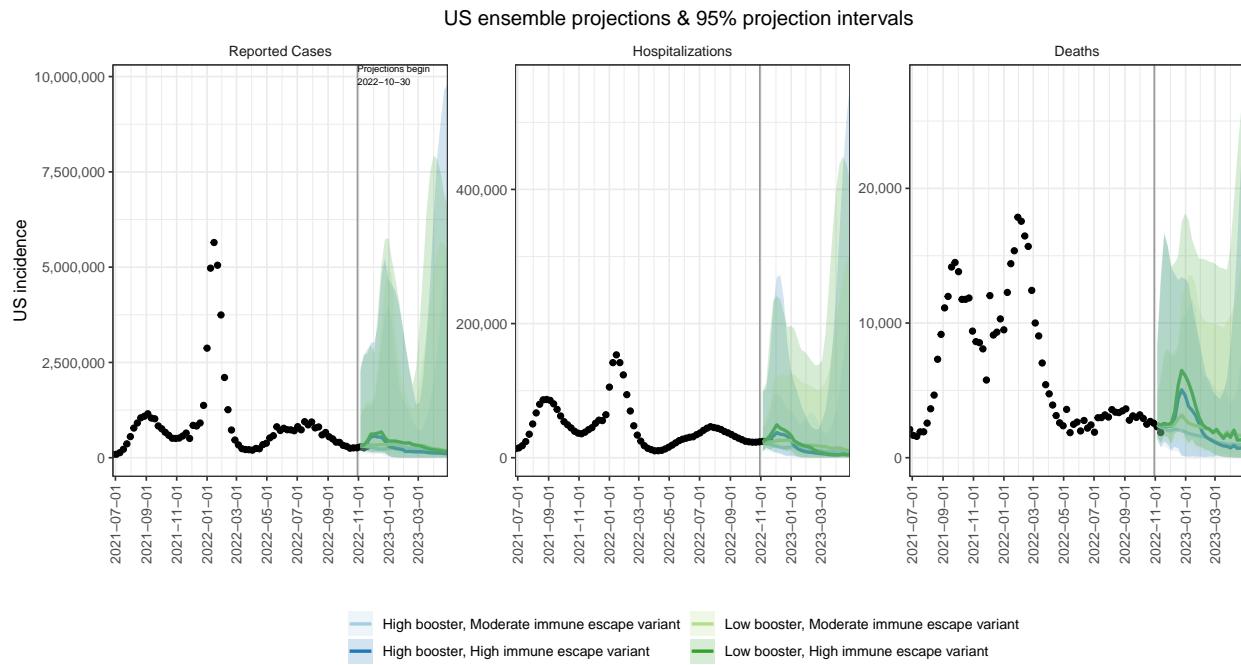


## National ensemble projection intervals – Deaths



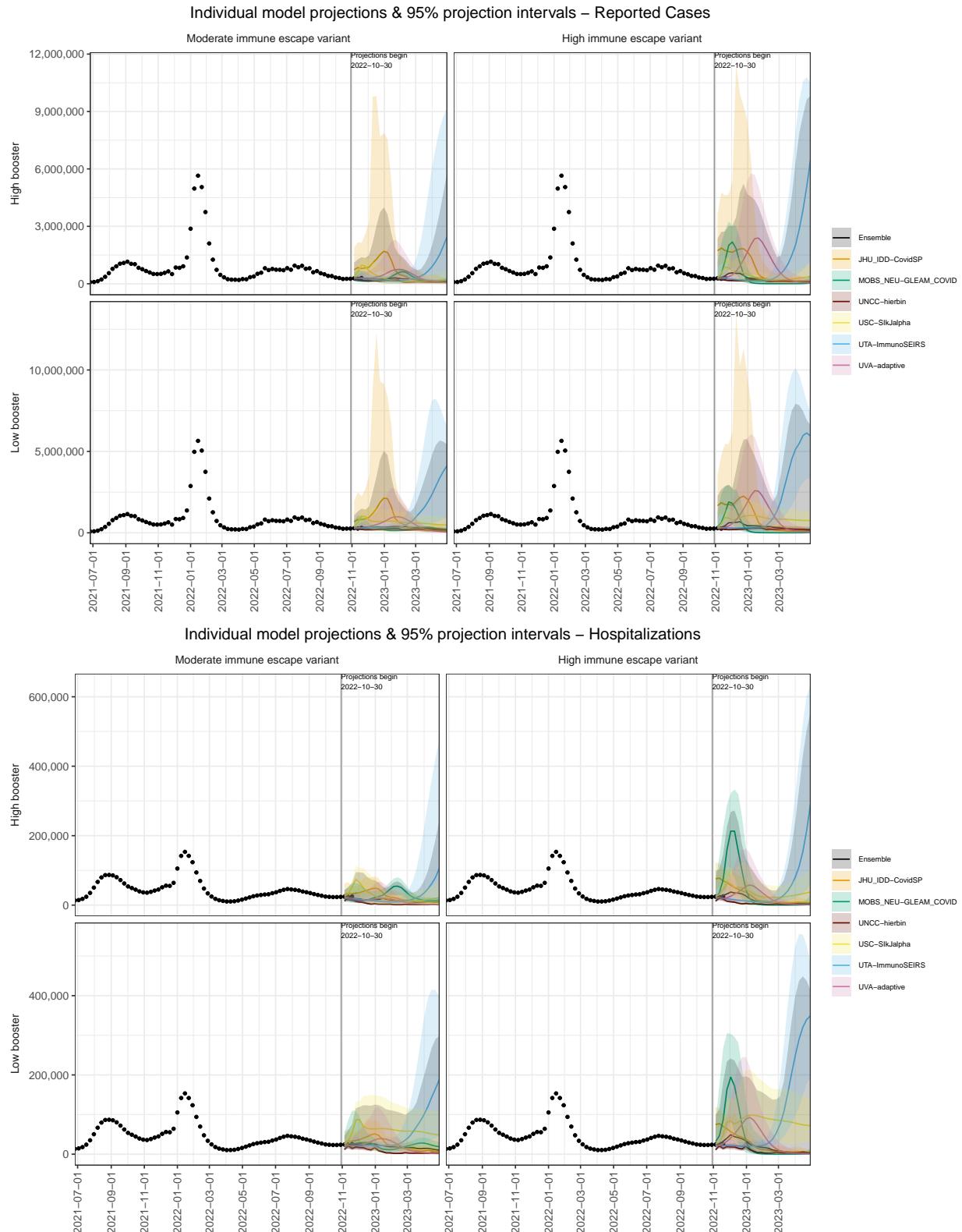
## National ensemble projections

Ensemble projections for national cases, hospitalizations and deaths separated by scenario.

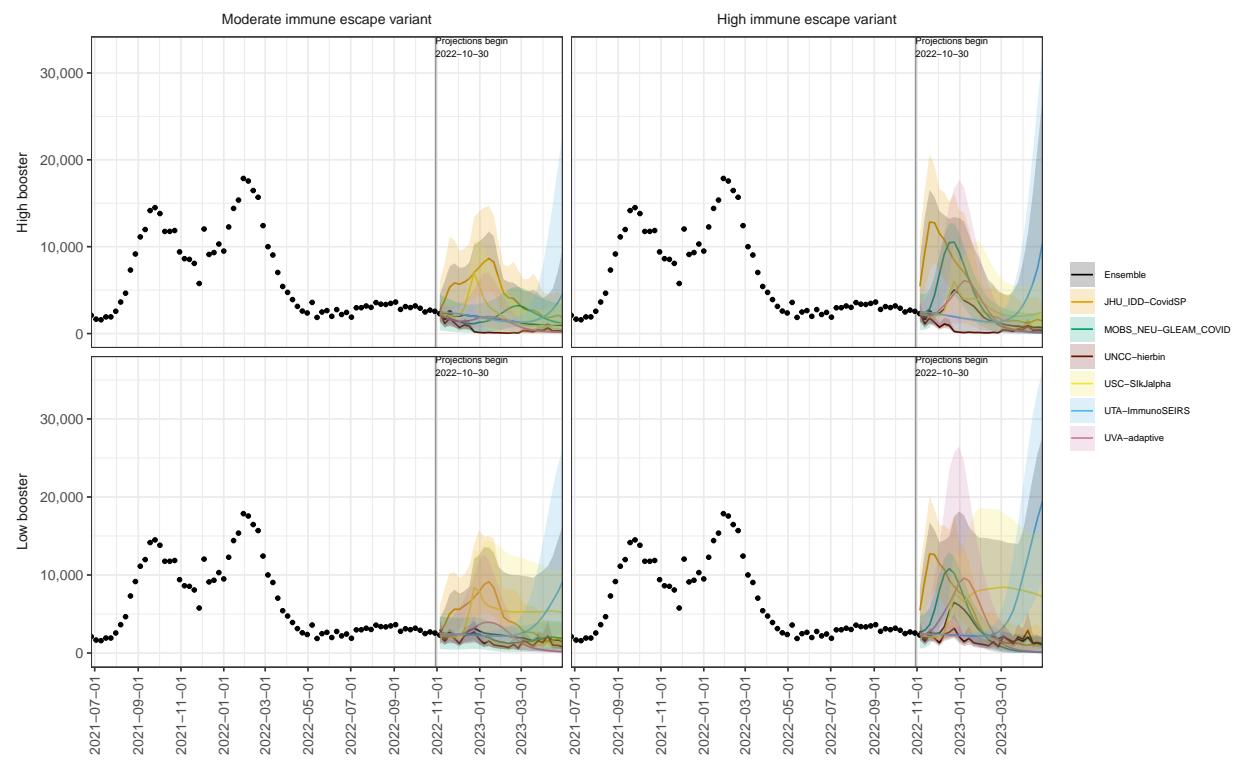


## National individual model projections

Individual model projections and ensemble by scenario for national cases, hospitalizations, and deaths.



### Individual model projections & 95% projection intervals – Deaths



## Differences between scenarios

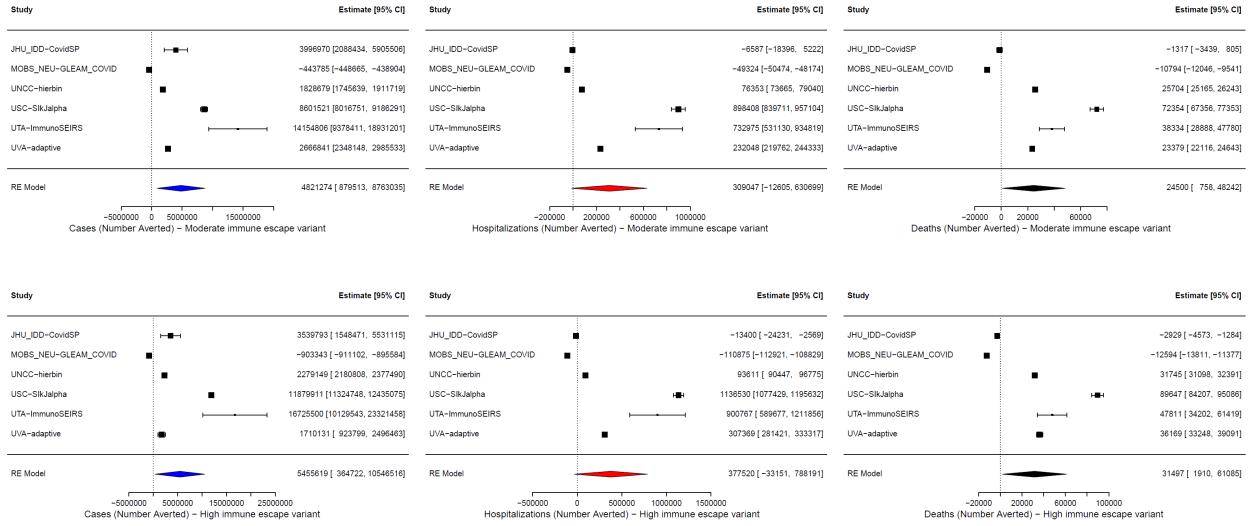


Figure 2: Estimated absolute effects of high vs. low booster uptake in scenarios with a moderate and high immune escape variant.

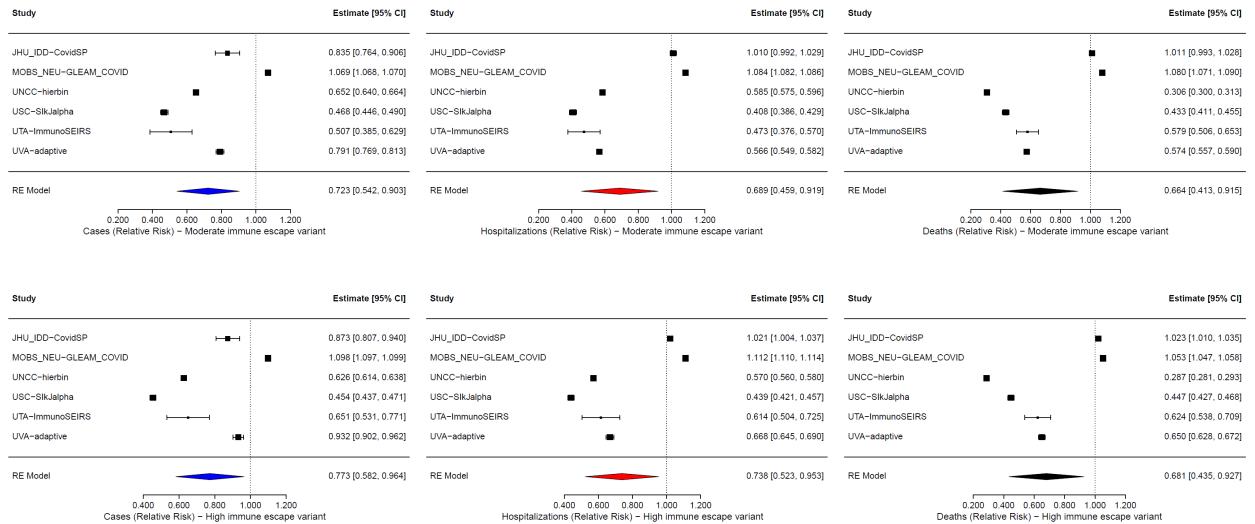
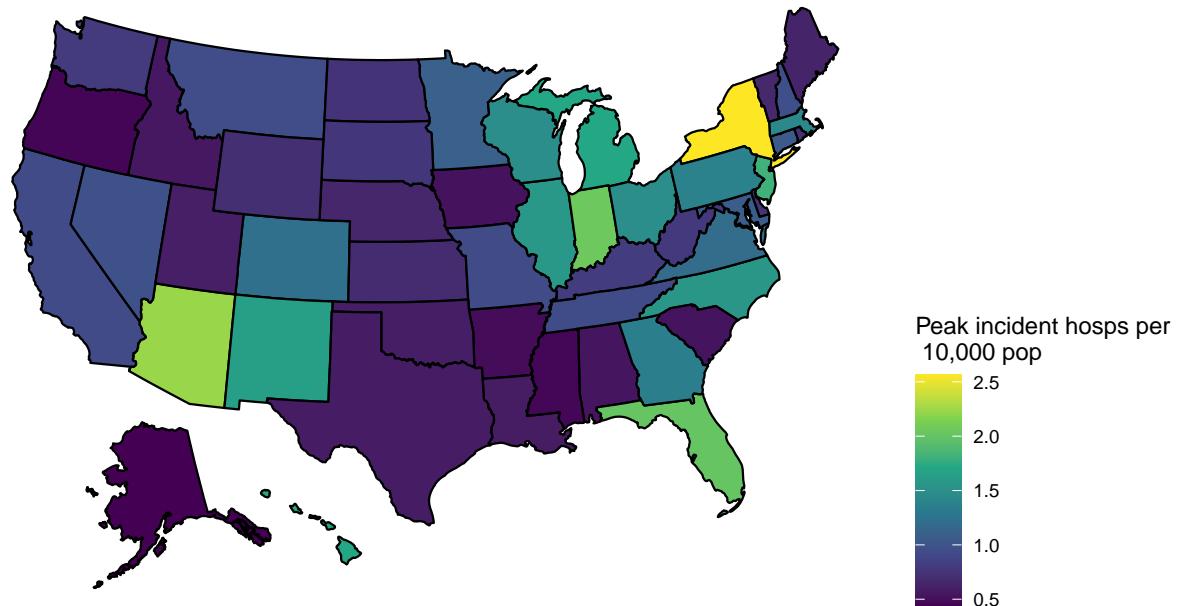


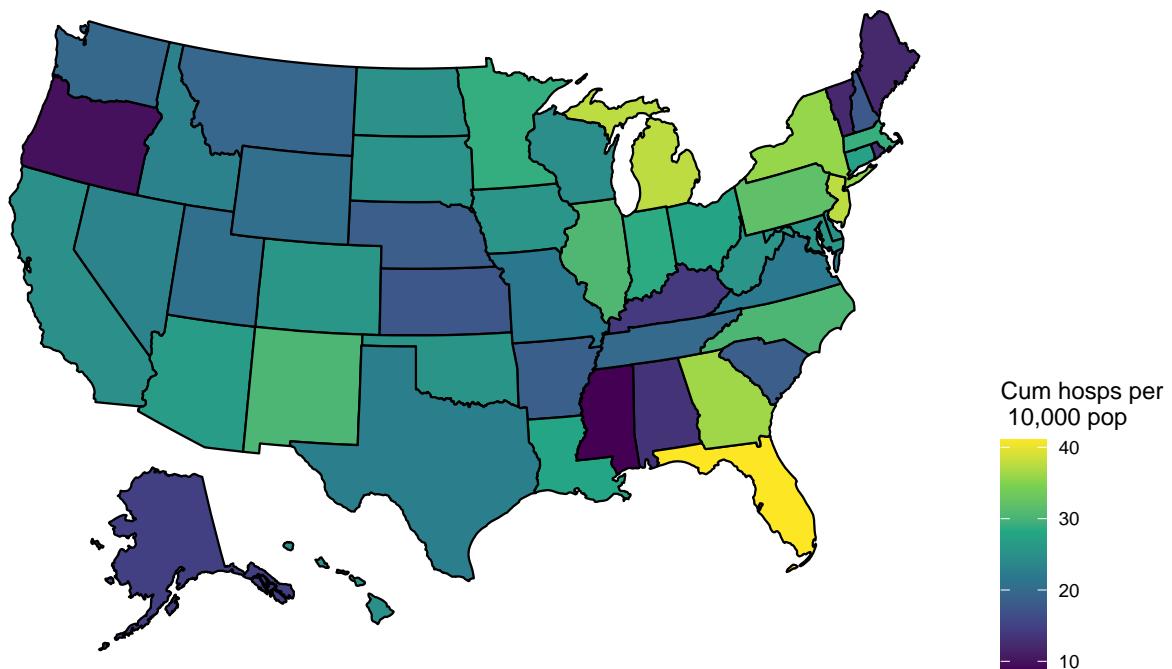
Figure 3: Estimated relative effects of high vs. low booster uptake in scenarios with a moderate and high immune escape variant.

## Risk maps

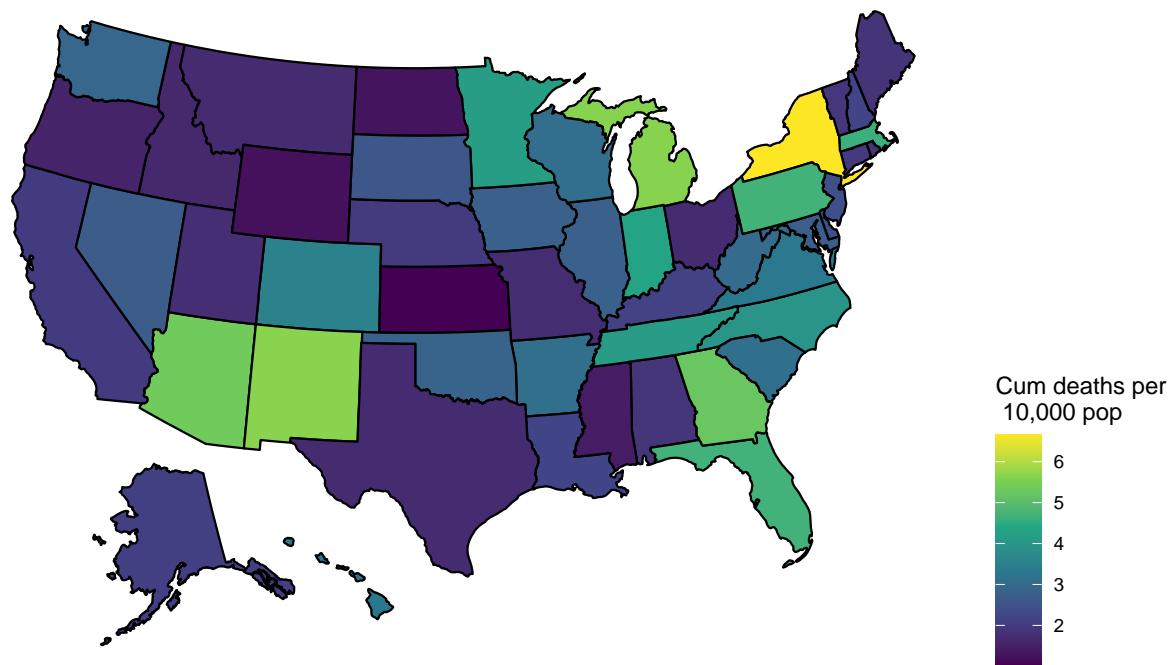
Peak incident reported hospitalizations per 10,000 population in scenario with low booster uptake, and a high escape variant: October 30, 2022 to May 06, 2023



Cumulative reported hospitalizations per 10,000 population in scenario with low booster uptake, and a high escape variant: October 30, 2022 to April 15, 2023

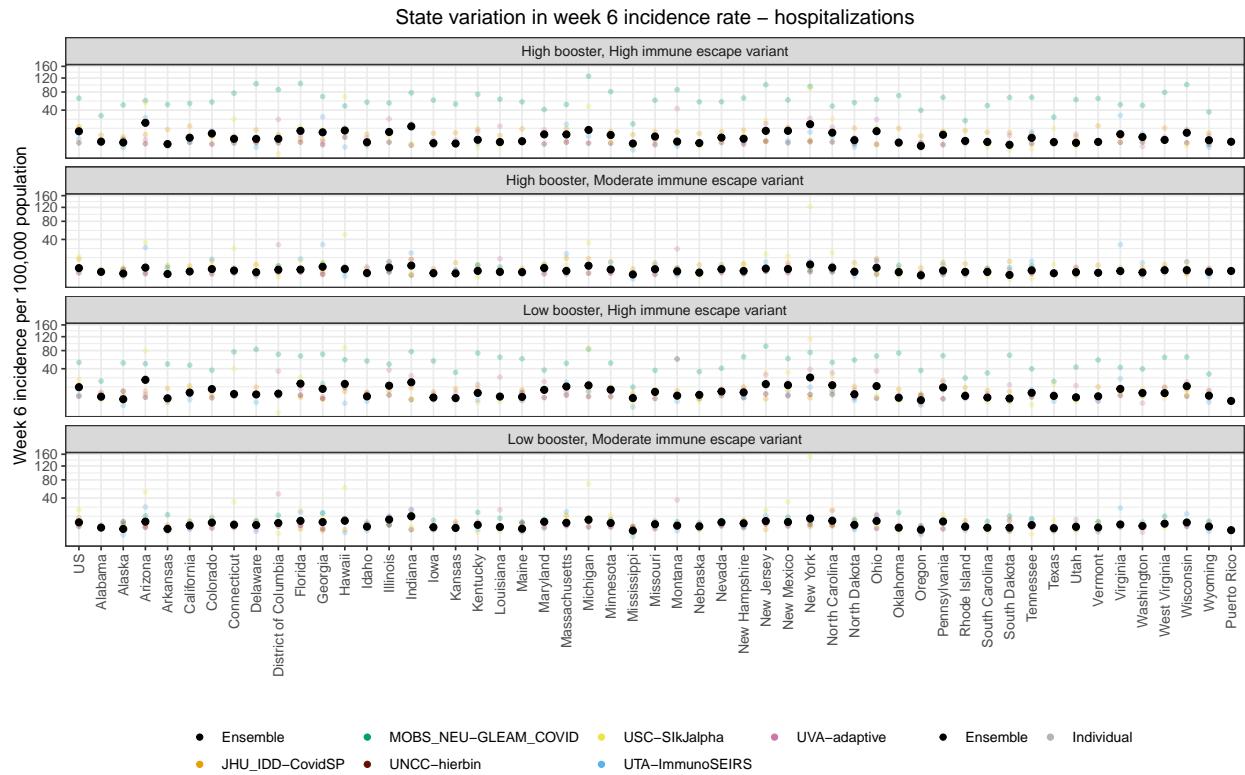


Cumulative deaths per 10,000 population in scenario with low booster uptake,  
and a high escape variant: October 30, 2022 to April 15, 2023

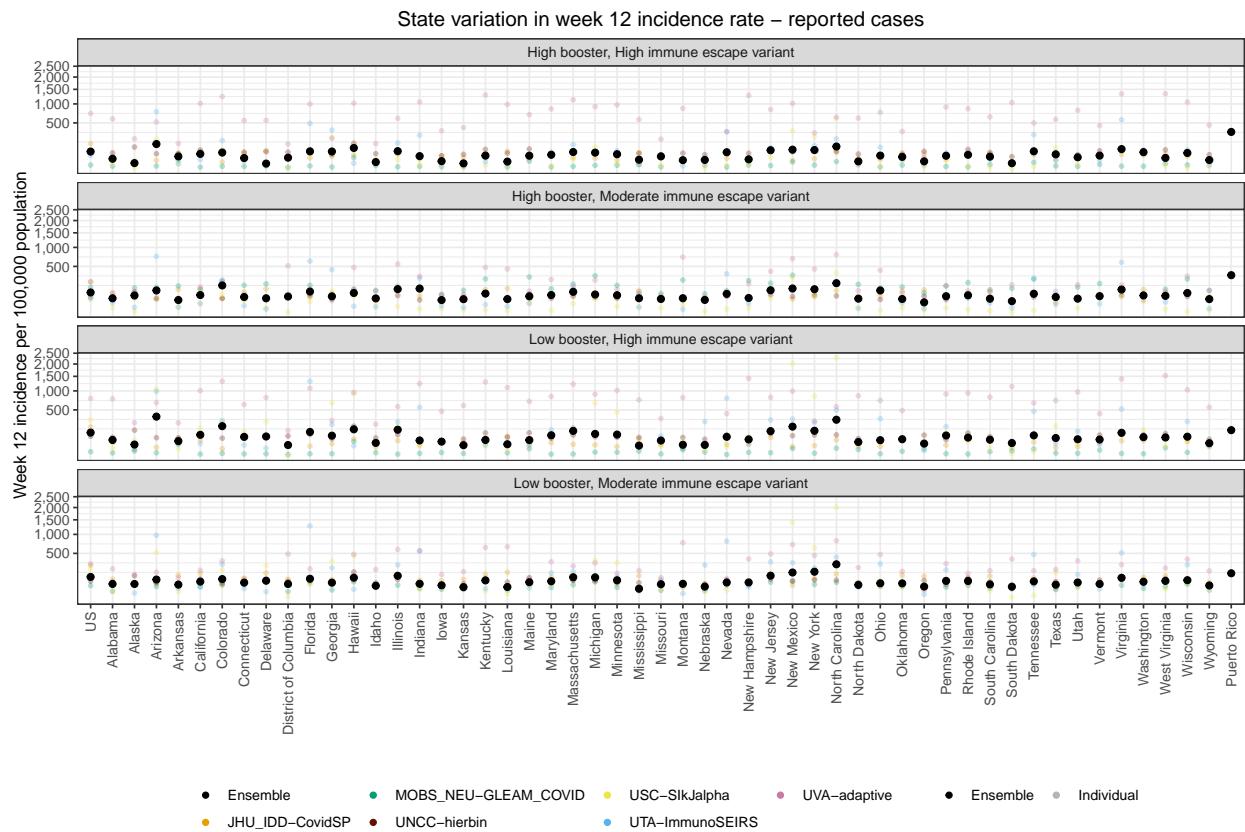


## State-level deviation from national

Individual model and ensembles projections for state-level hospitalization incidence per 100,000 population at week 6.



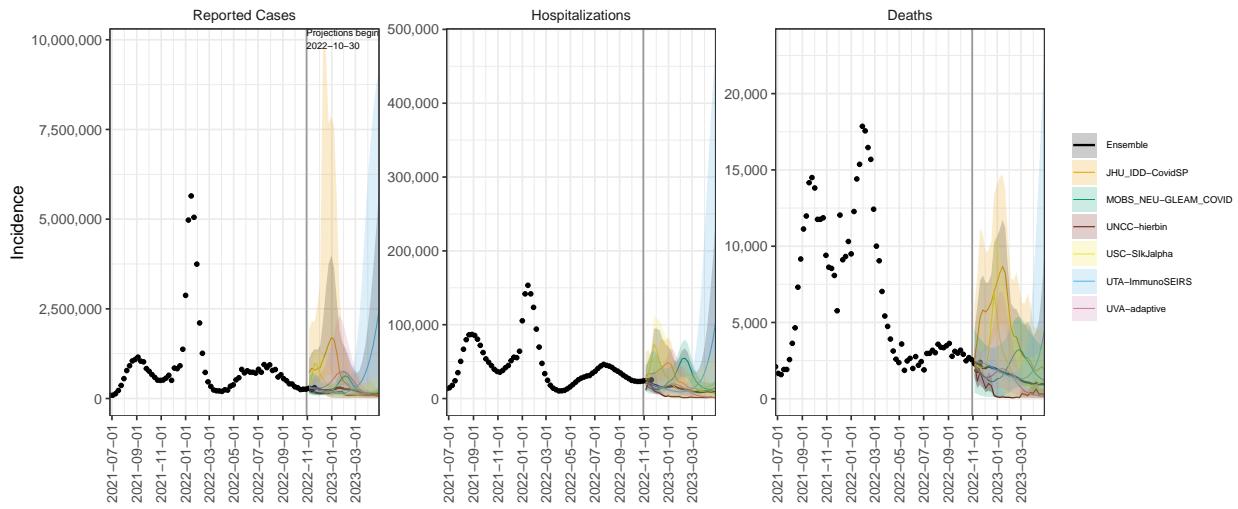
Individual model and ensembles projections for state-level incidence per 100,000 population at week 12.



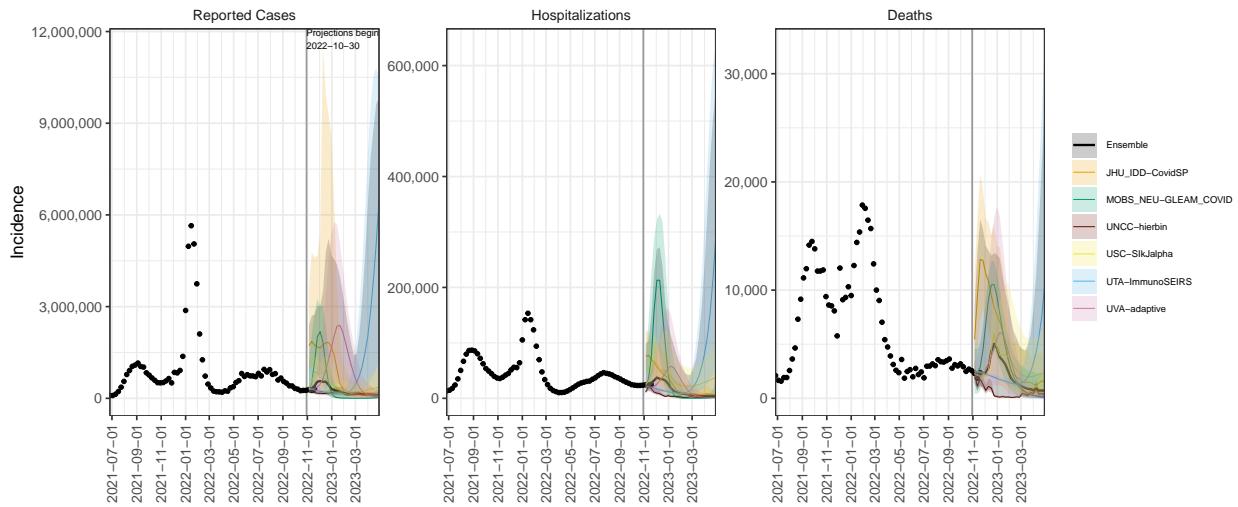
## National model variation

Individual model projections for national incident cases, hospitalizations and deaths.

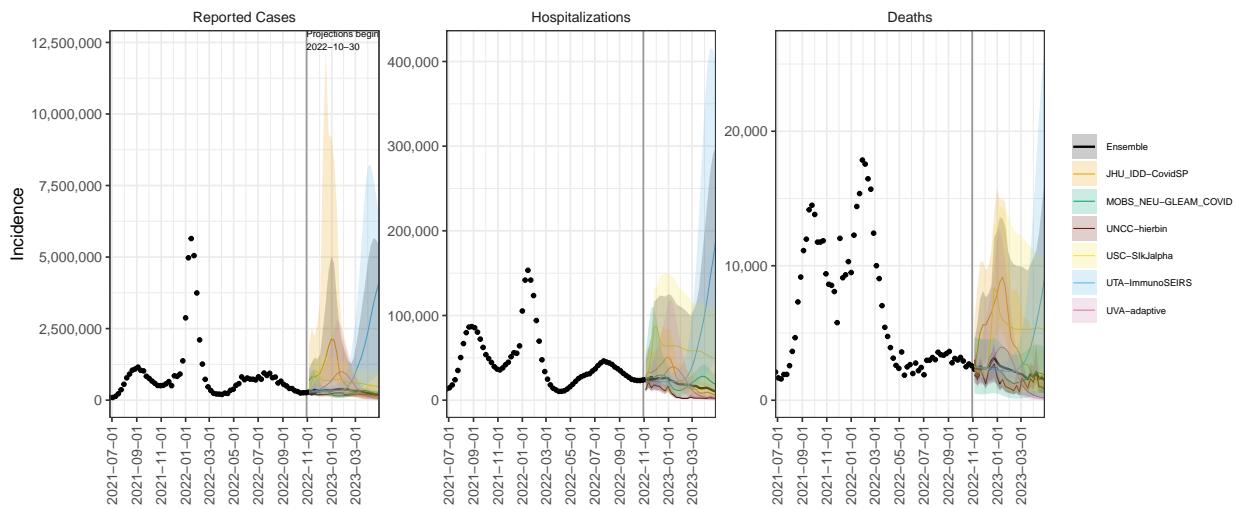
Individual model projections & 95% projection intervals – High booster, Moderate immune escape variant



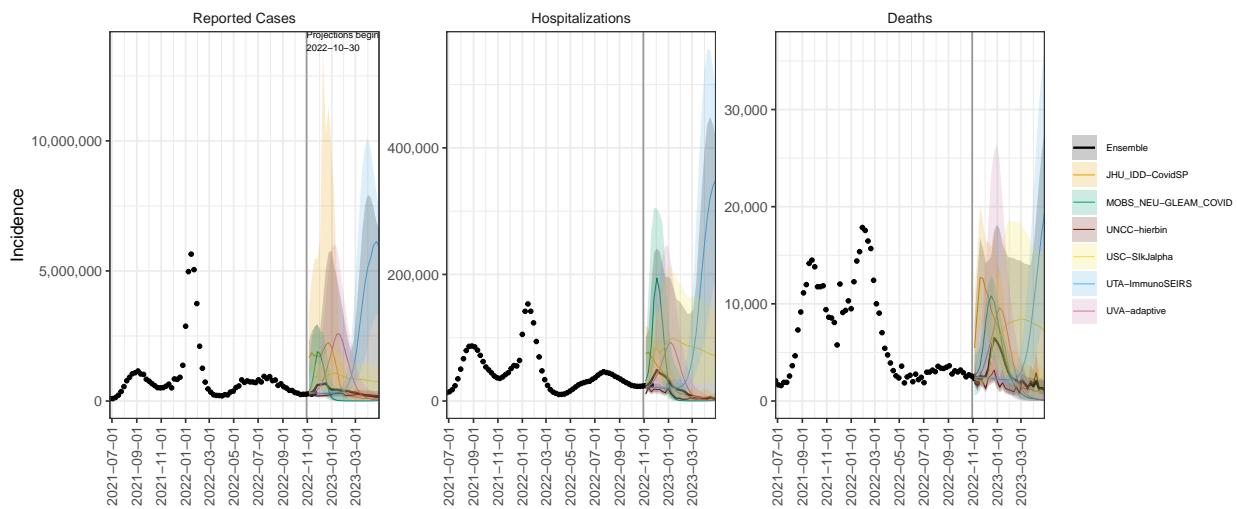
Individual model projections & 95% projection intervals – High booster, High immune escape variant



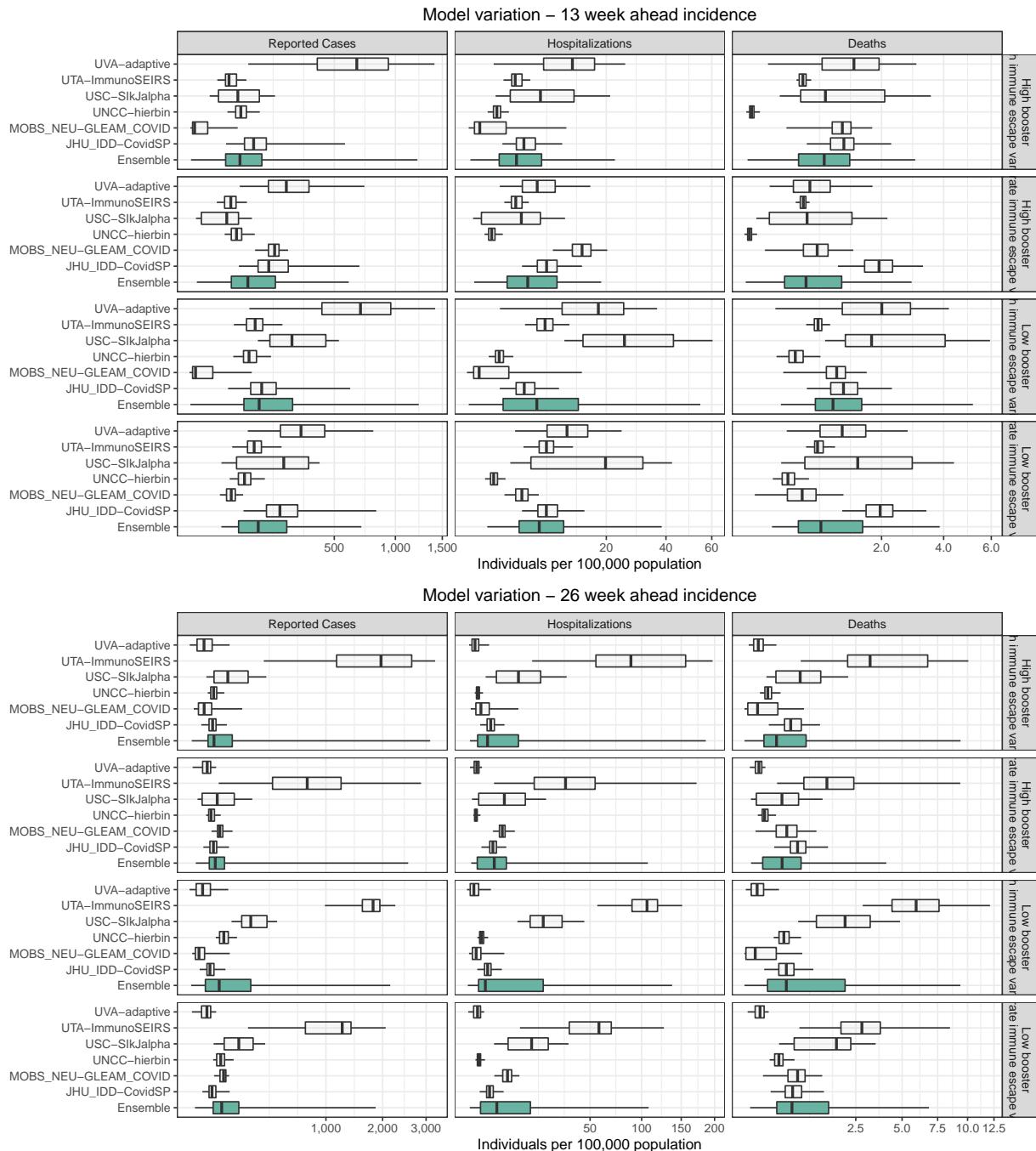
Individual model projections & 95% projection intervals – Low booster, Moderate immune escape variant



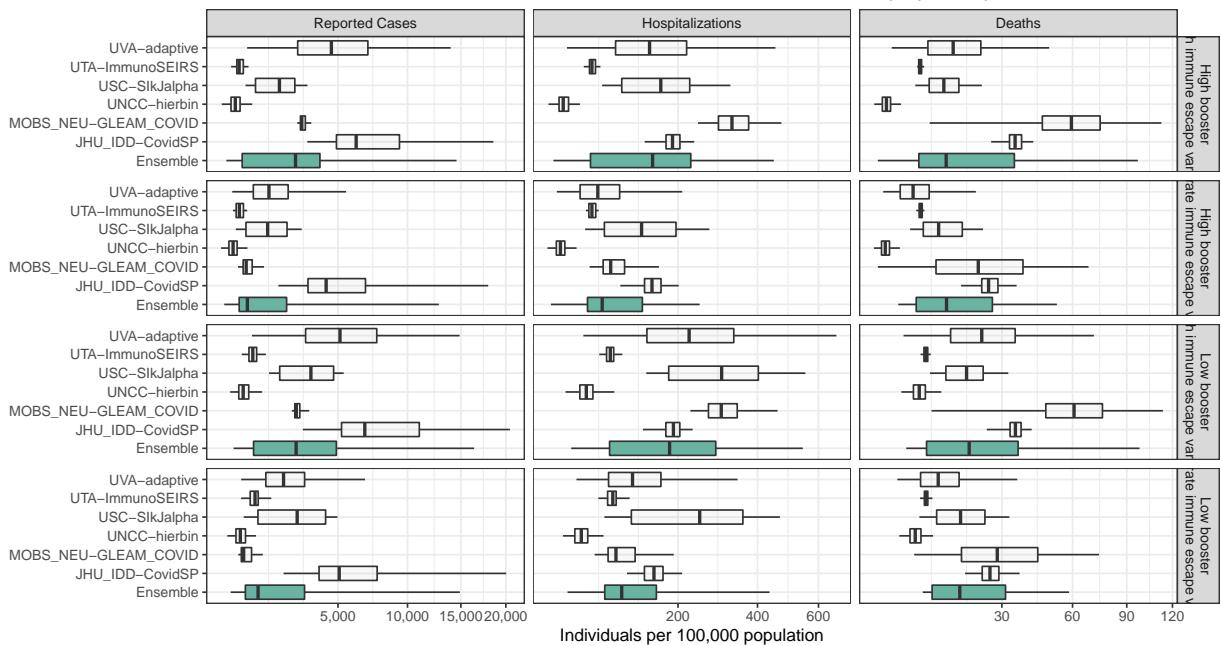
Individual model projections & 95% projection intervals – Low booster, High immune escape variant



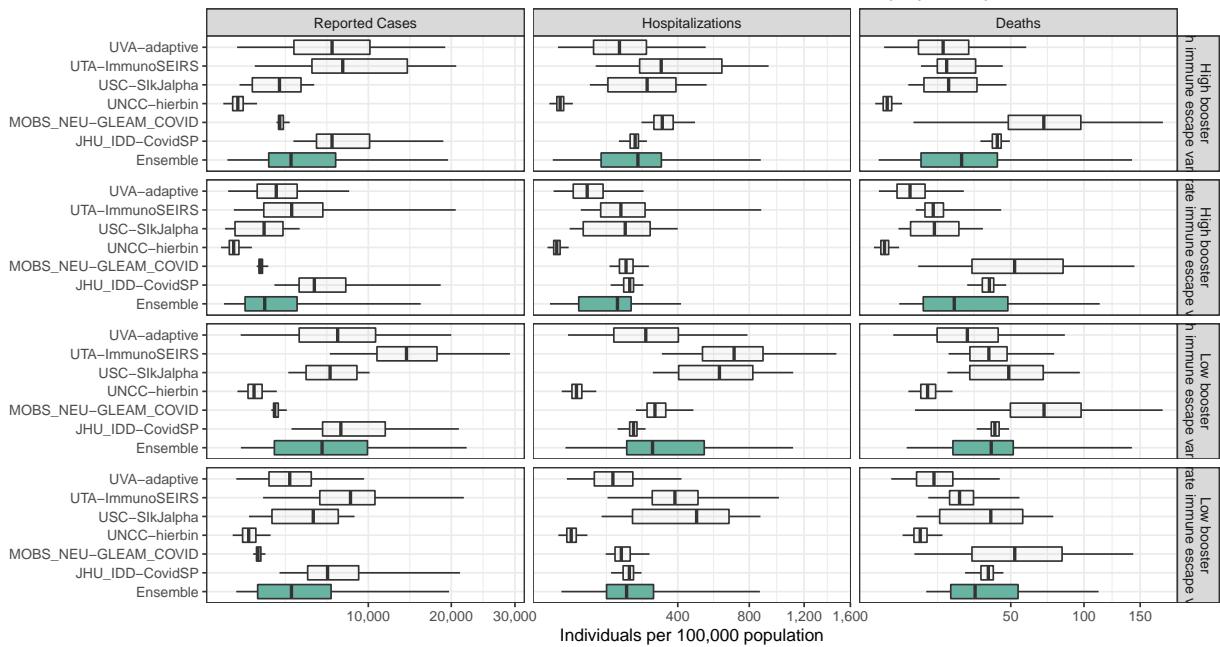
## Projection distributions



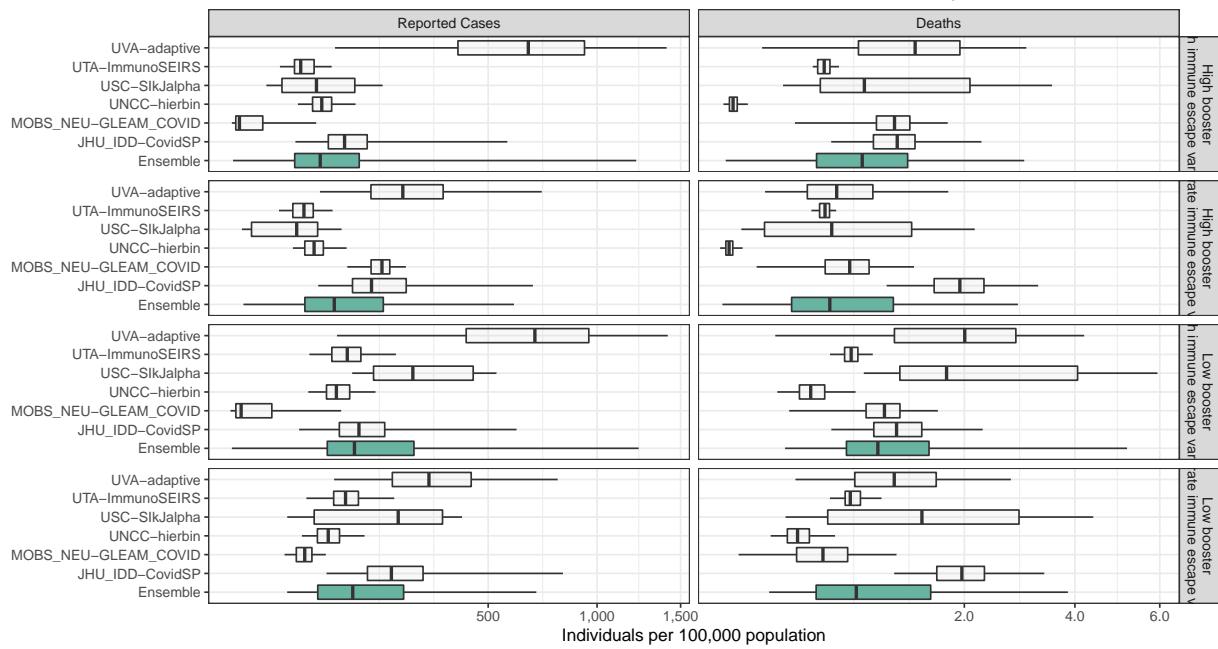
Model variation – 13 week ahead cumulative incidence over projection period



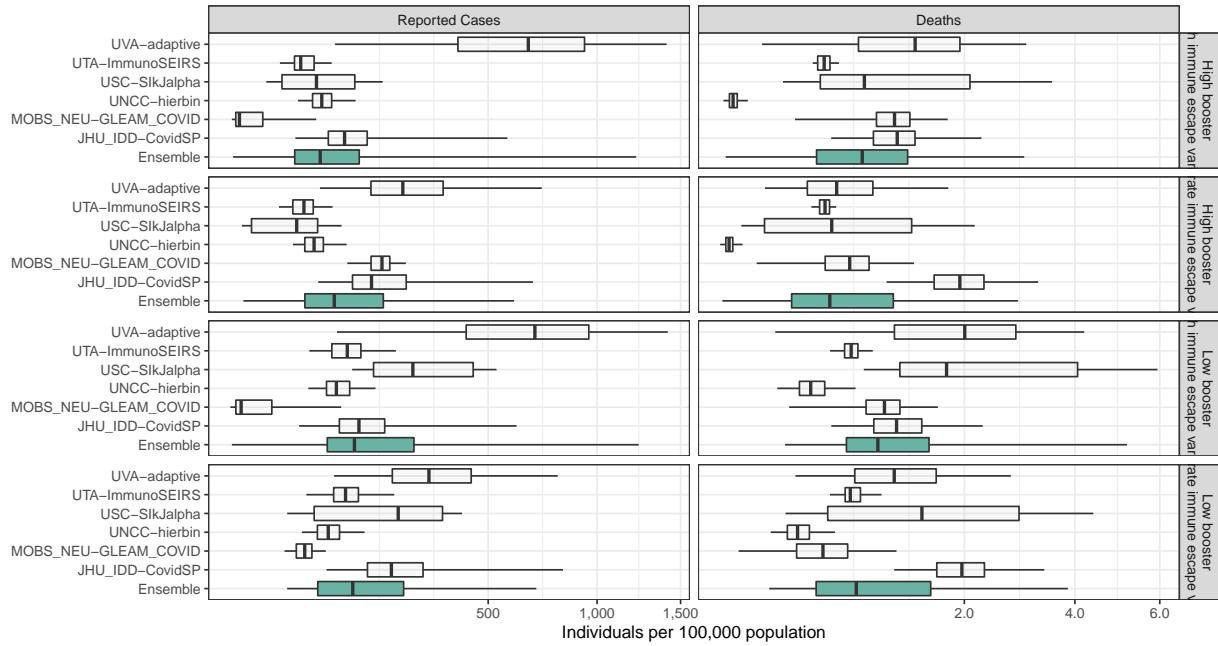
Model variation – 26 week ahead cumulative incidence over projection period



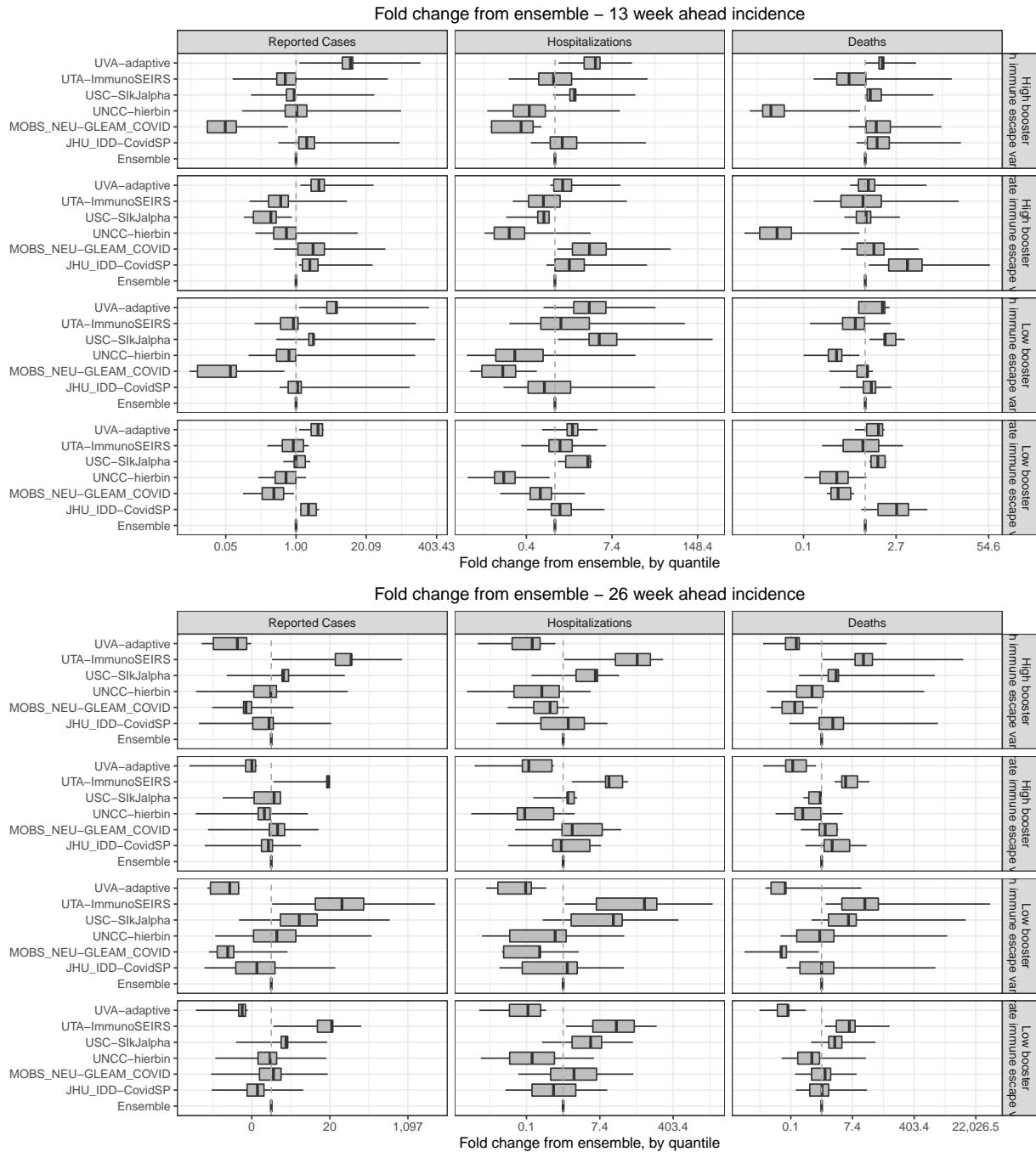
Model variation – 13 week ahead cumulative incidence over entire pandemic

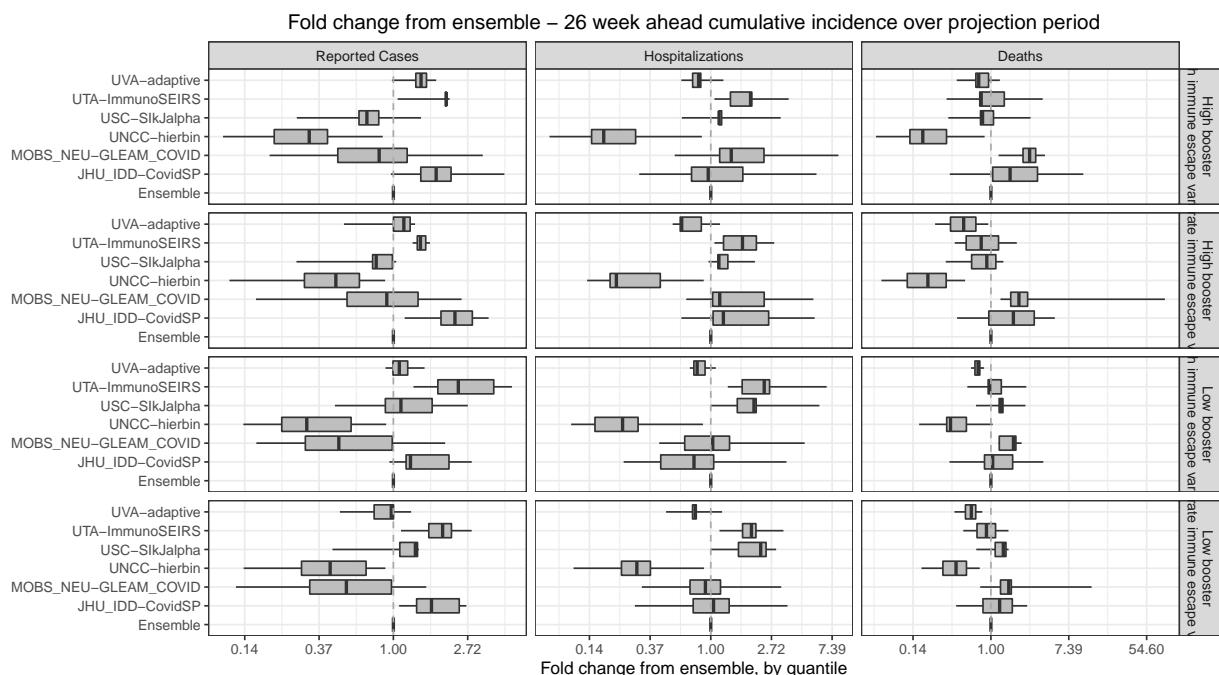
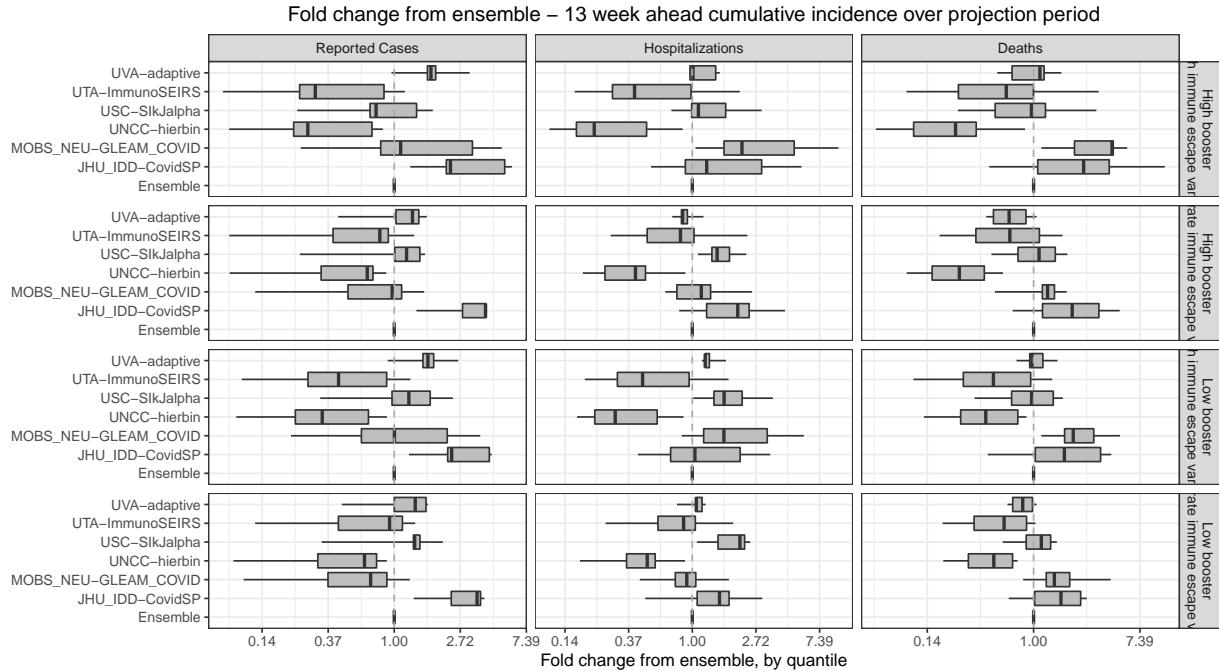


Model variation – 26 week ahead cumulative incidence over entire pandemic

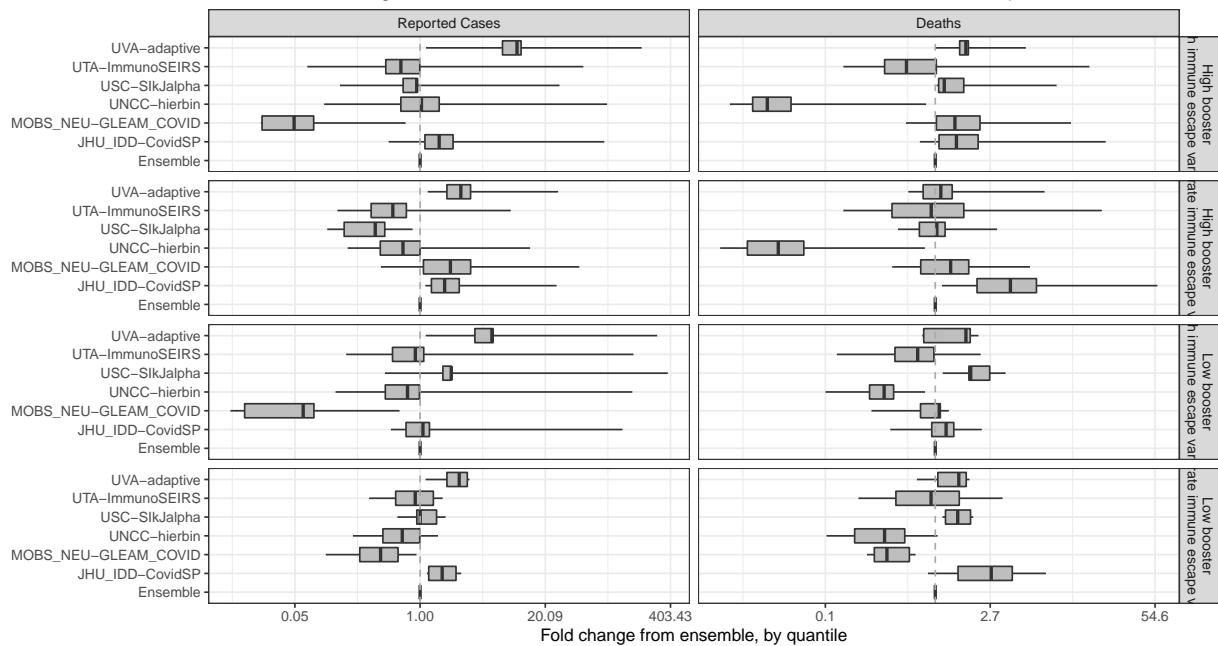


## Difference between model and ensemble distributions

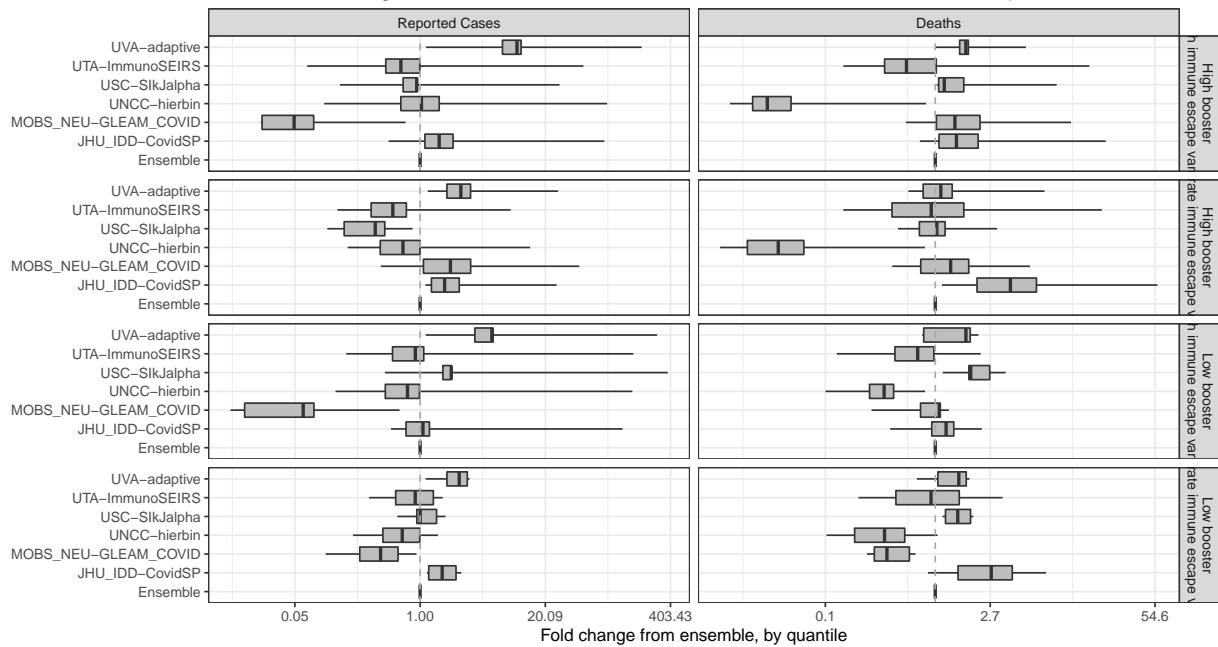




Fold change from ensemble – 13 week ahead cumulative incidence over entire pandemic

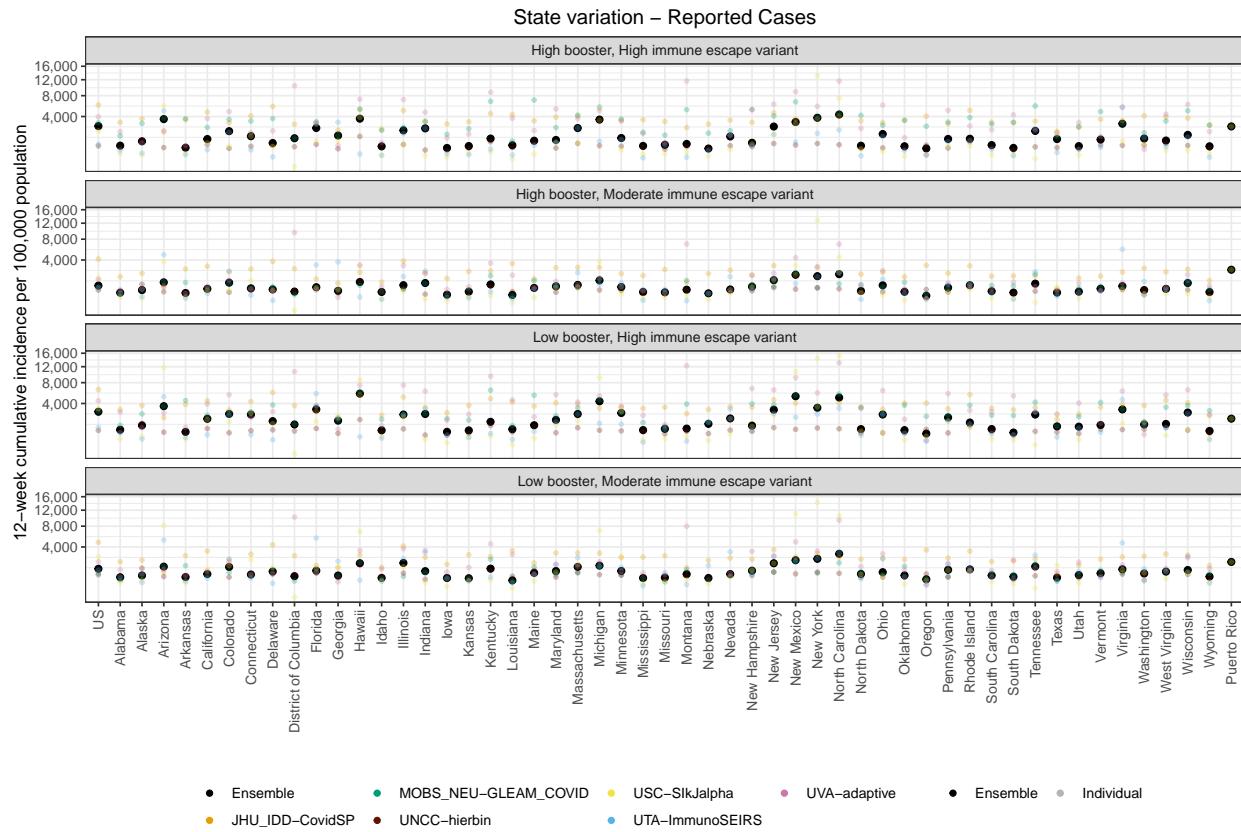


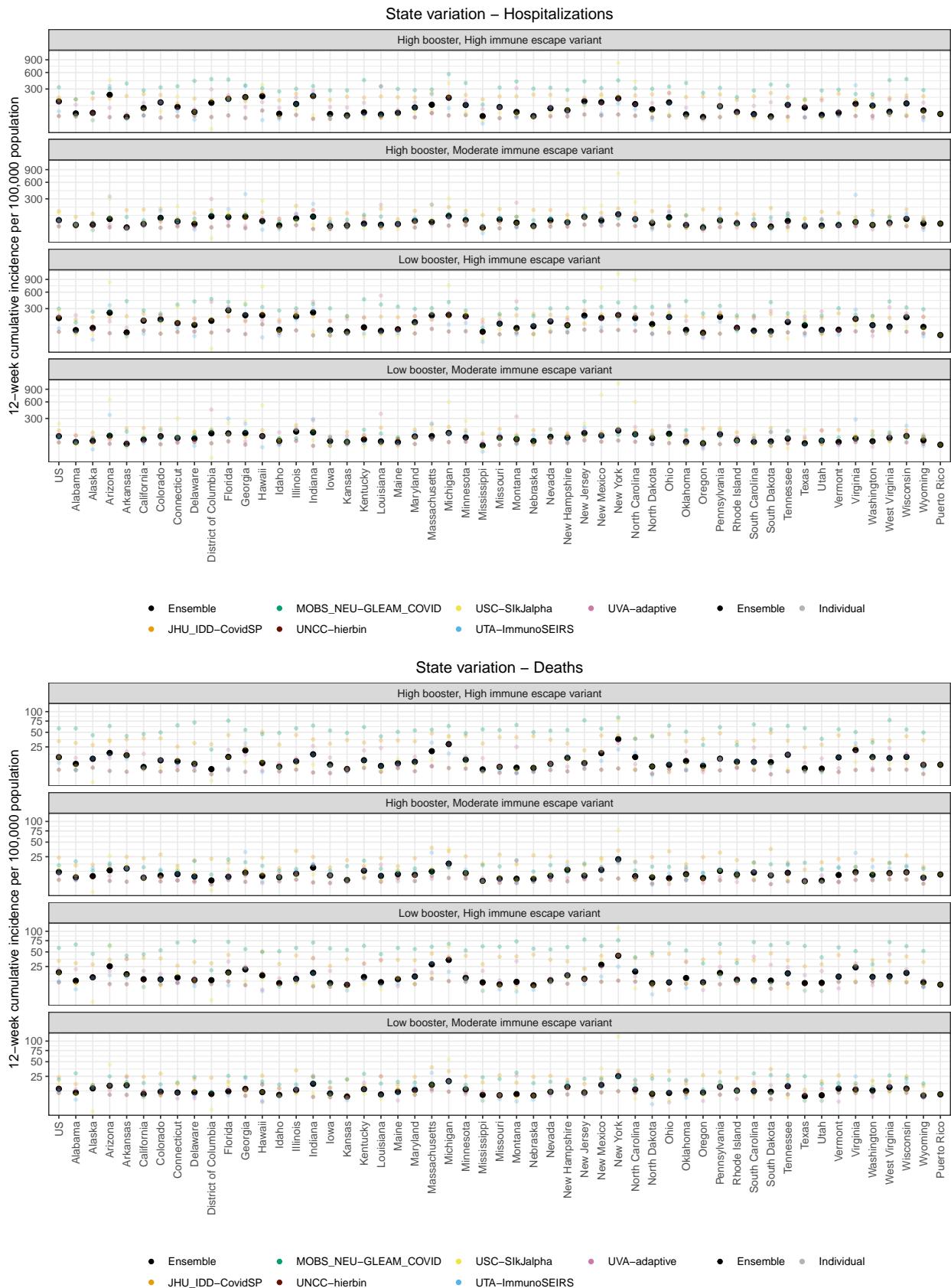
Fold change from ensemble – 26 week ahead cumulative incidence over entire pandemic



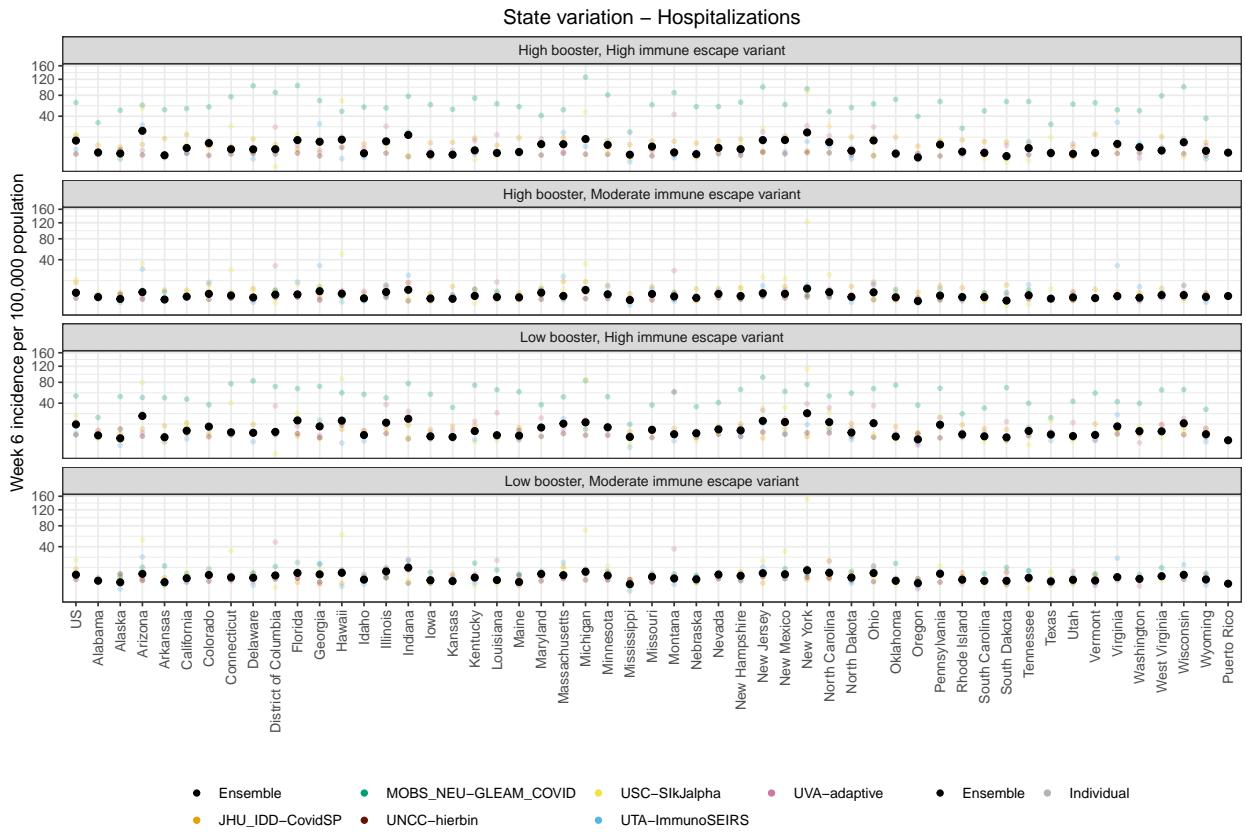
## Supplemental Plots

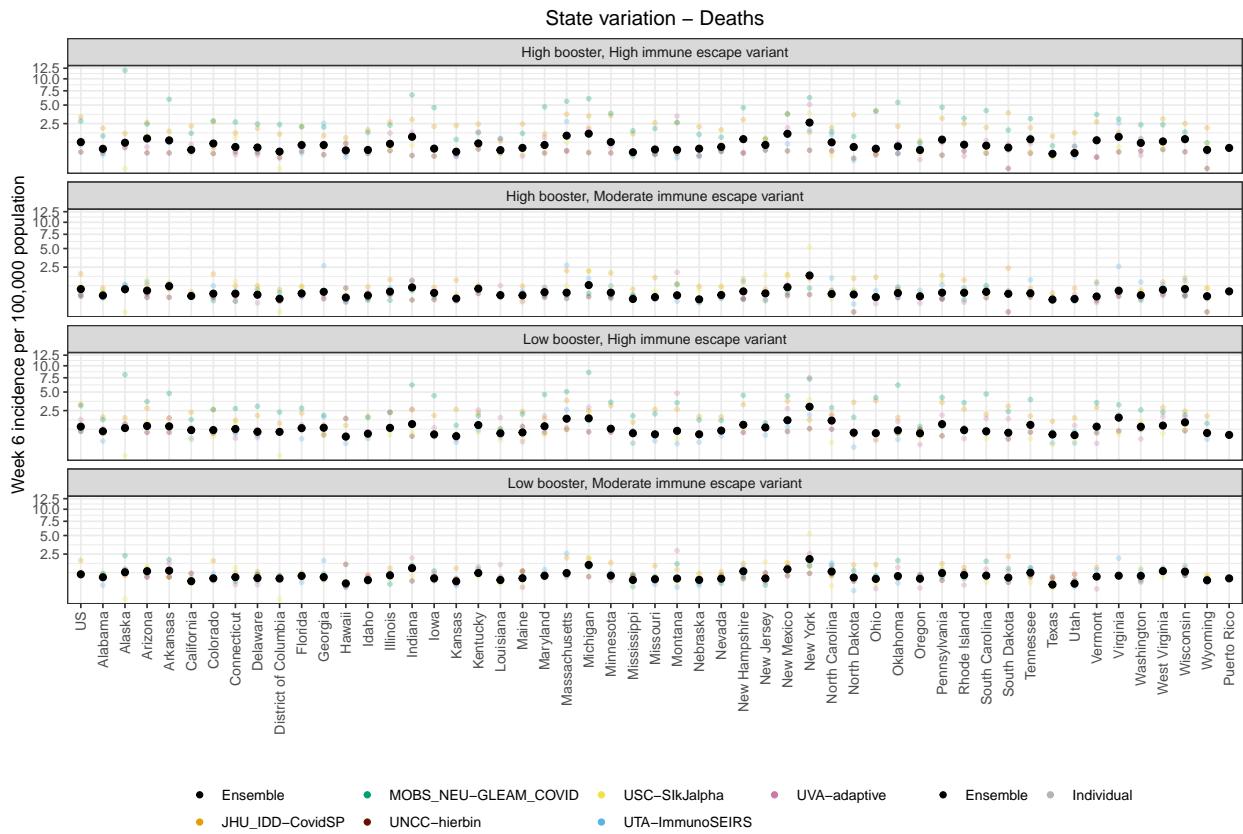
Individual model and ensembles projections for state-level cumulative incidence per 100,000 population over 12-week projection period.



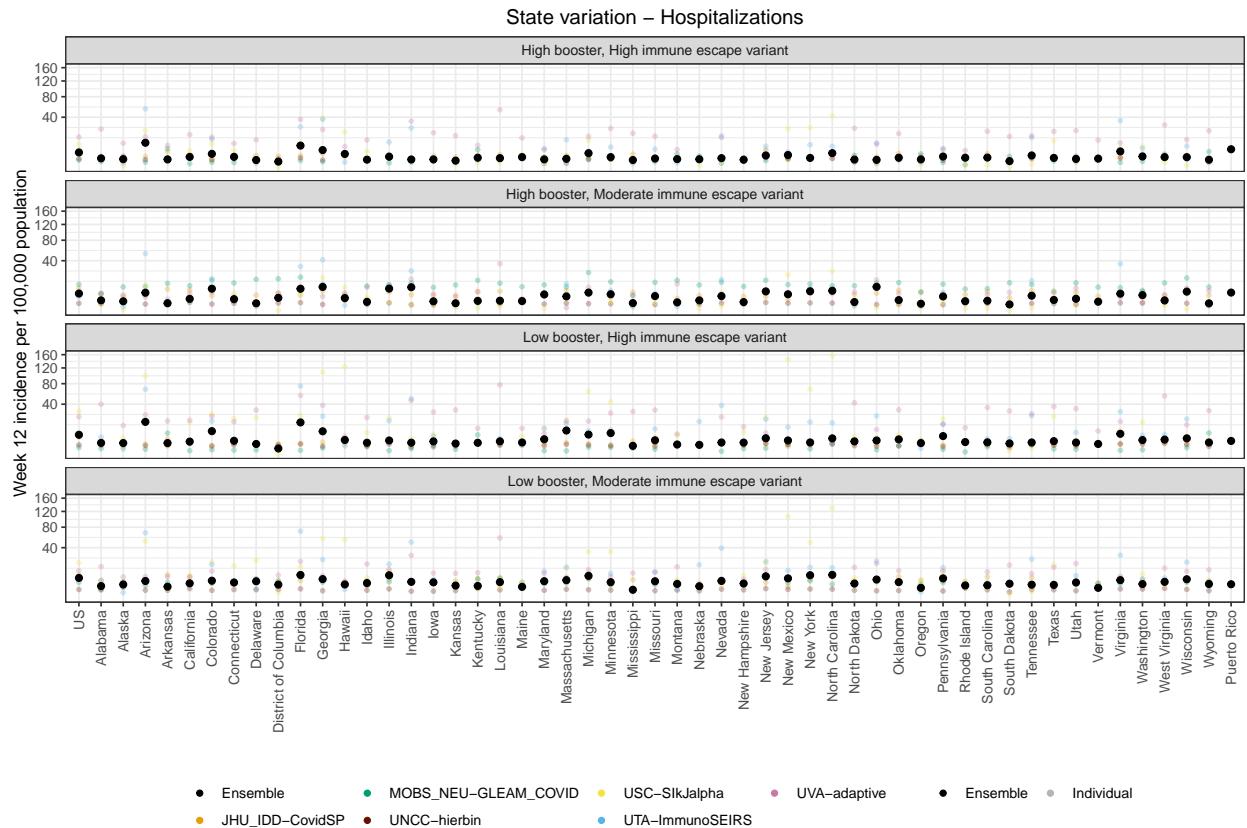


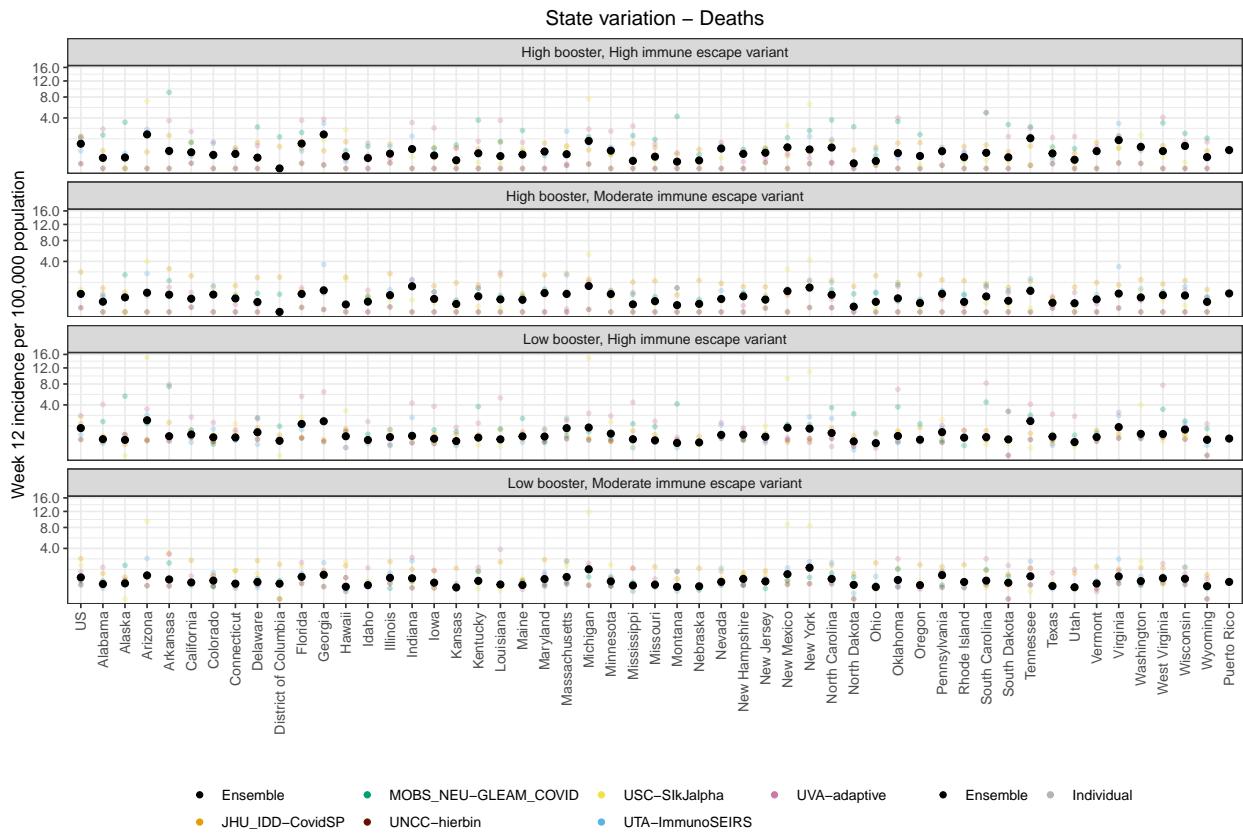
Individual model and ensembles projections for state-level death and hospitalization incidence per 100,000 population at week 6.



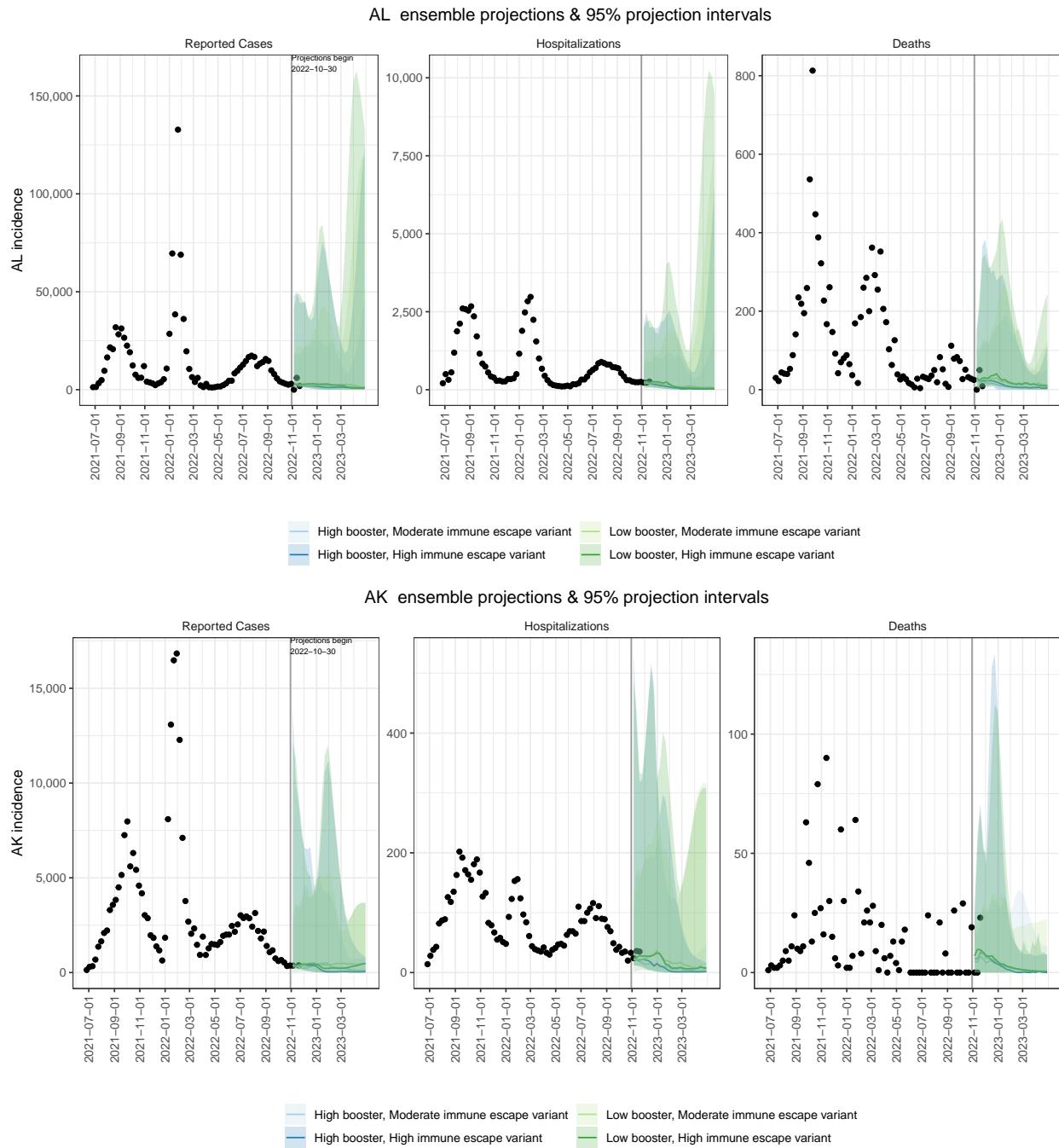


Individual model and ensembles projections for state-level incidence per 100,000 population at week 12.

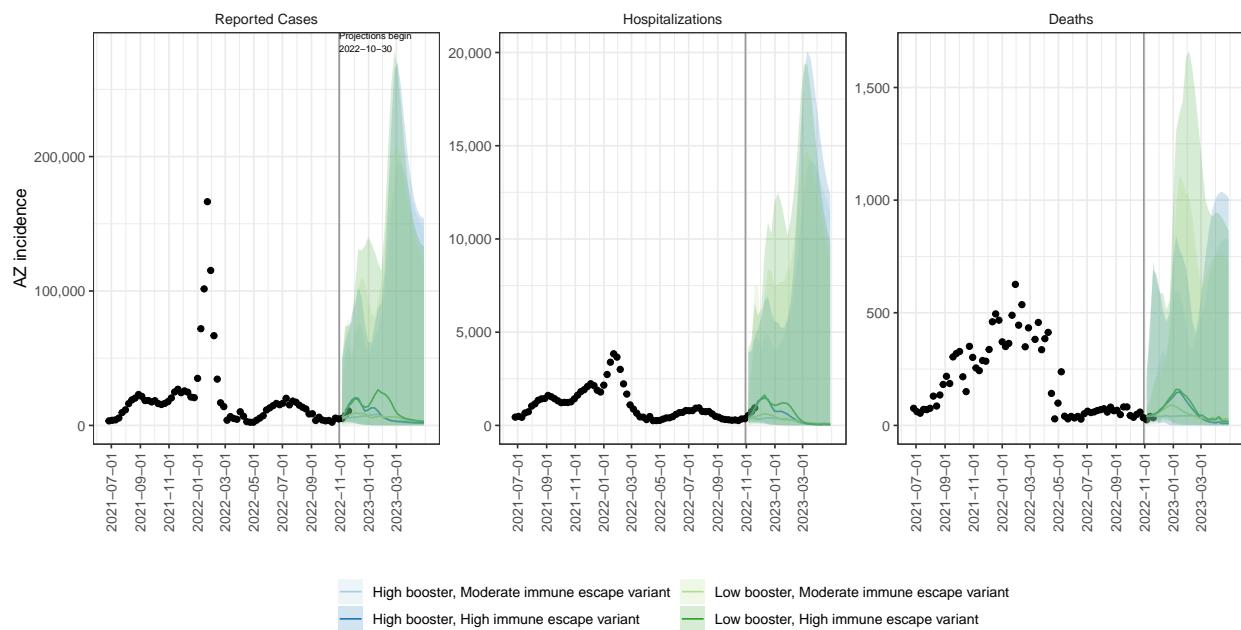




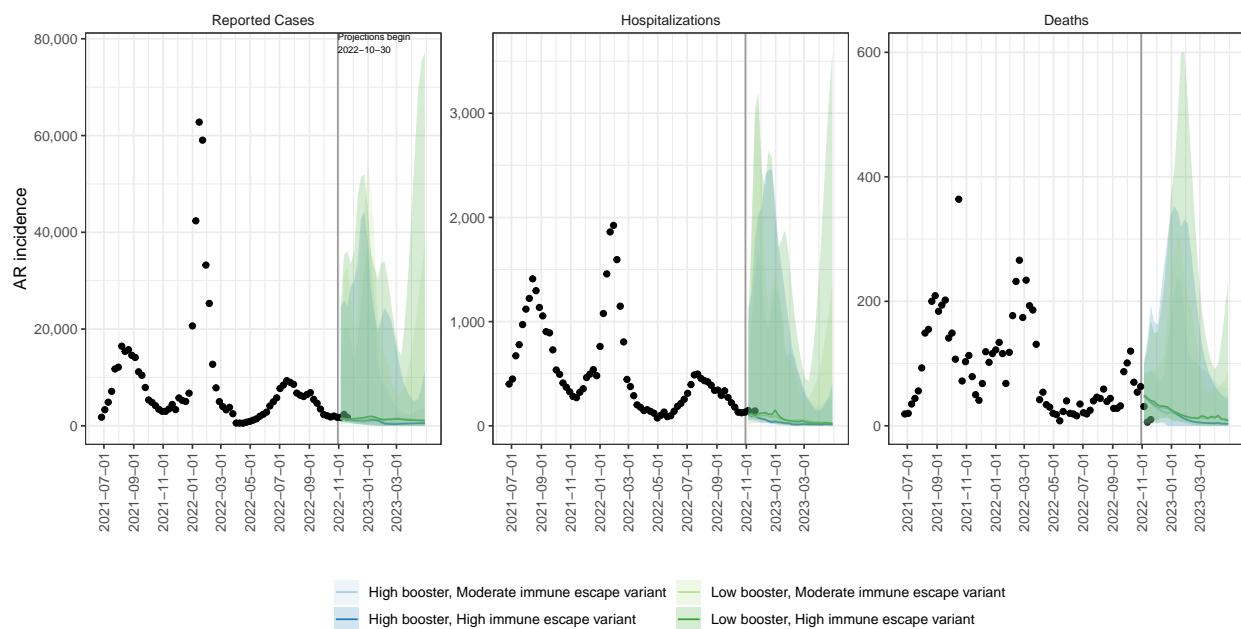
## State-level ensemble plots



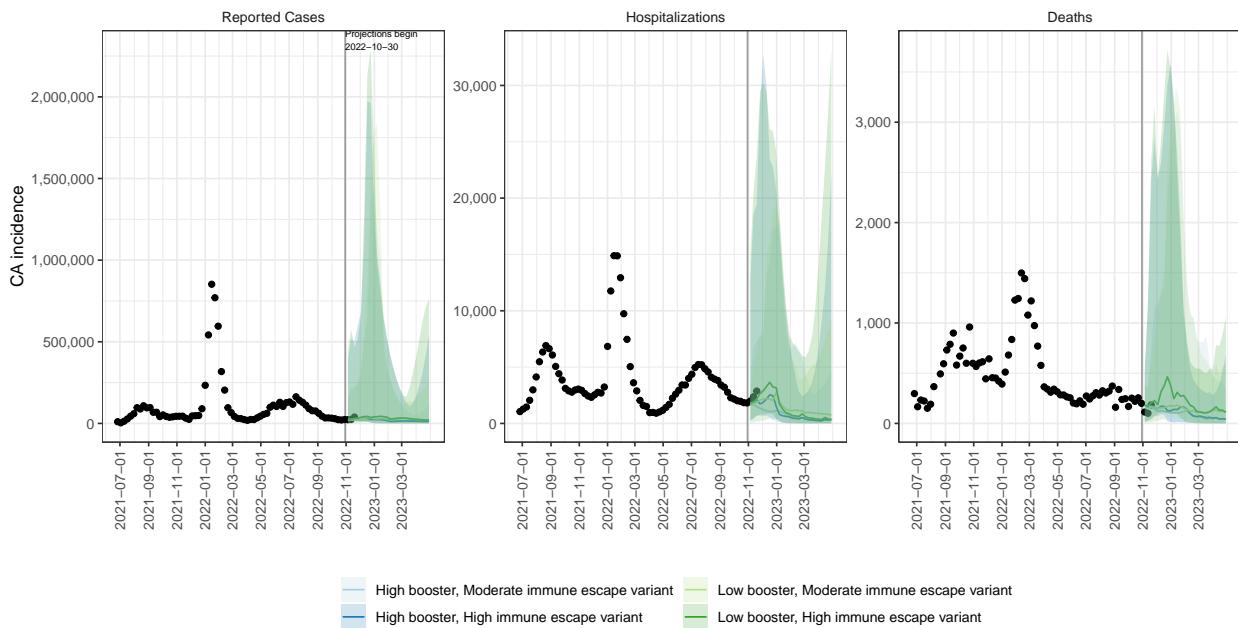
### AZ ensemble projections & 95% projection intervals



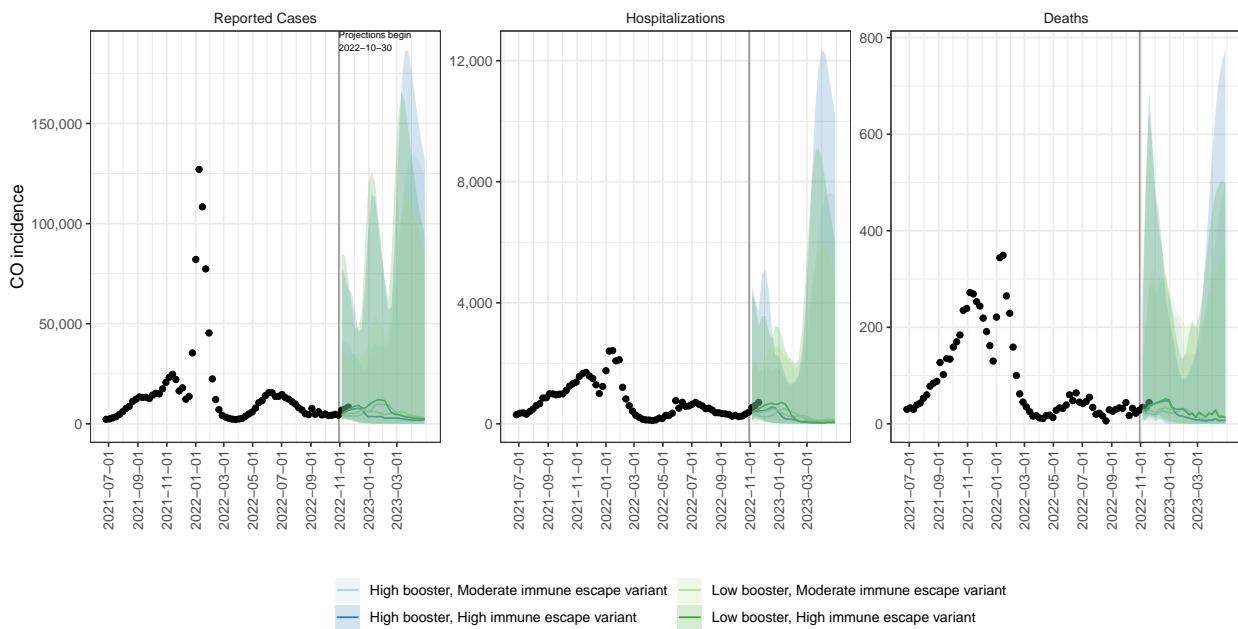
### AR ensemble projections & 95% projection intervals



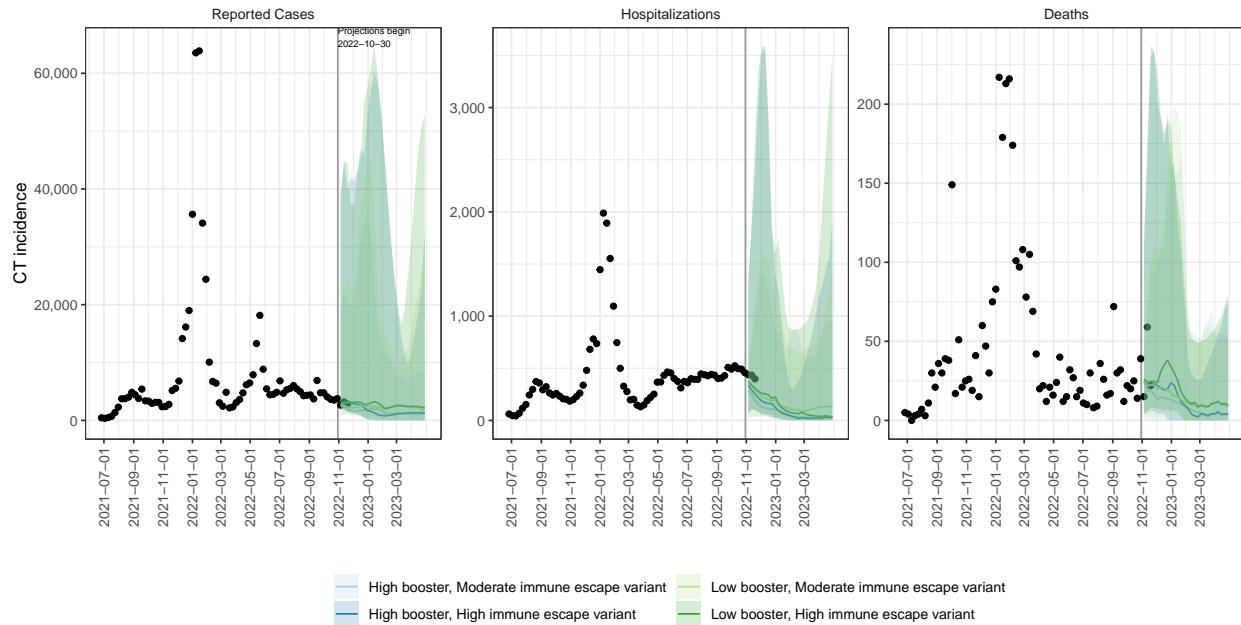
### CA ensemble projections & 95% projection intervals



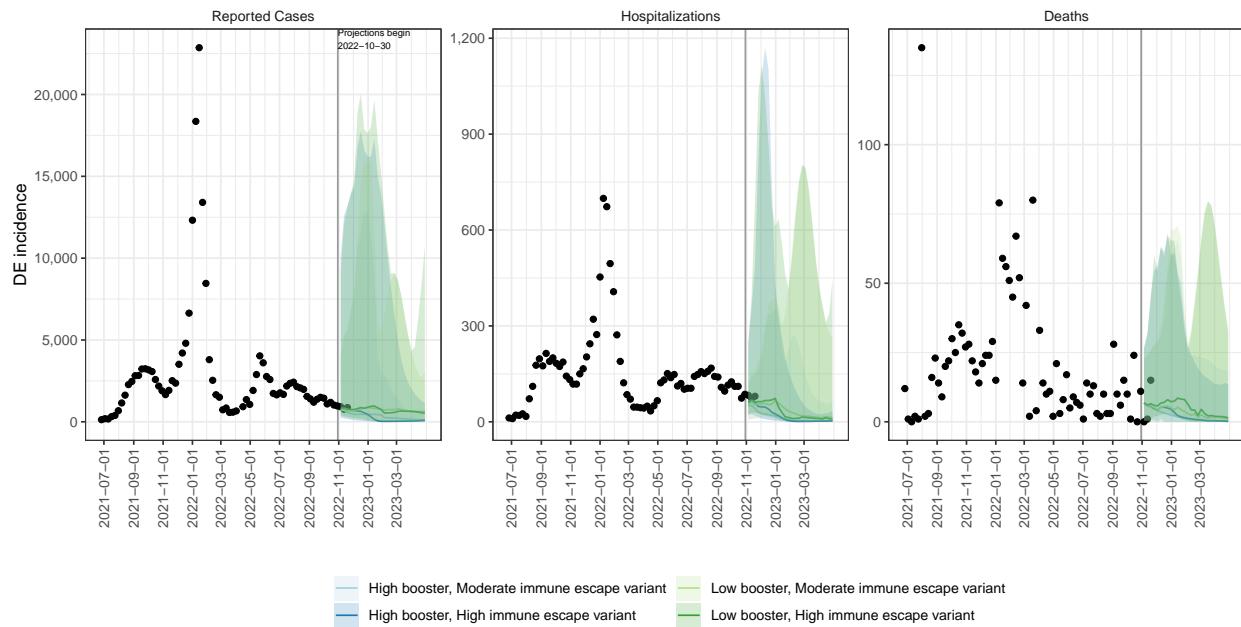
### CO ensemble projections & 95% projection intervals



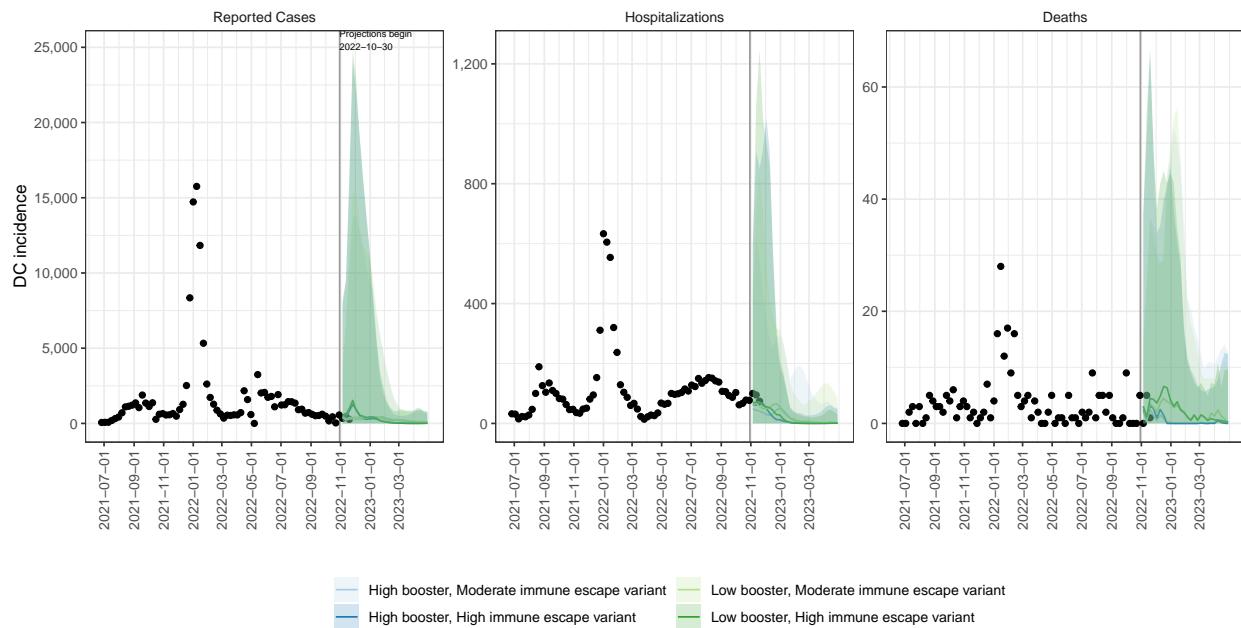
### CT ensemble projections & 95% projection intervals



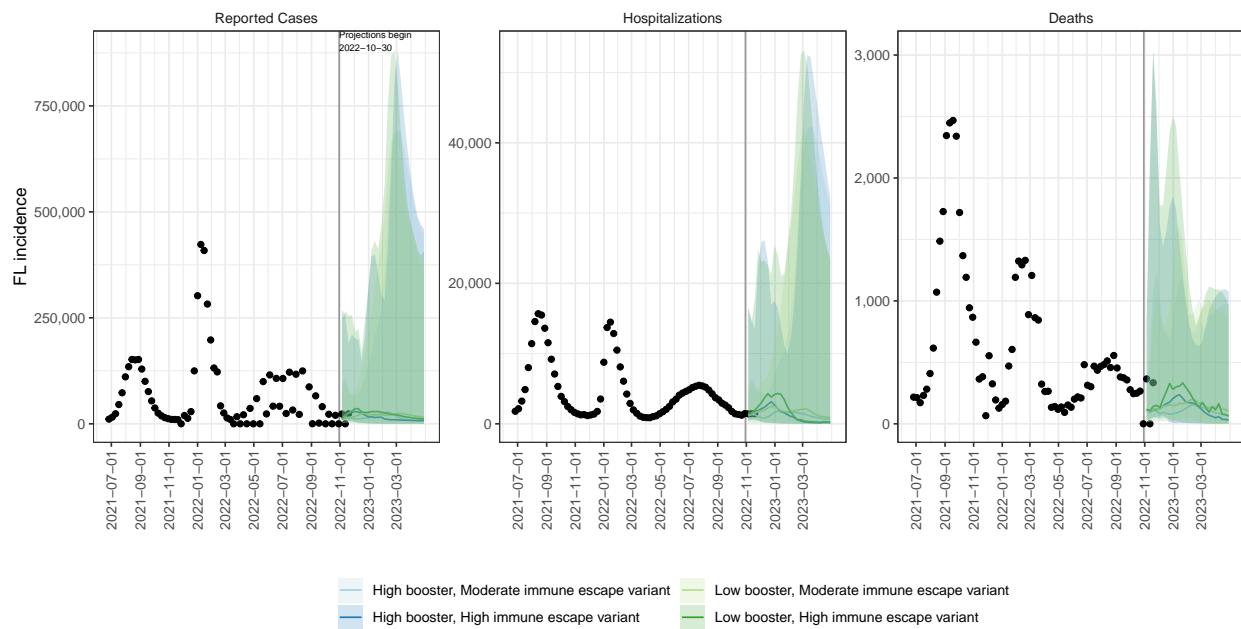
### DE ensemble projections & 95% projection intervals



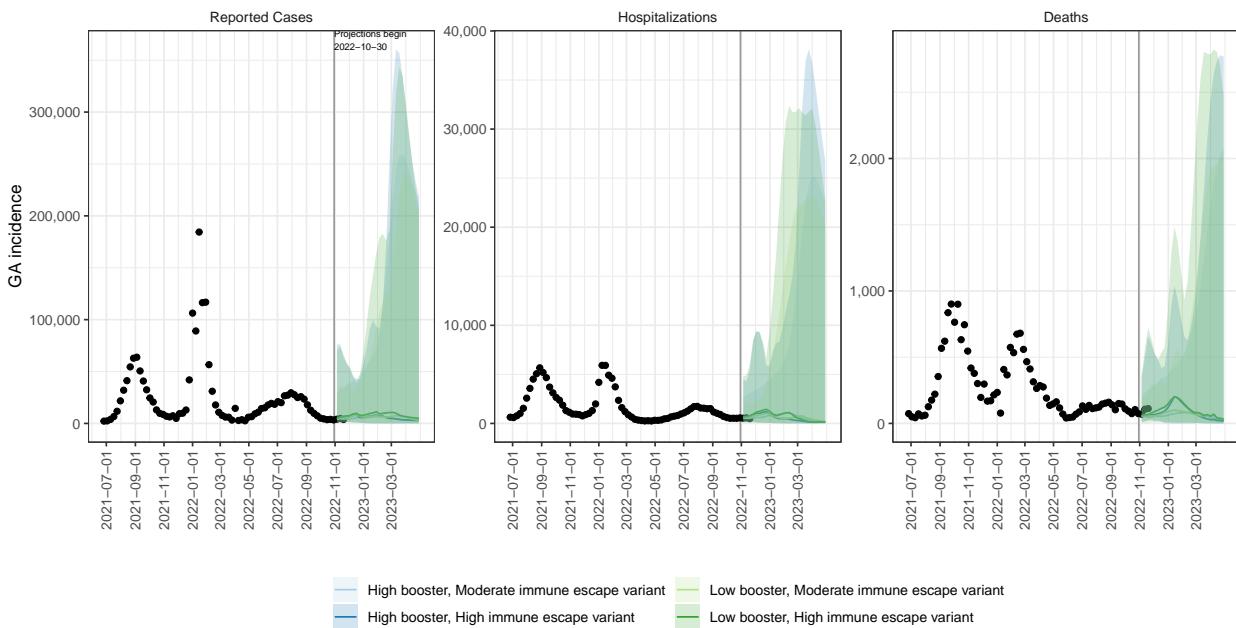
### DC ensemble projections & 95% projection intervals



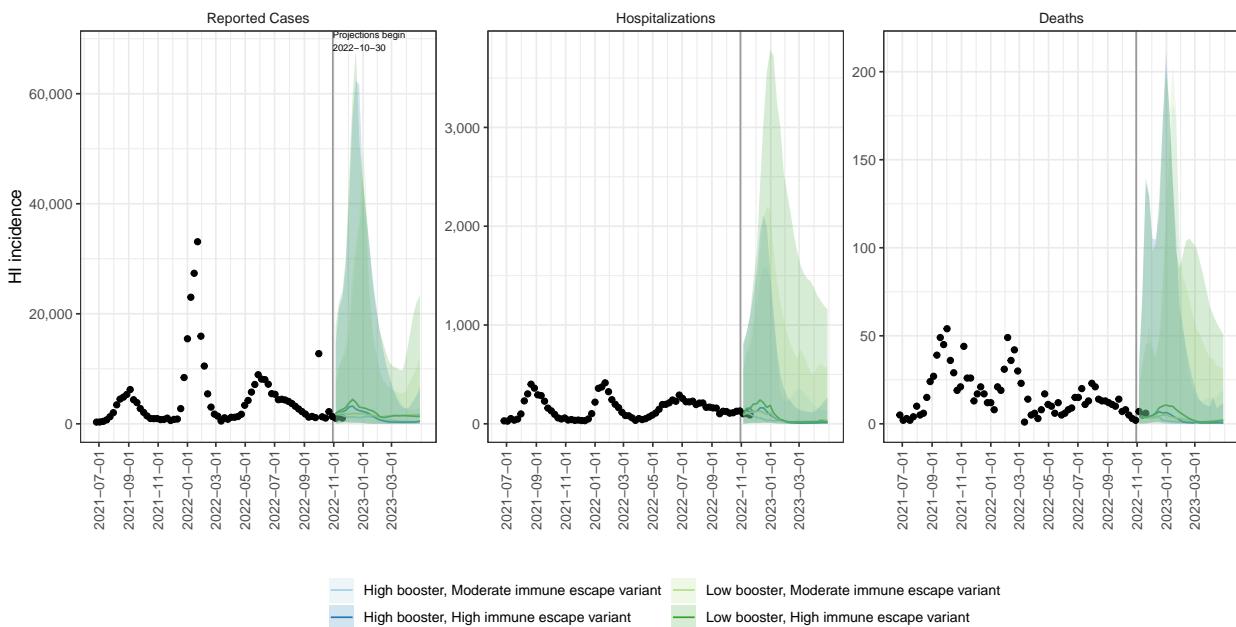
### FL ensemble projections & 95% projection intervals



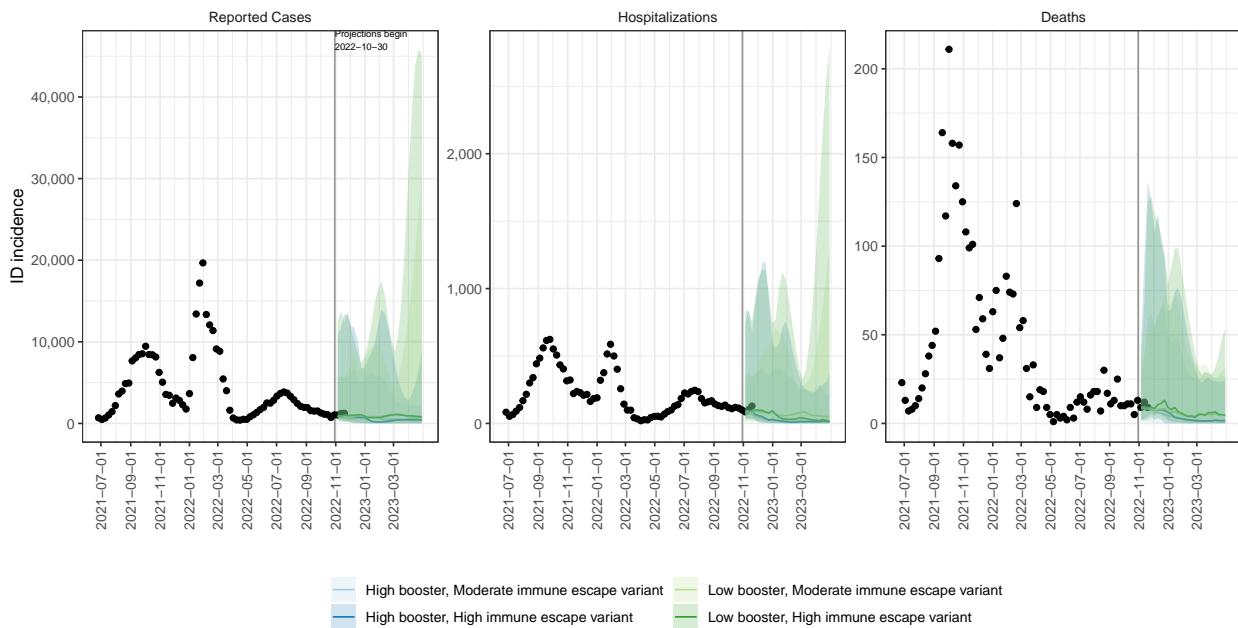
### GA ensemble projections & 95% projection intervals



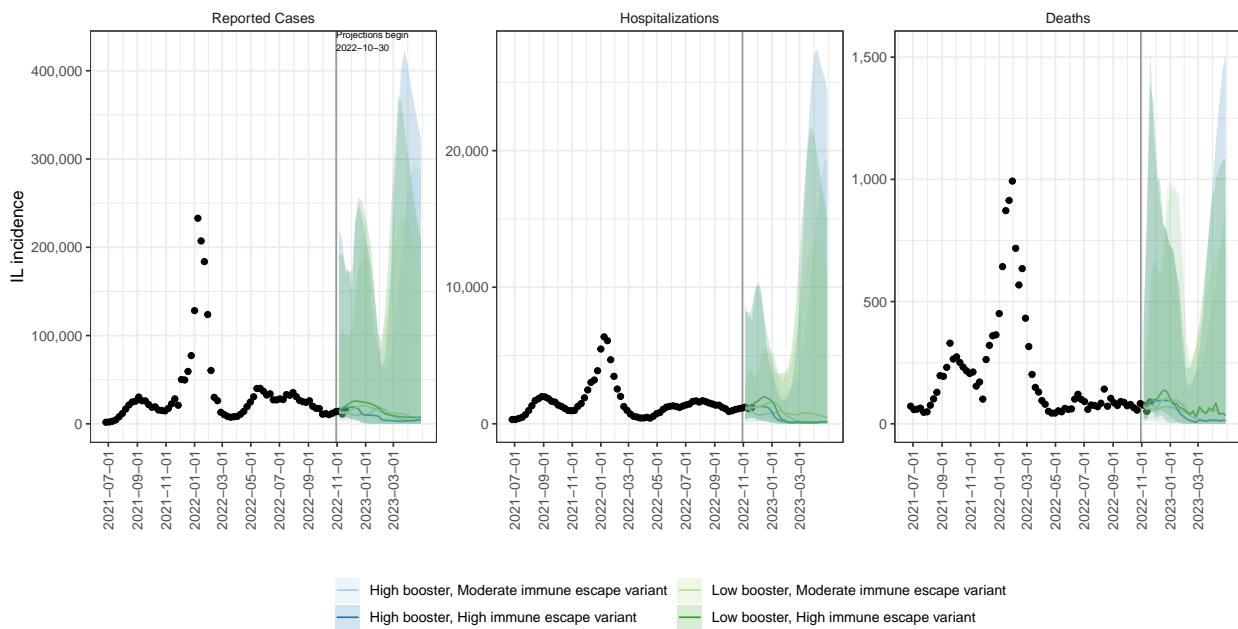
### HI ensemble projections & 95% projection intervals



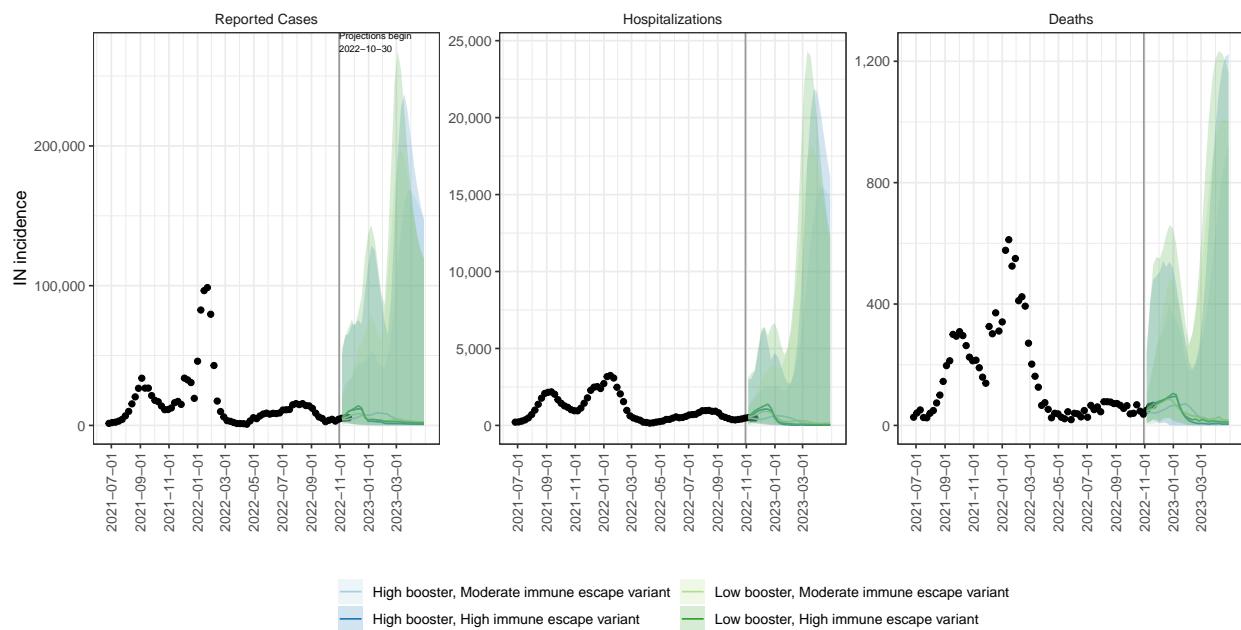
### ID ensemble projections & 95% projection intervals



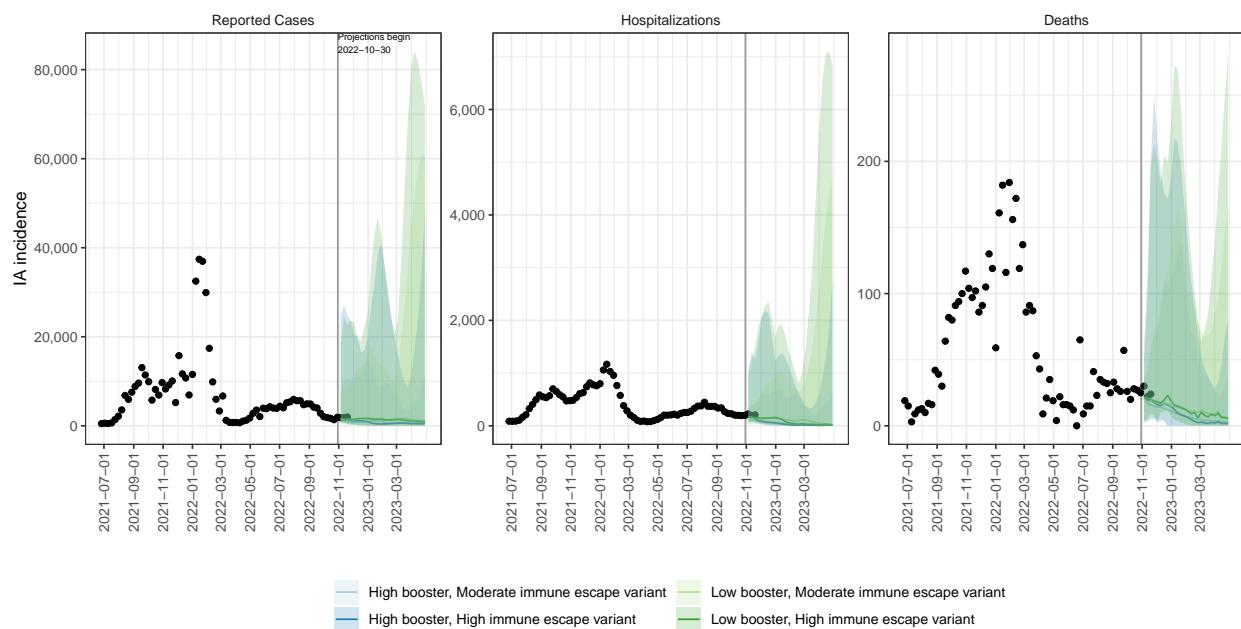
### IL ensemble projections & 95% projection intervals



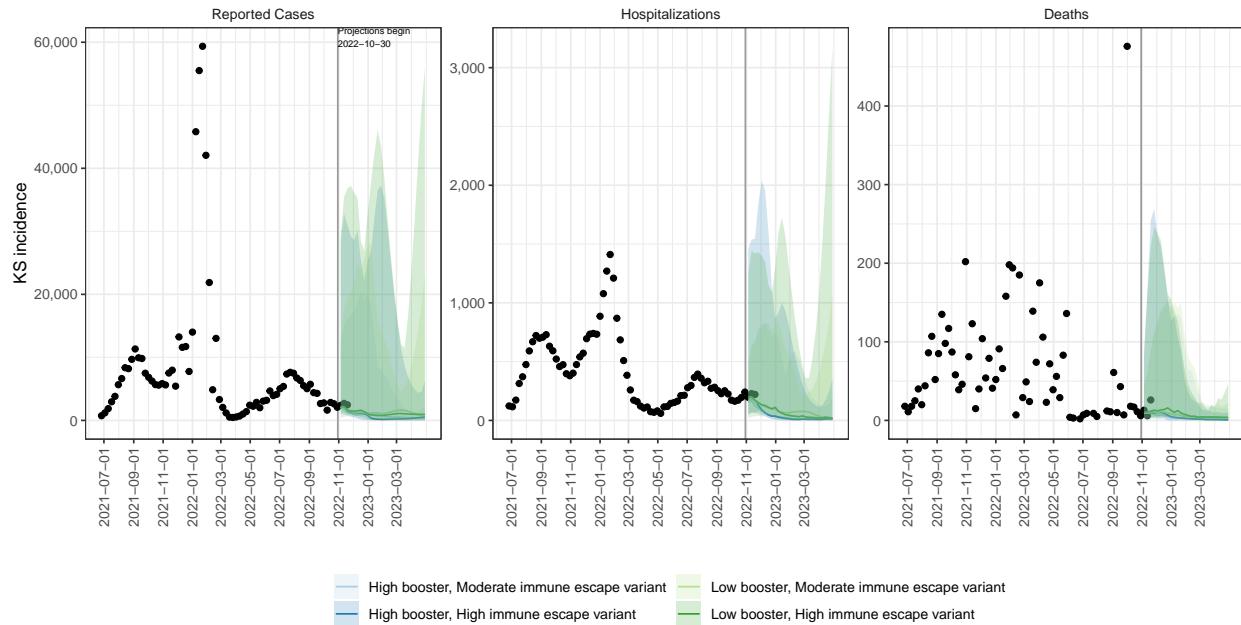
### IN ensemble projections & 95% projection intervals



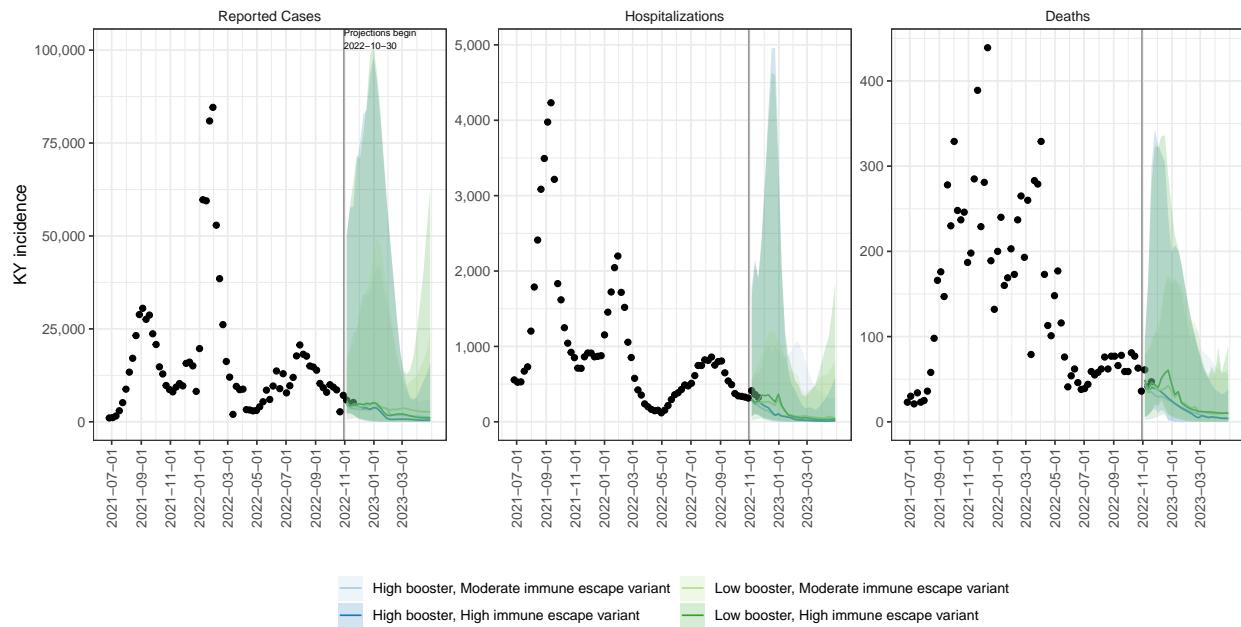
### IA ensemble projections & 95% projection intervals



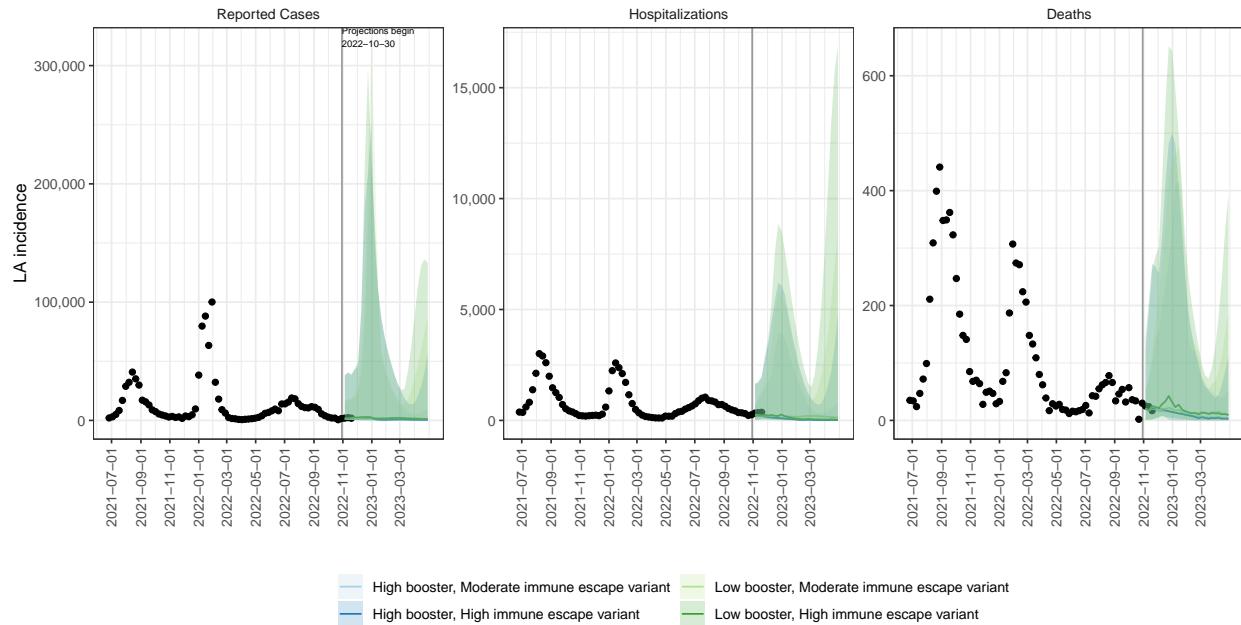
### KS ensemble projections & 95% projection intervals



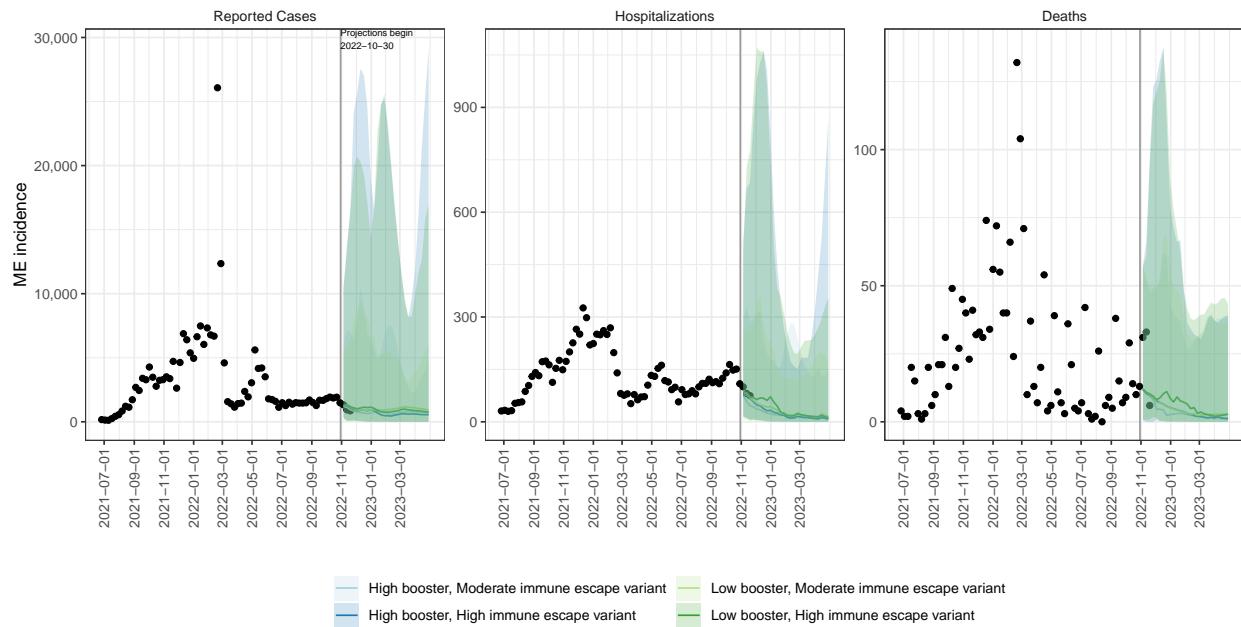
### KY ensemble projections & 95% projection intervals



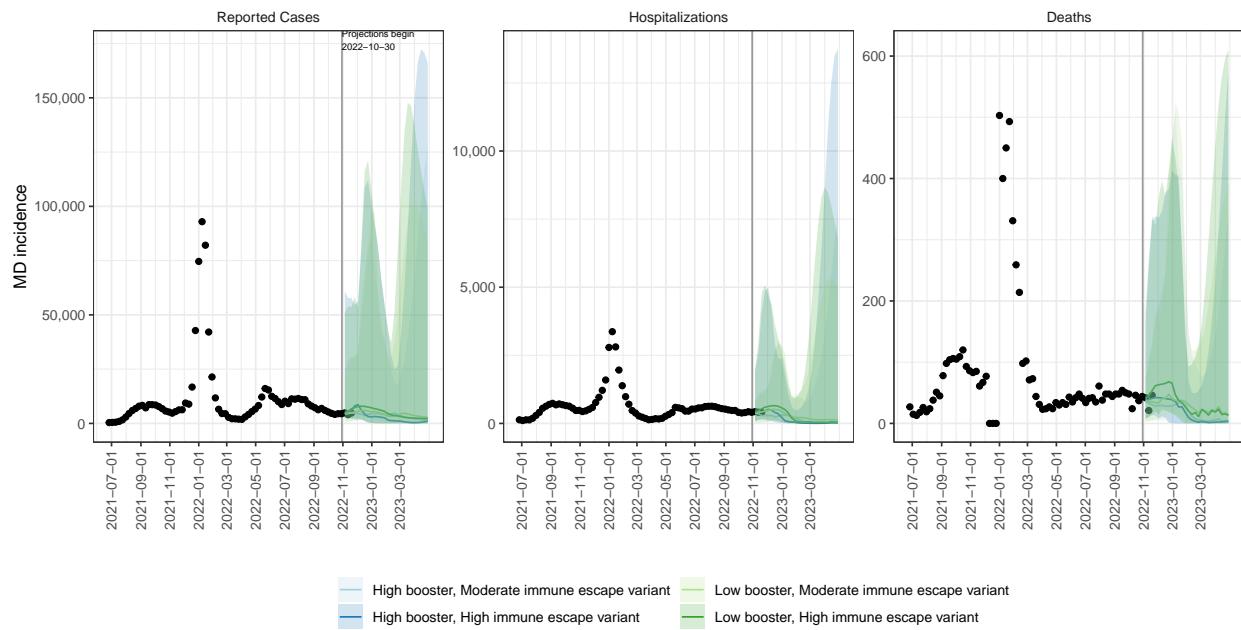
### LA ensemble projections & 95% projection intervals



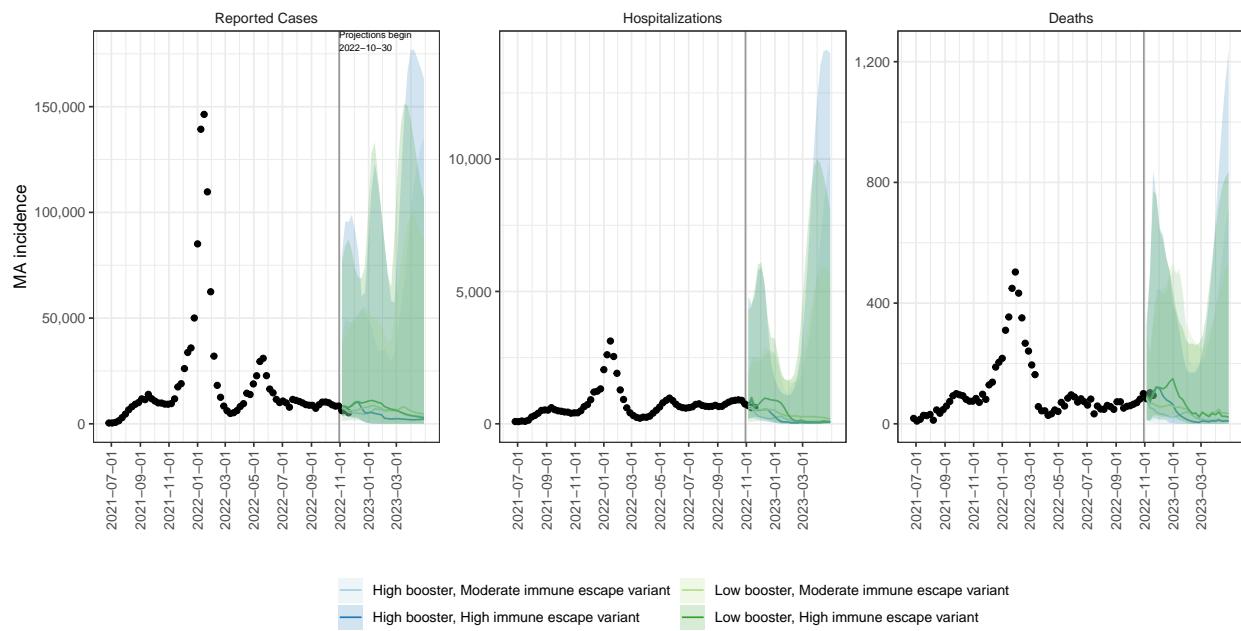
### ME ensemble projections & 95% projection intervals



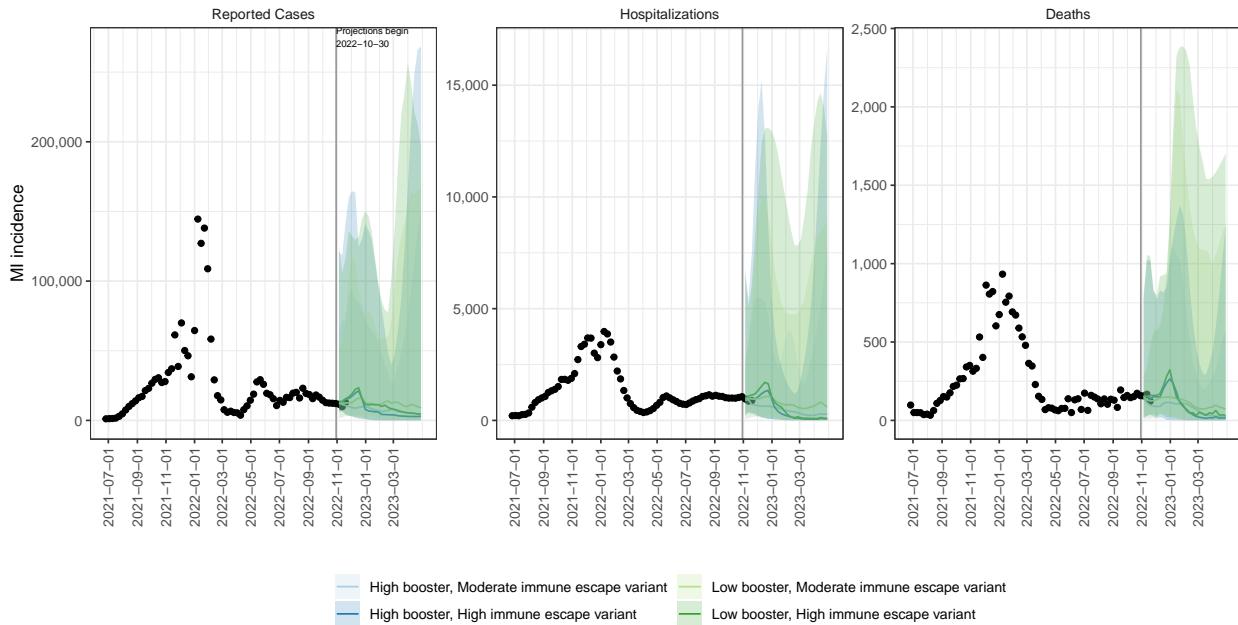
### MD ensemble projections & 95% projection intervals



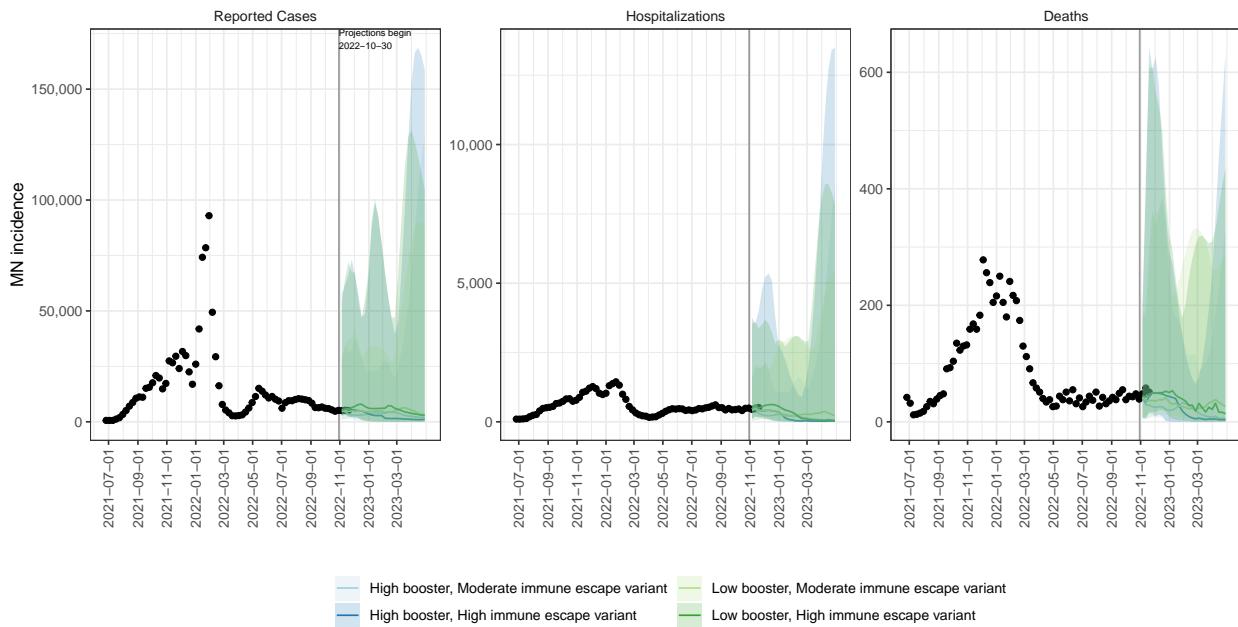
### MA ensemble projections & 95% projection intervals



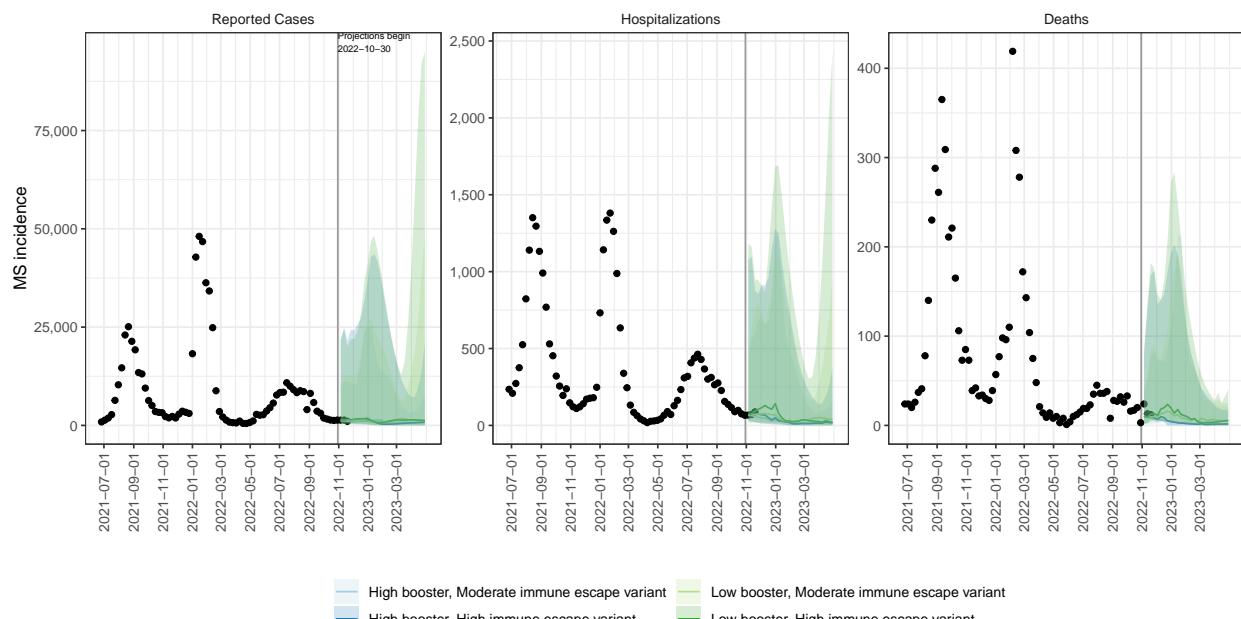
### MI ensemble projections & 95% projection intervals



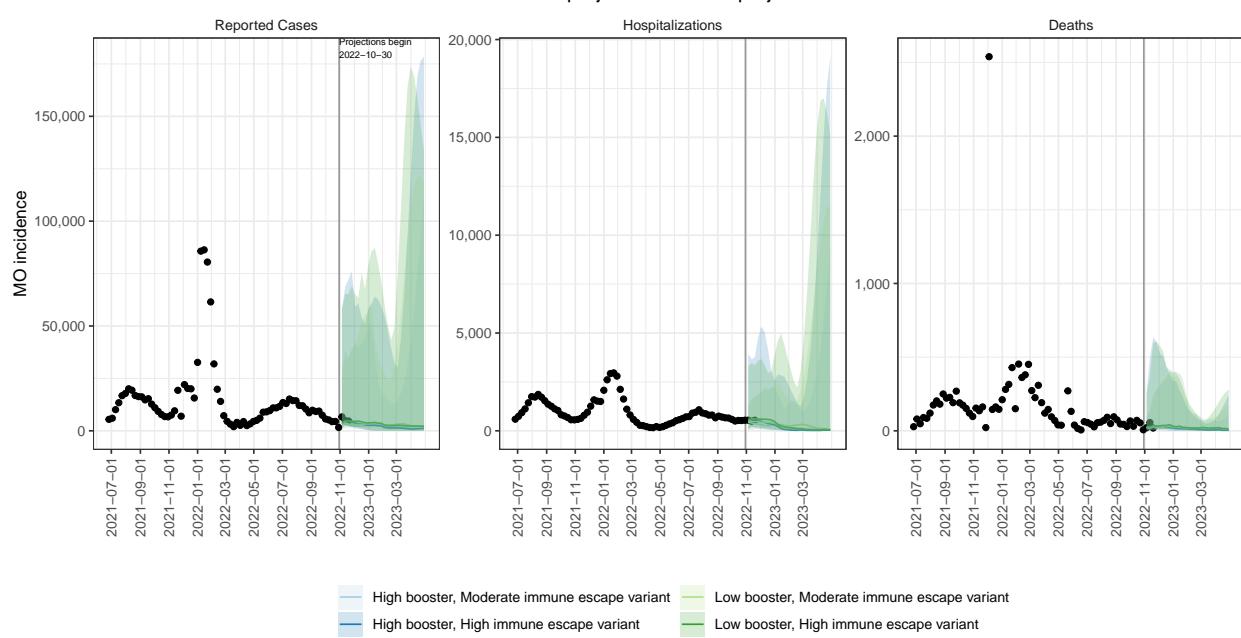
### MN ensemble projections & 95% projection intervals



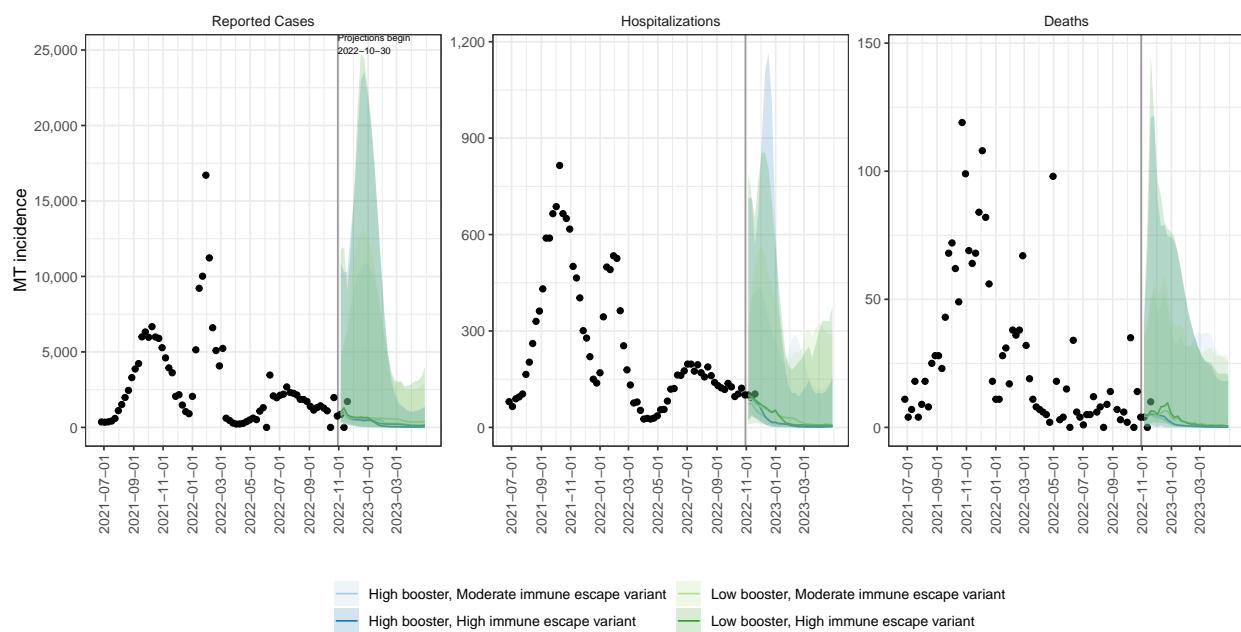
### MS ensemble projections & 95% projection intervals



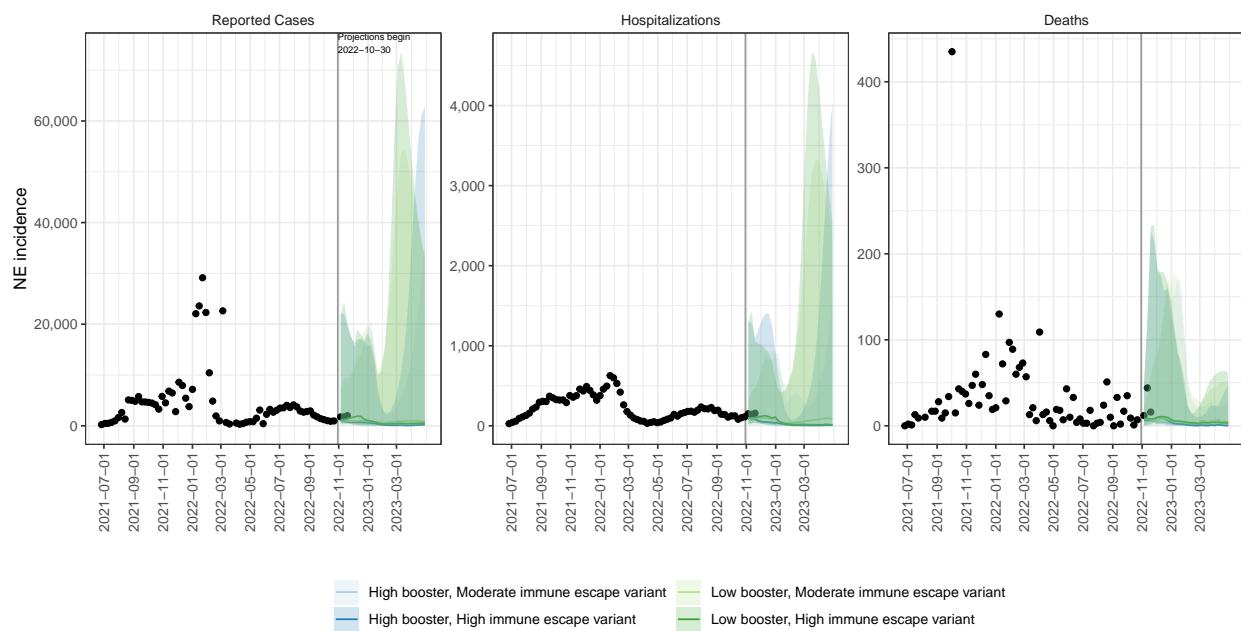
### MO ensemble projections & 95% projection intervals



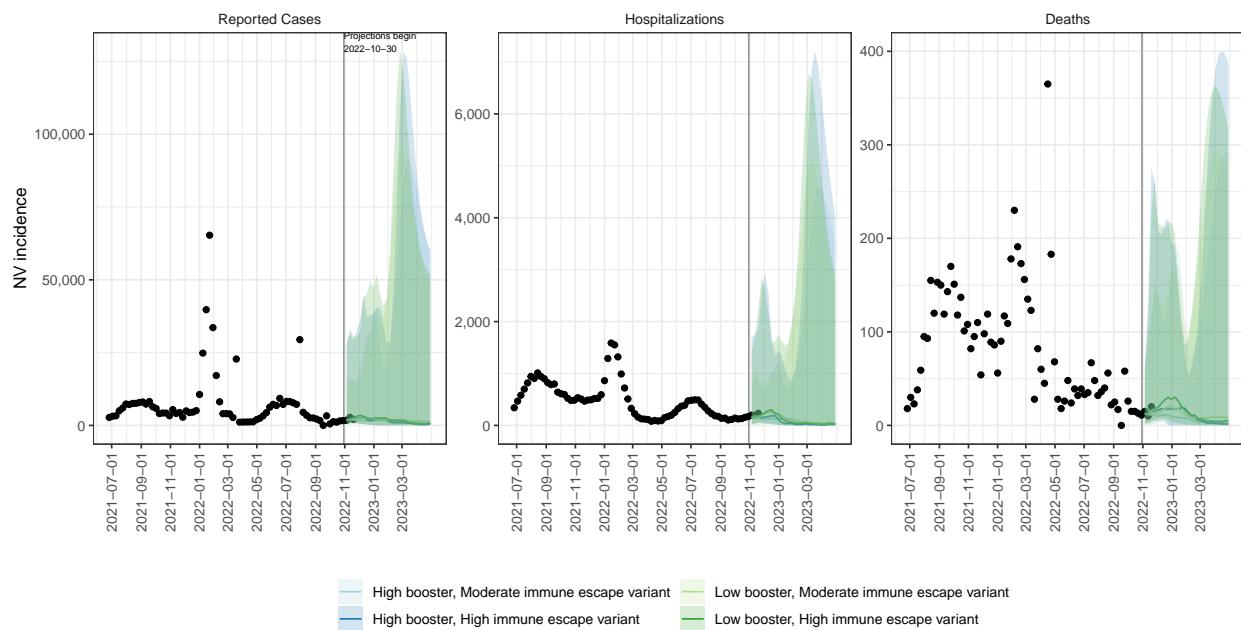
### MT ensemble projections & 95% projection intervals



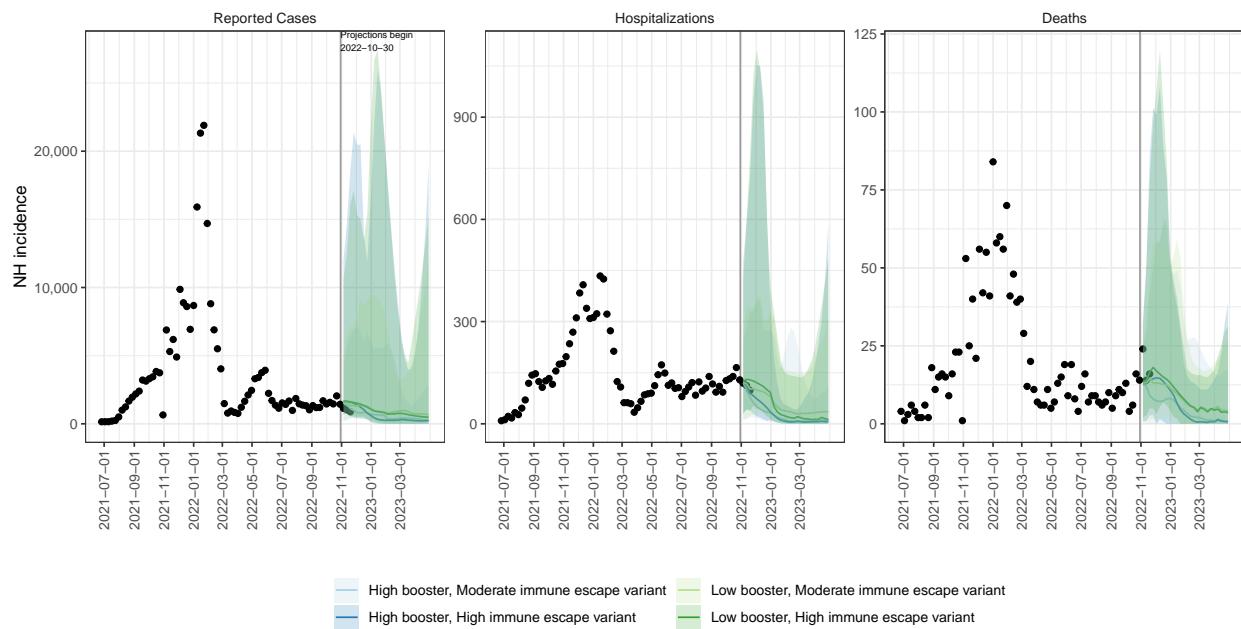
### NE ensemble projections & 95% projection intervals



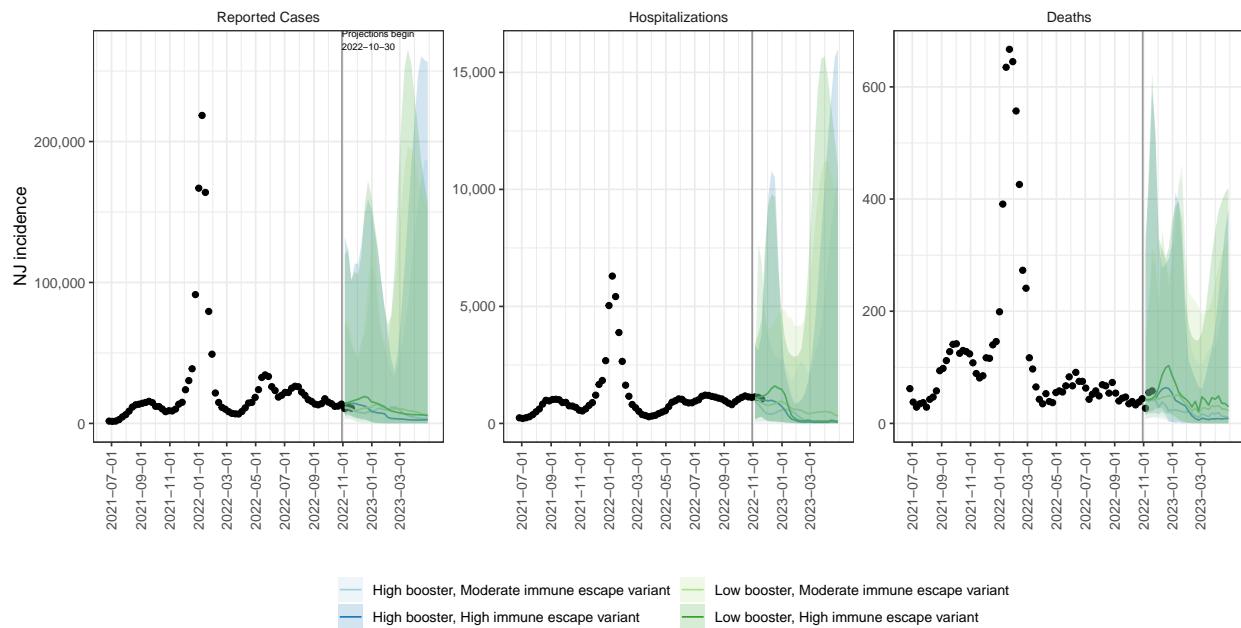
### NV ensemble projections & 95% projection intervals



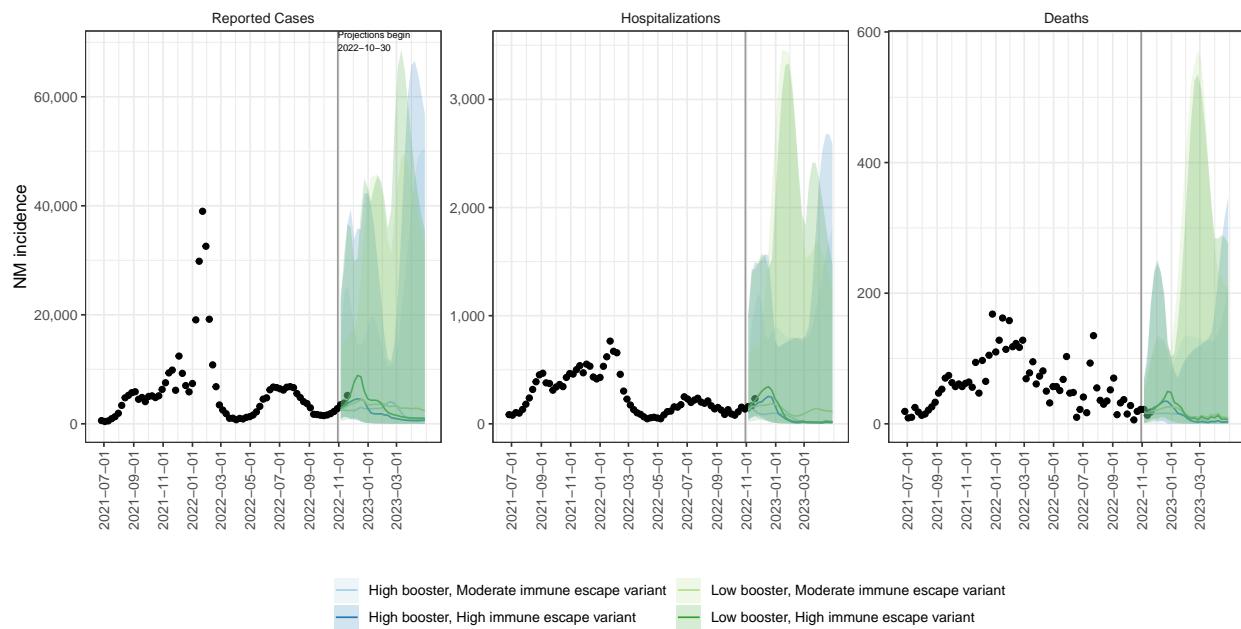
### NH ensemble projections & 95% projection intervals



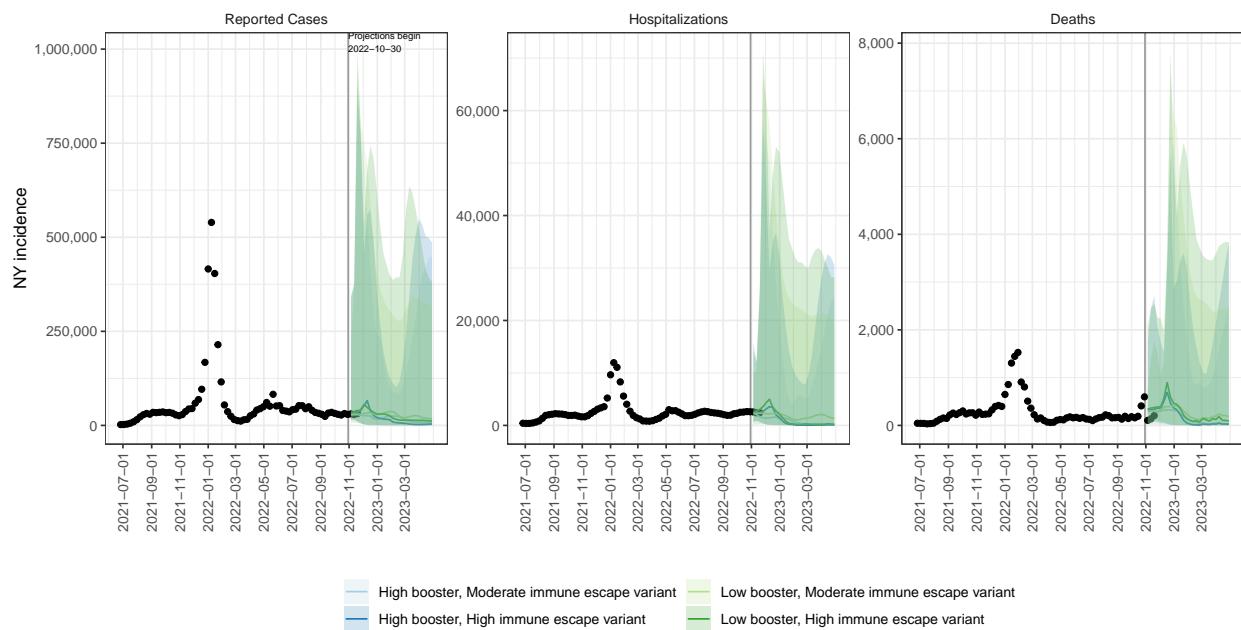
### NJ ensemble projections & 95% projection intervals



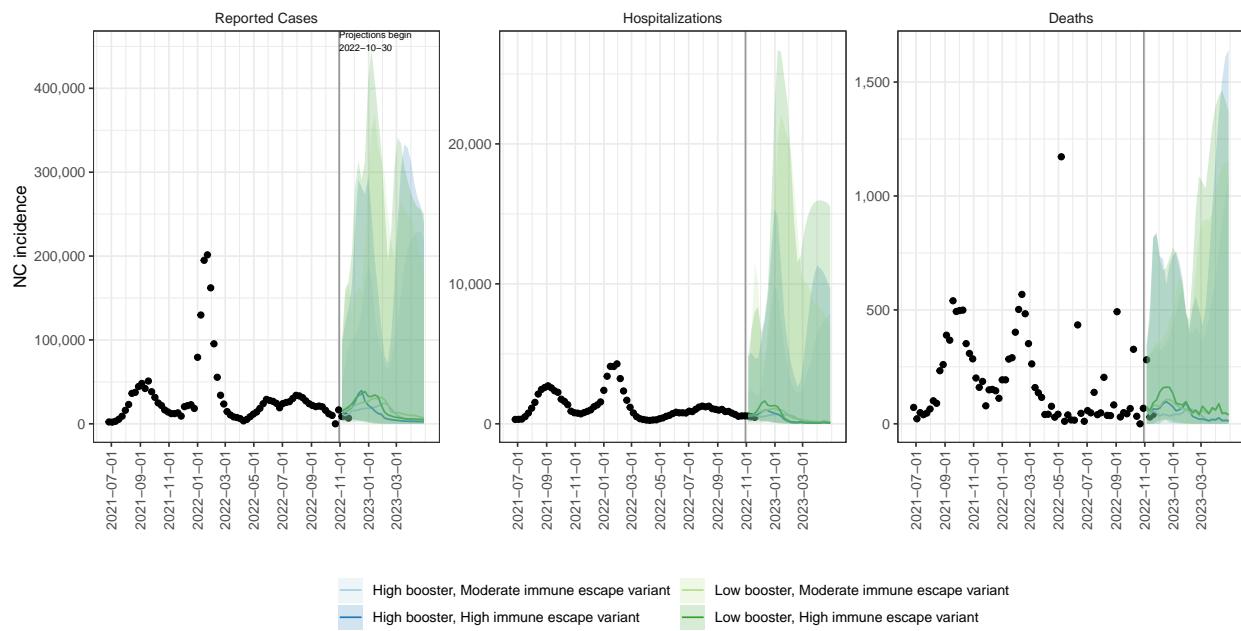
### NM ensemble projections & 95% projection intervals



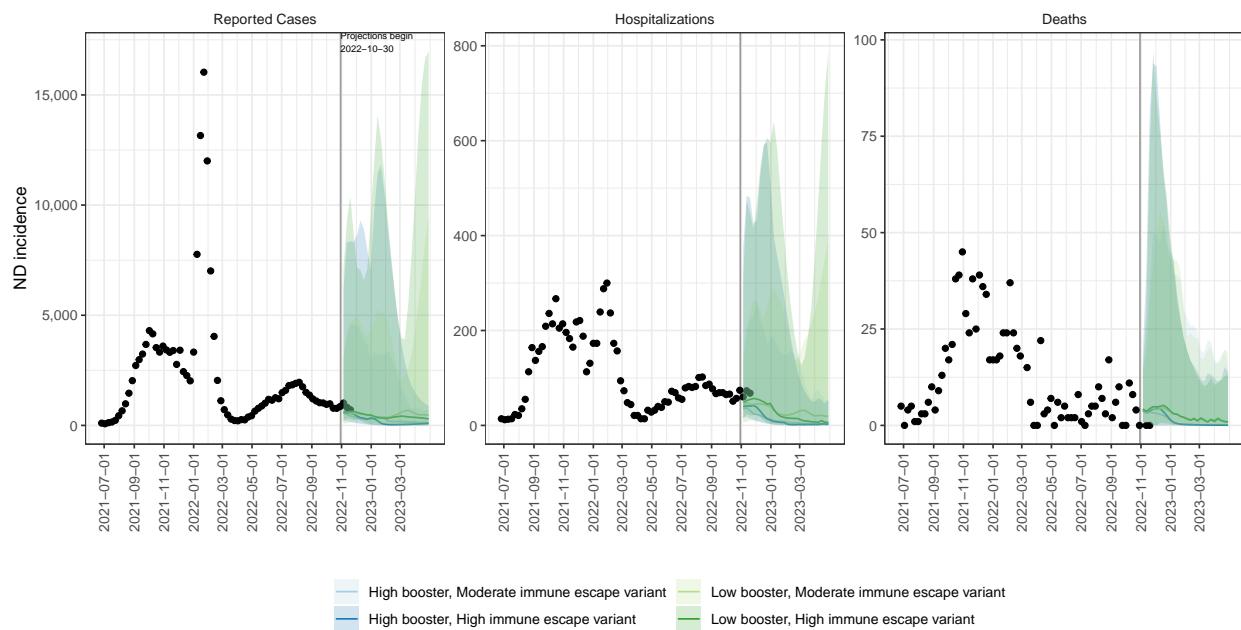
### NY ensemble projections & 95% projection intervals



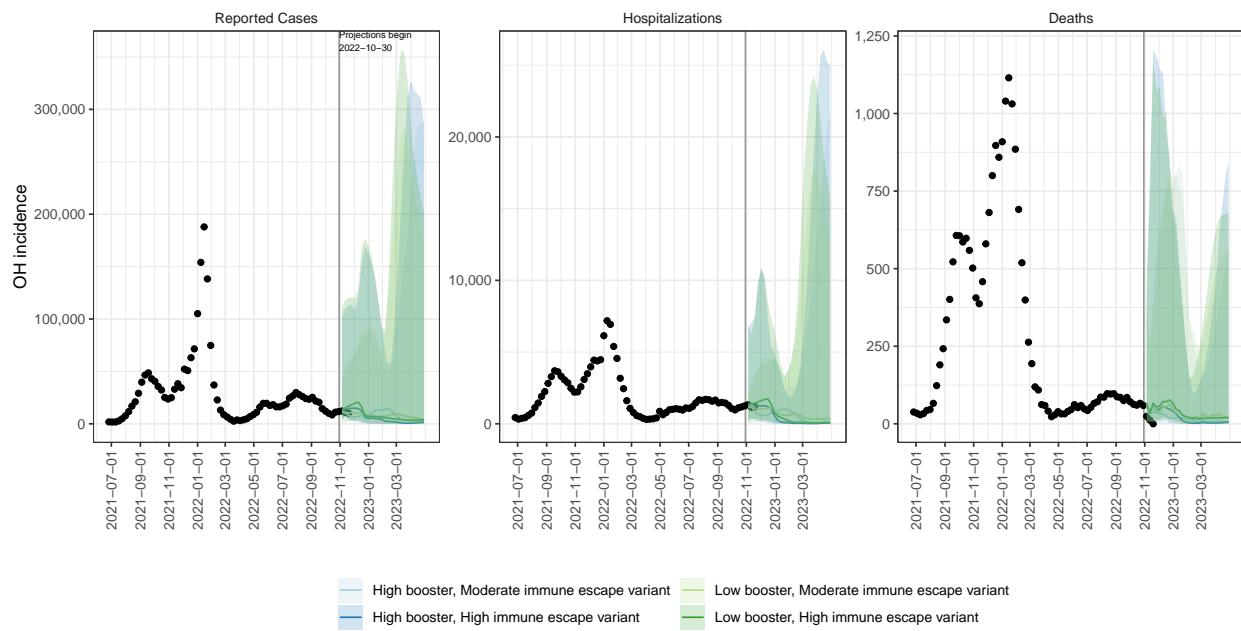
### NC ensemble projections & 95% projection intervals



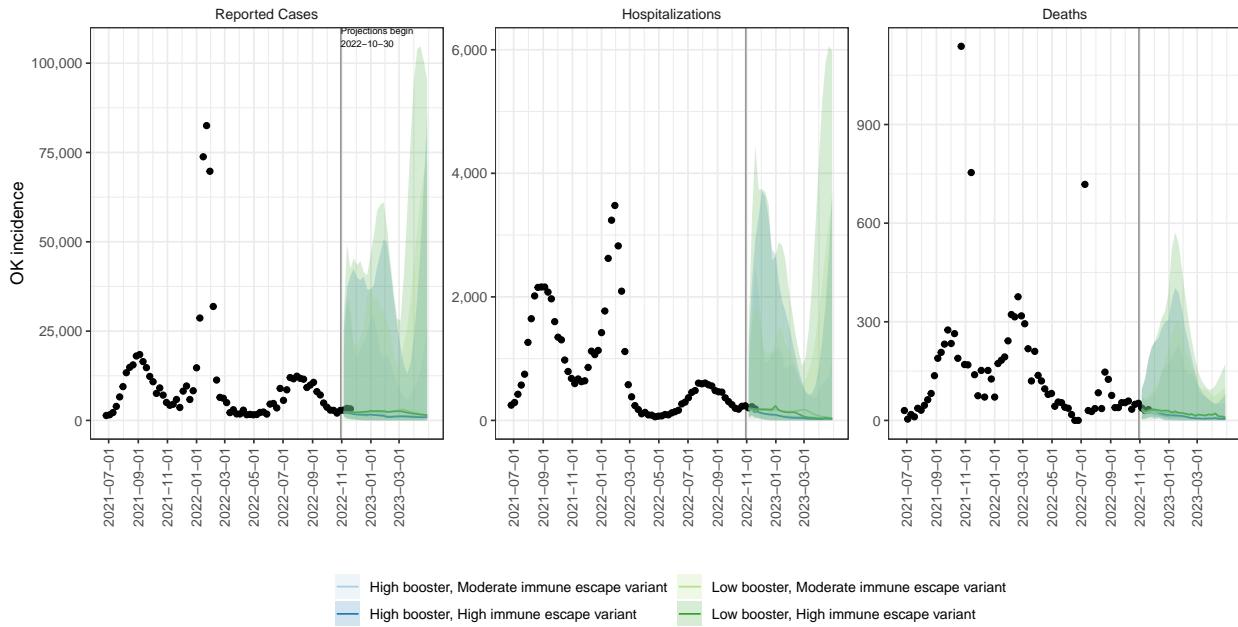
### ND ensemble projections & 95% projection intervals



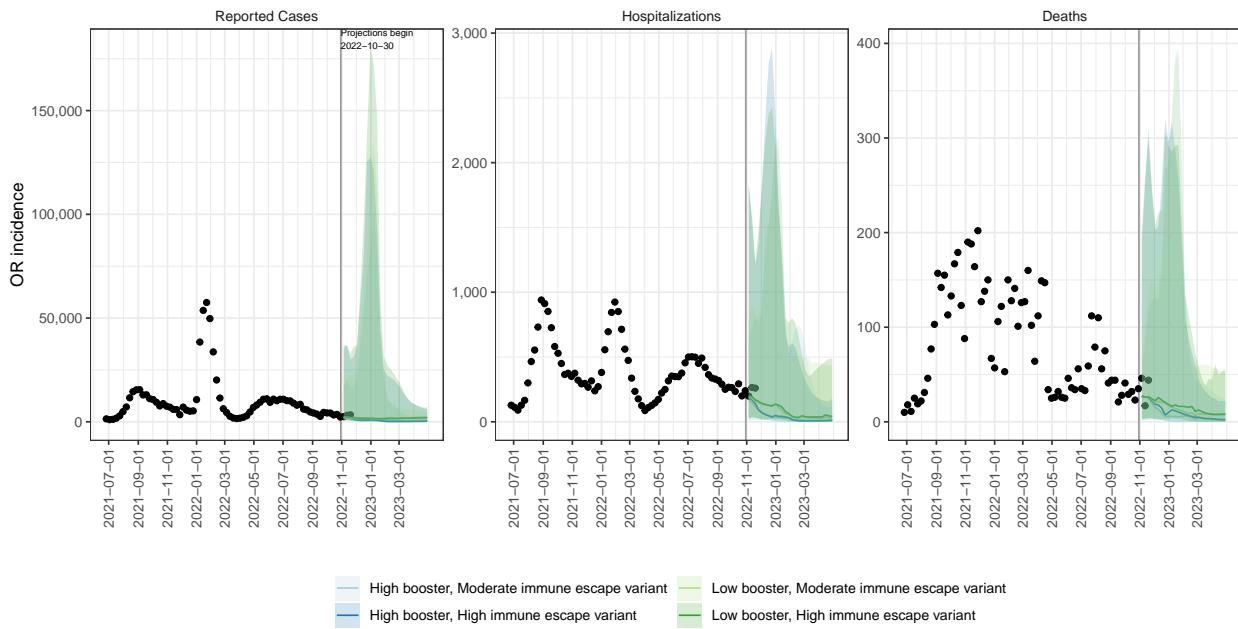
### OH ensemble projections & 95% projection intervals



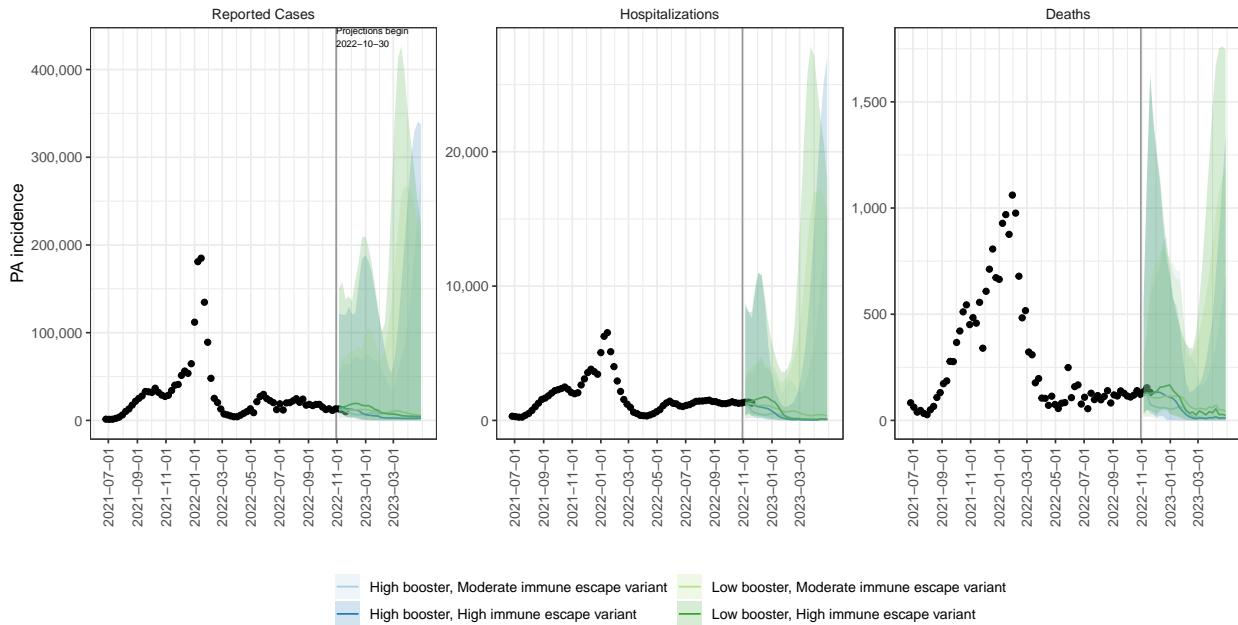
### OK ensemble projections & 95% projection intervals



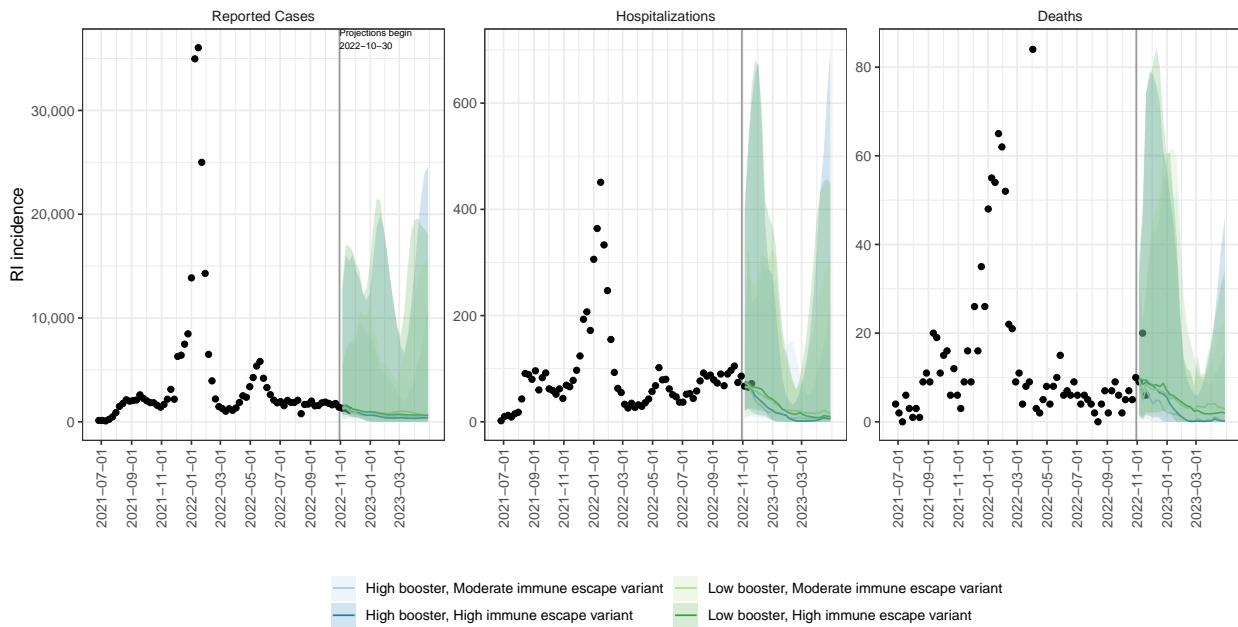
### OR ensemble projections & 95% projection intervals



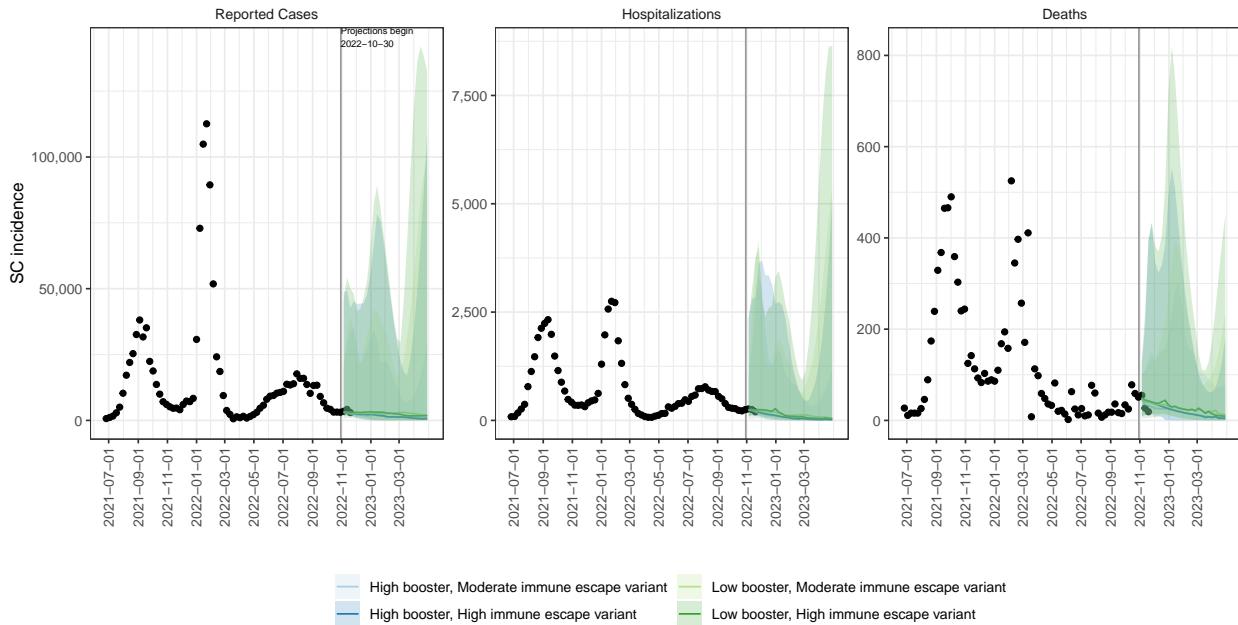
PA ensemble projections & 95% projection intervals



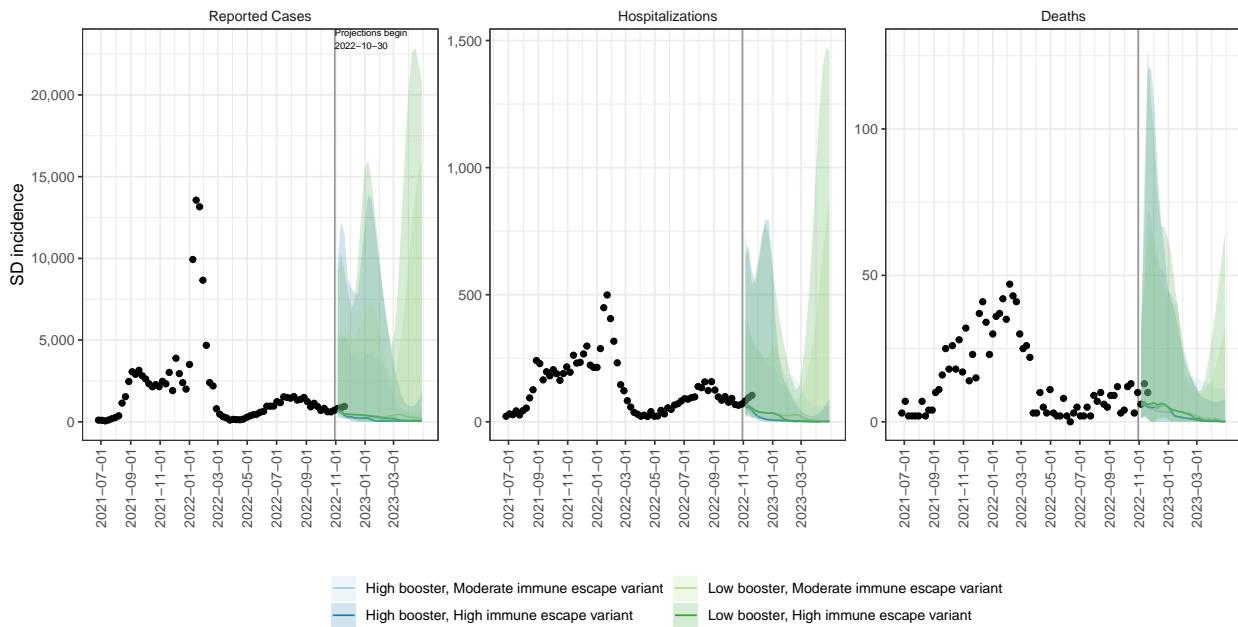
RI ensemble projections & 95% projection intervals



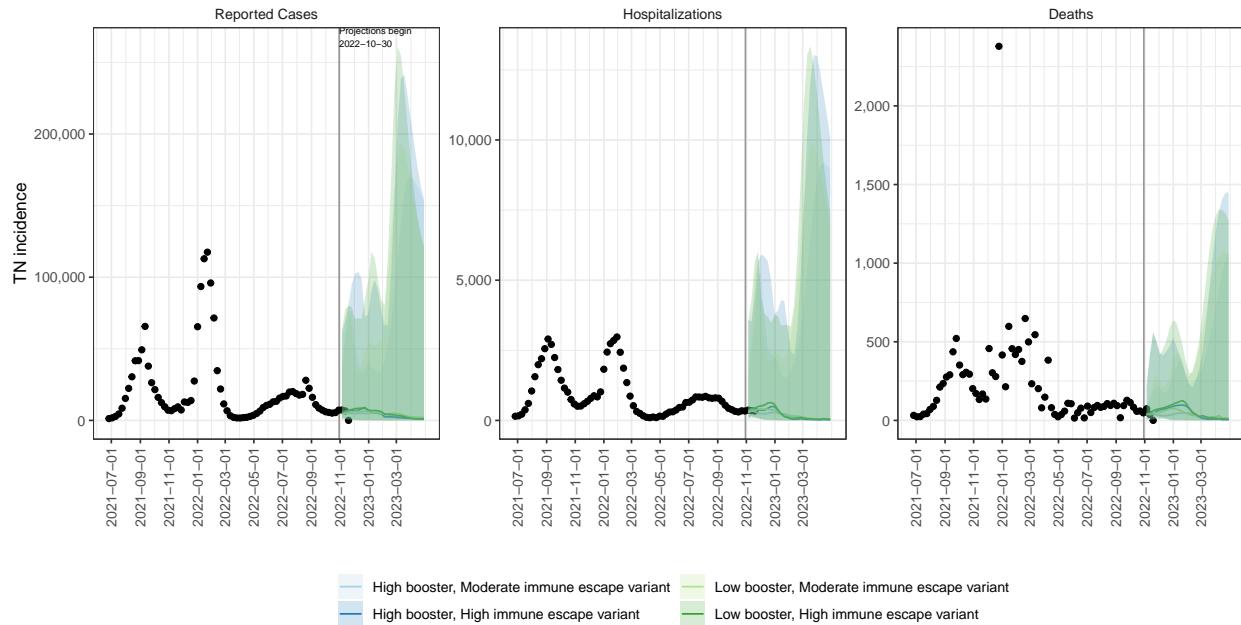
### SC ensemble projections & 95% projection intervals



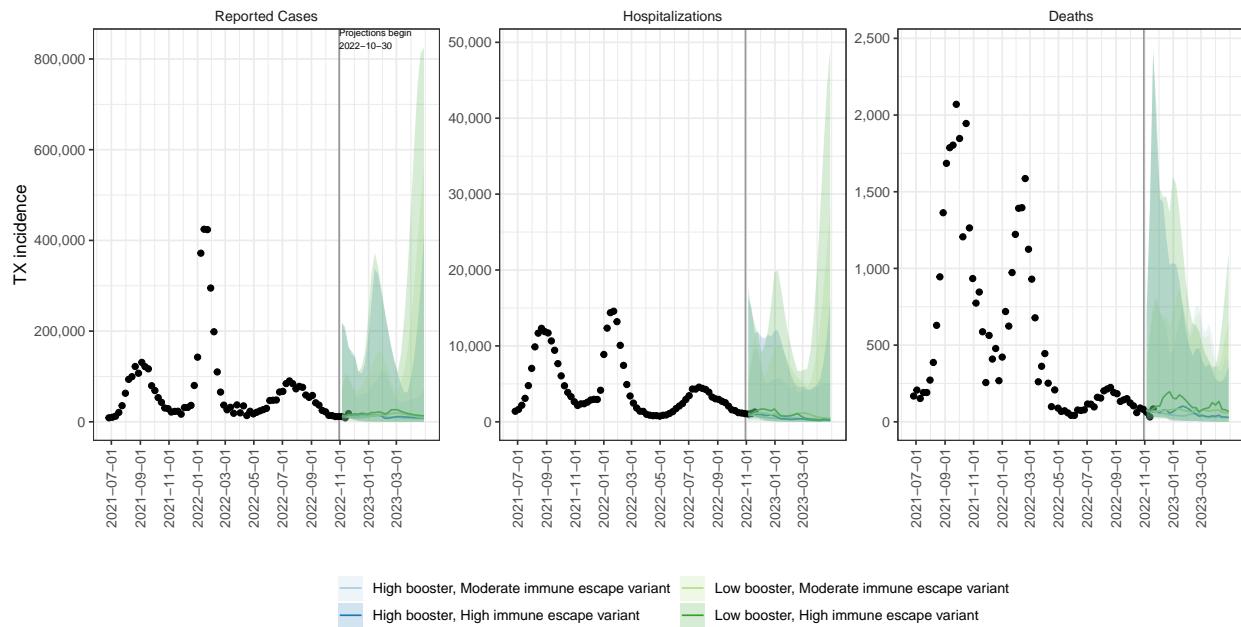
### SD ensemble projections & 95% projection intervals



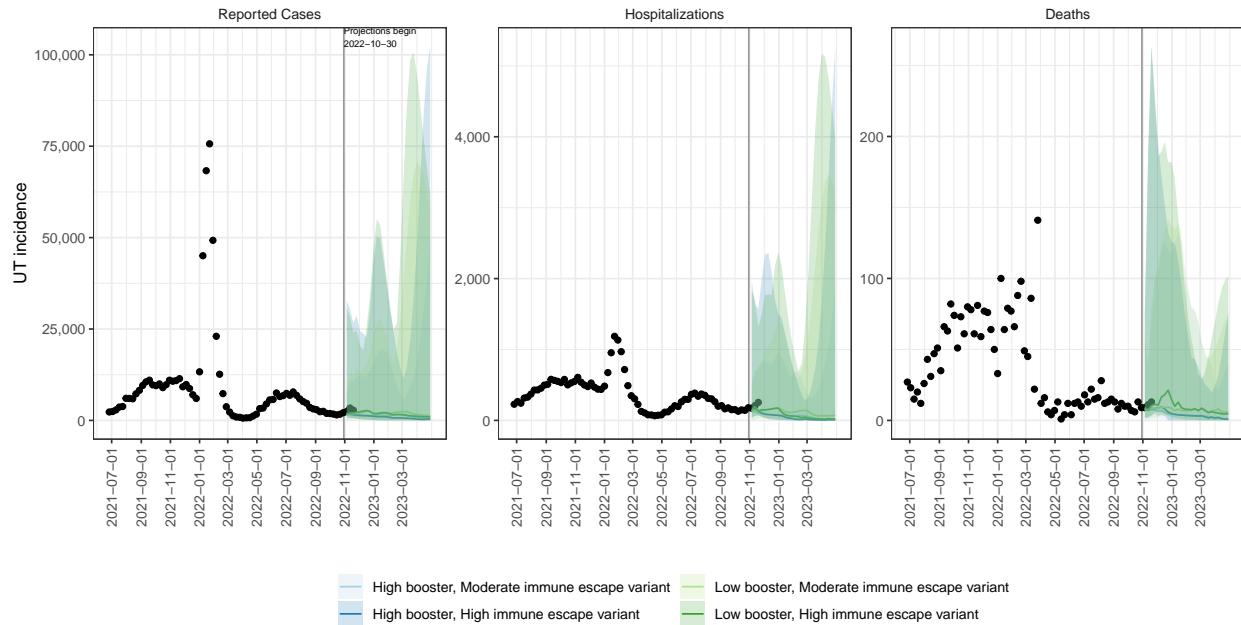
### TN ensemble projections & 95% projection intervals



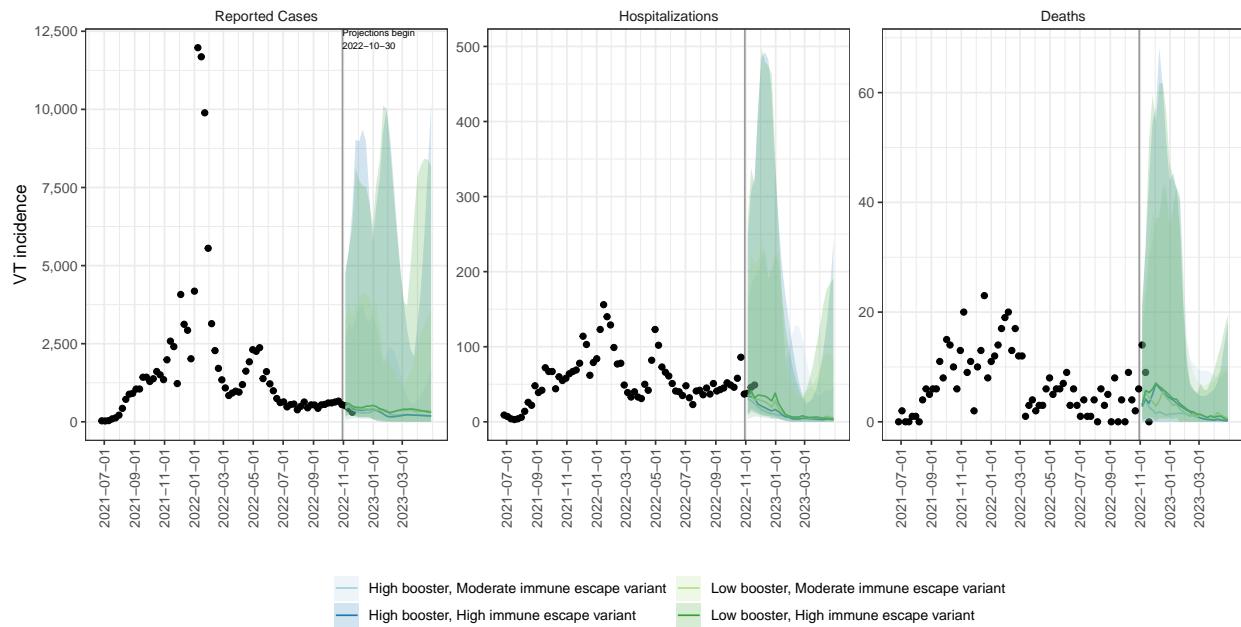
### TX ensemble projections & 95% projection intervals



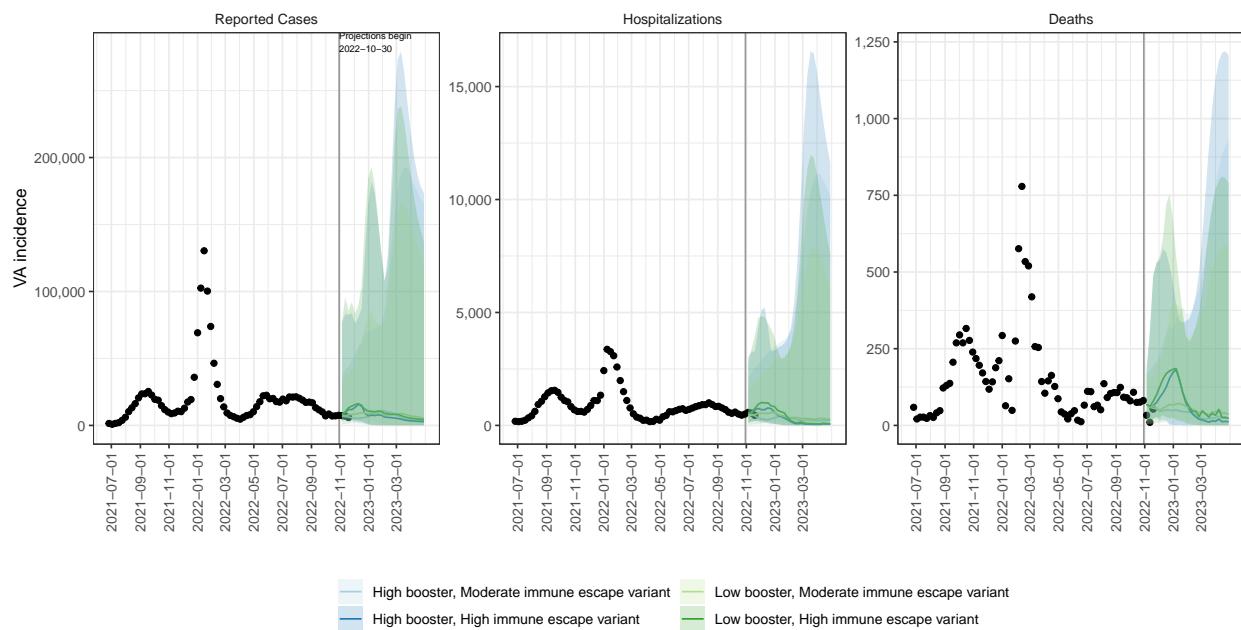
### UT ensemble projections & 95% projection intervals



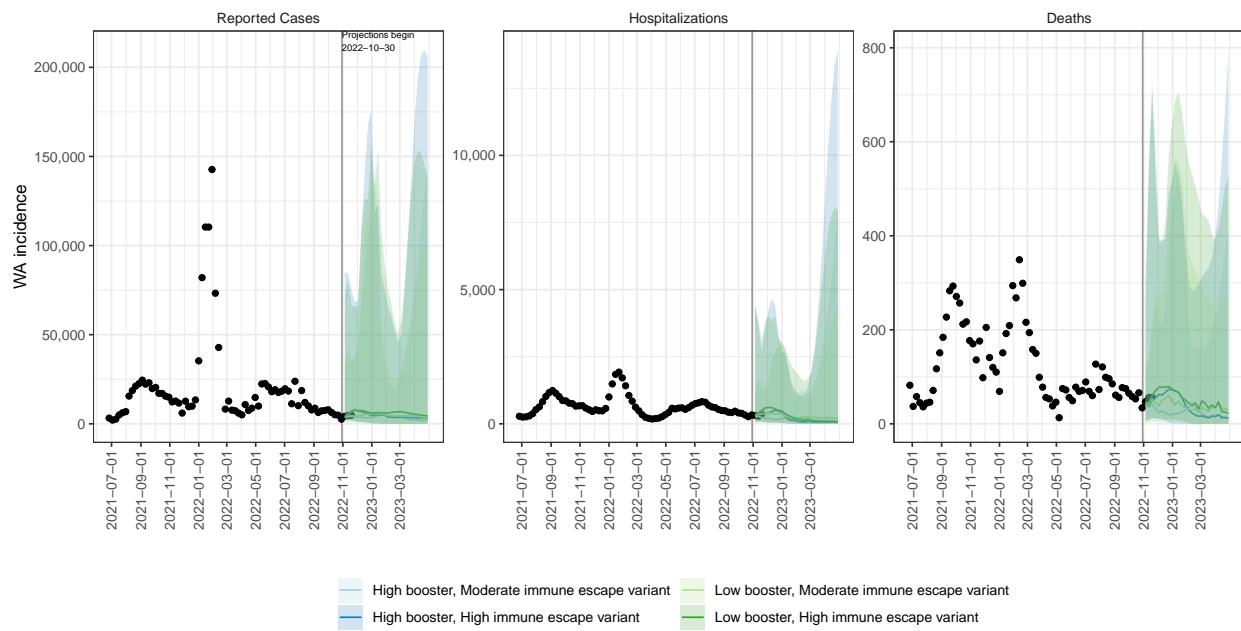
### VT ensemble projections & 95% projection intervals



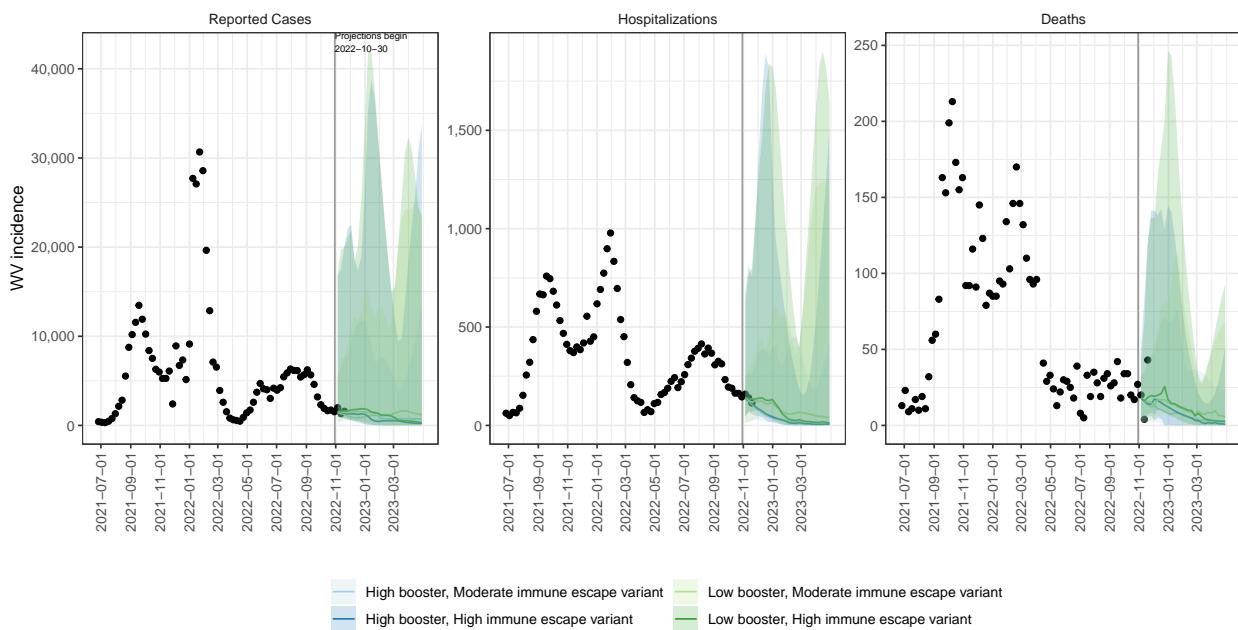
### VA ensemble projections & 95% projection intervals



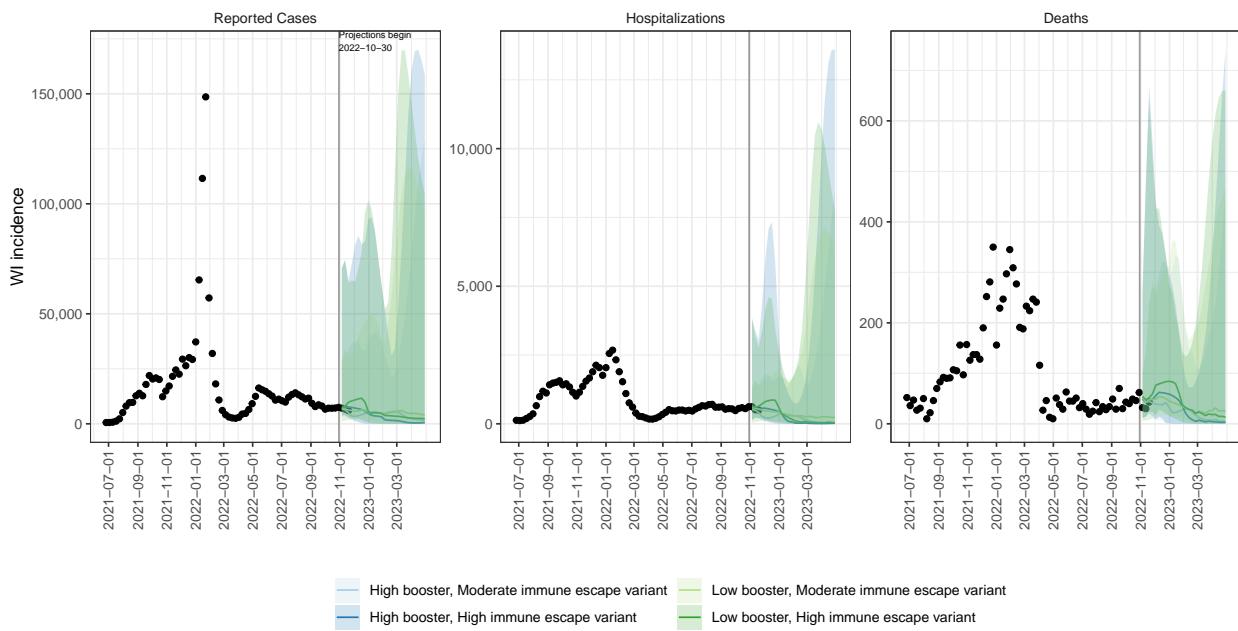
### WA ensemble projections & 95% projection intervals



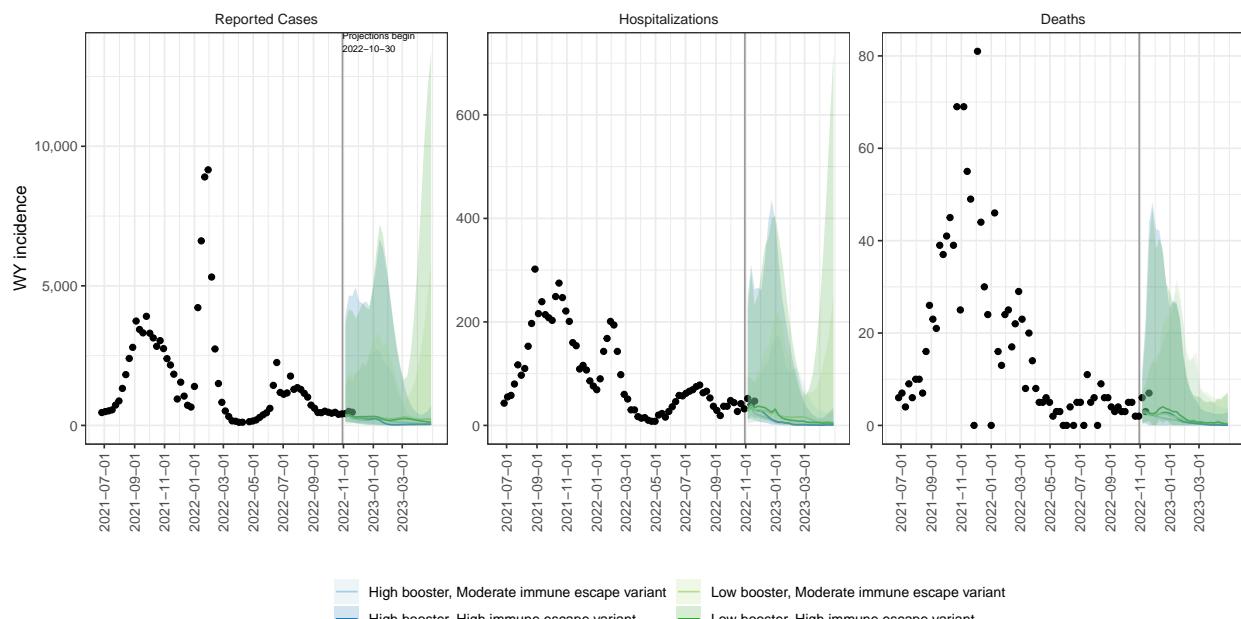
### WV ensemble projections & 95% projection intervals



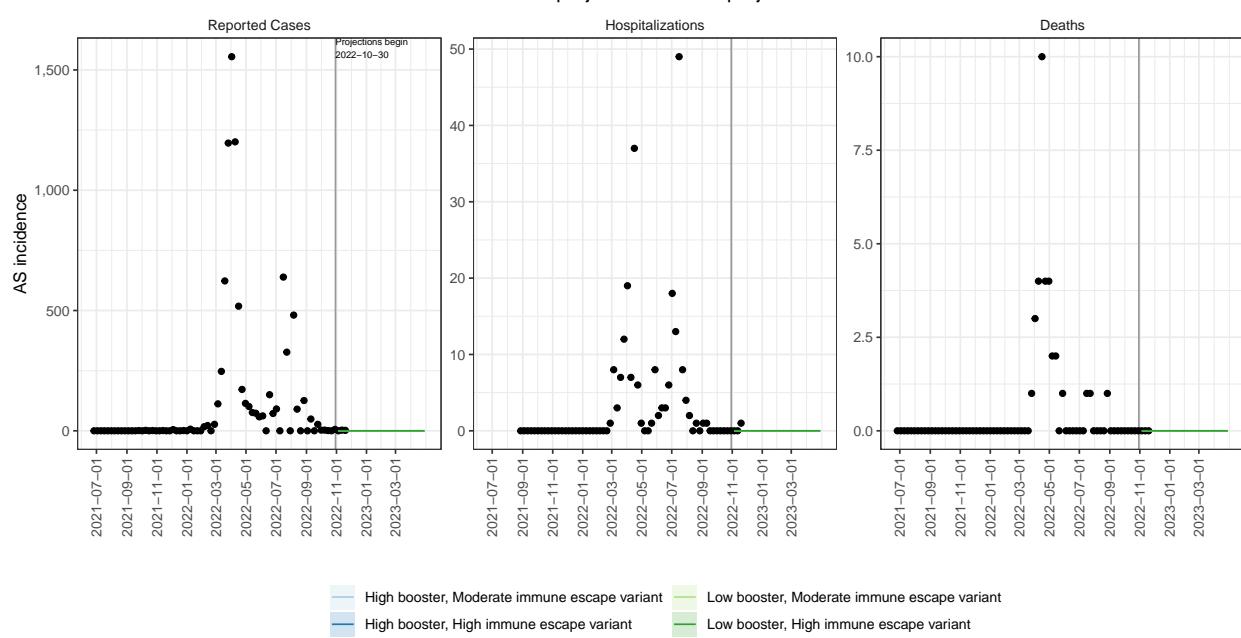
### WI ensemble projections & 95% projection intervals



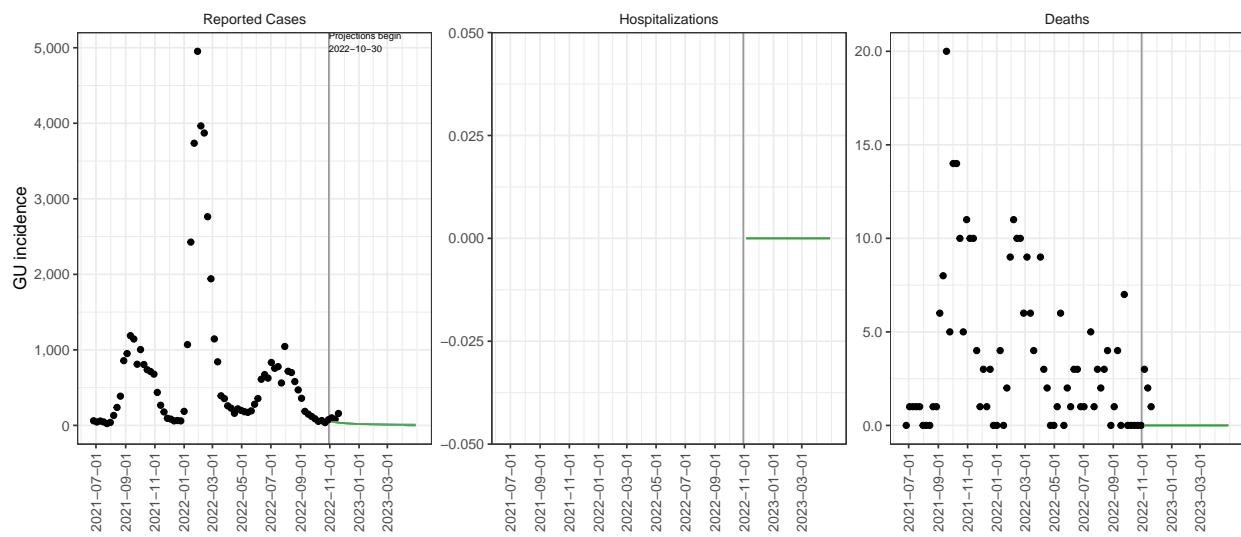
### WY ensemble projections & 95% projection intervals



### AS ensemble projections & 95% projection intervals

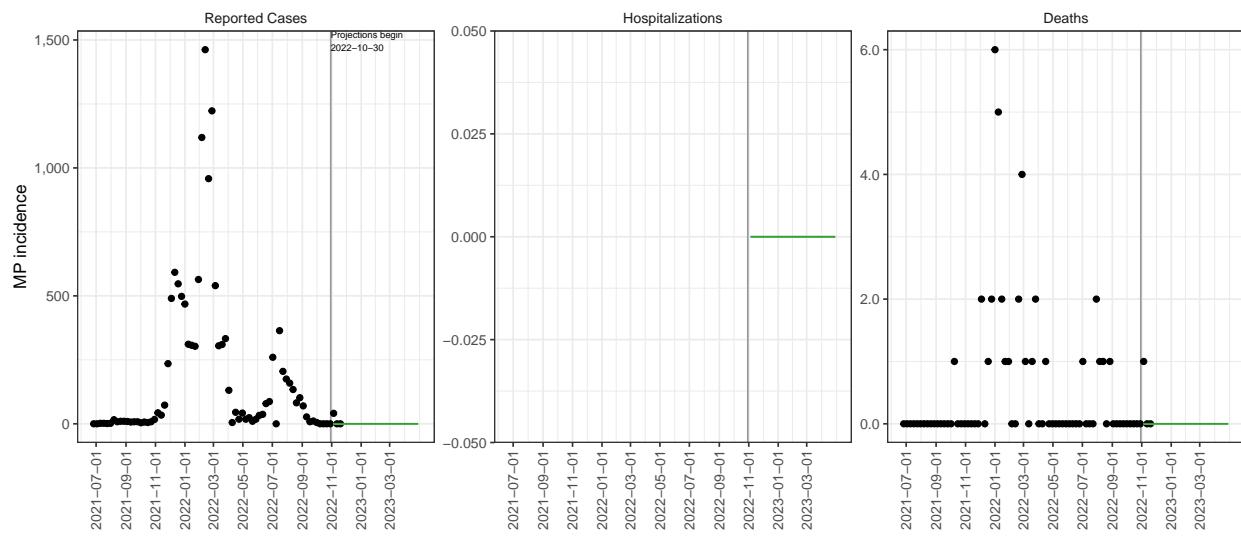


### GU ensemble projections & 95% projection intervals



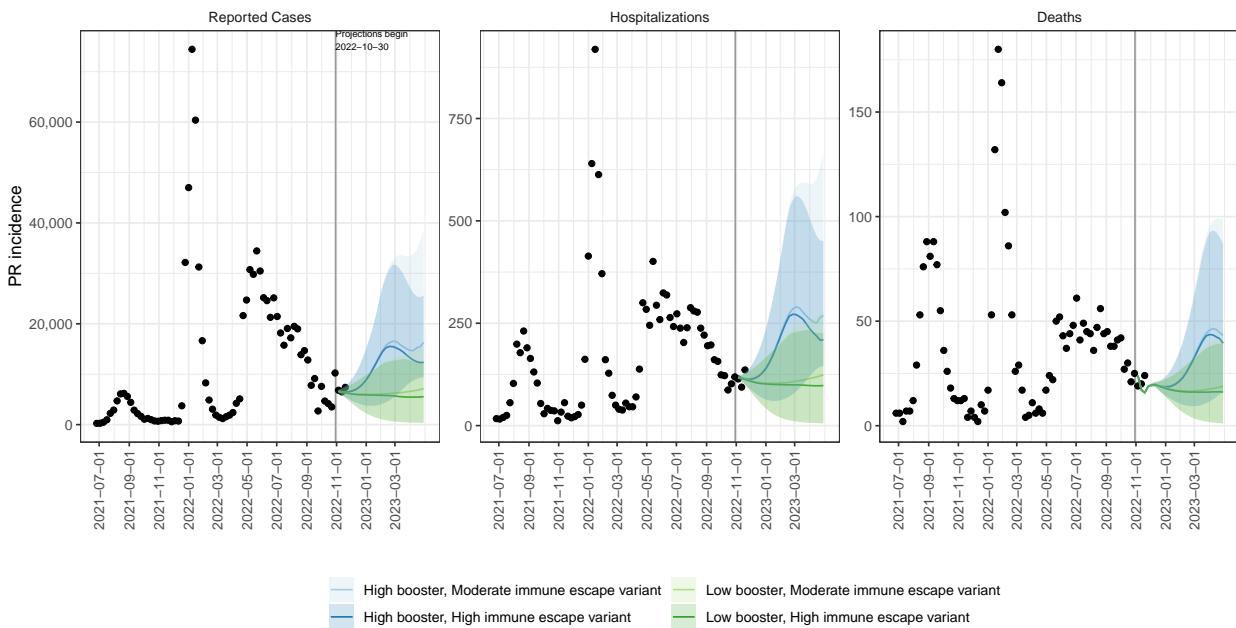
<span style="color: #80B1D3;">■</span> High booster, Moderate immune escape variant <span style="color: #4F81BD;">■</span> High booster, High immune escape variant	<span style="color: #A9E4D1;">■</span> Low booster, Moderate immune escape variant <span style="color: #2ECC71;">■</span> Low booster, High immune escape variant
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### MP ensemble projections & 95% projection intervals

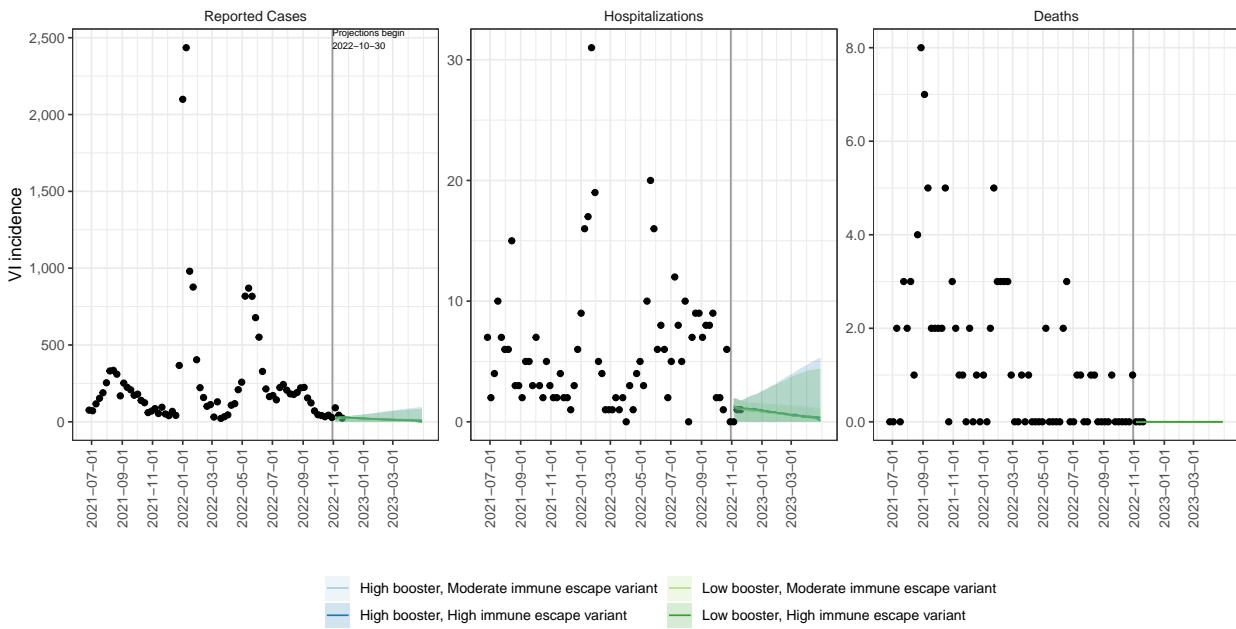


<span style="color: #80B1D3;">■</span> High booster, Moderate immune escape variant <span style="color: #4F81BD;">■</span> High booster, High immune escape variant	<span style="color: #A9E4D1;">■</span> Low booster, Moderate immune escape variant <span style="color: #2ECC71;">■</span> Low booster, High immune escape variant
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PR ensemble projections & 95% projection intervals



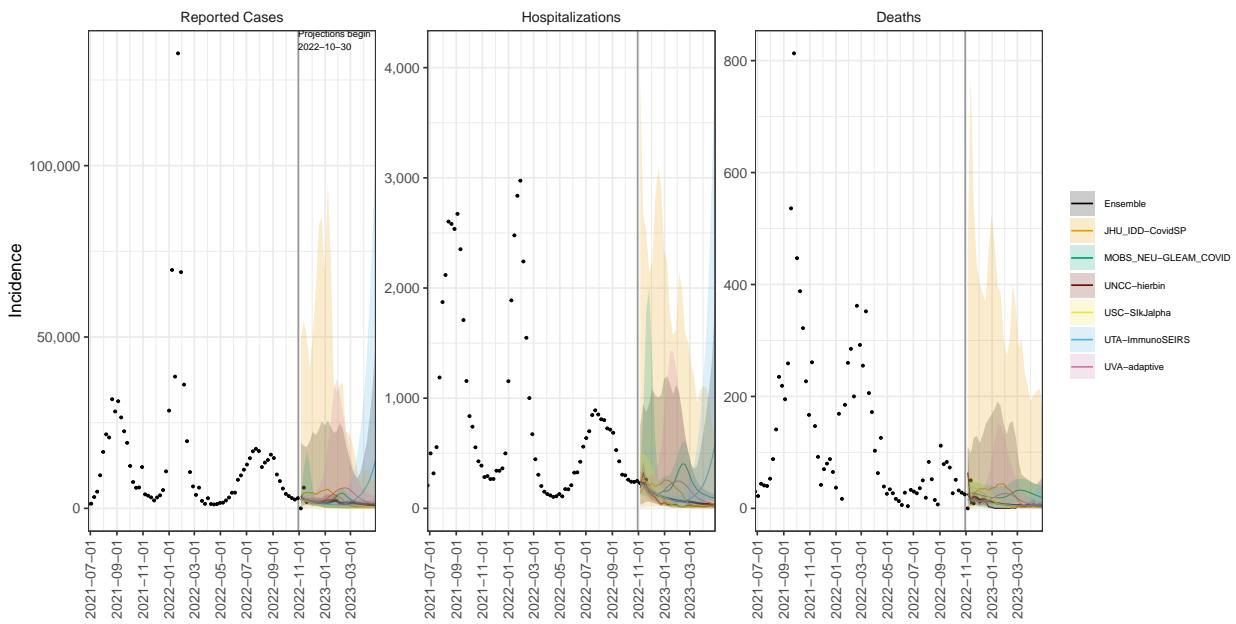
VI ensemble projections & 95% projection intervals



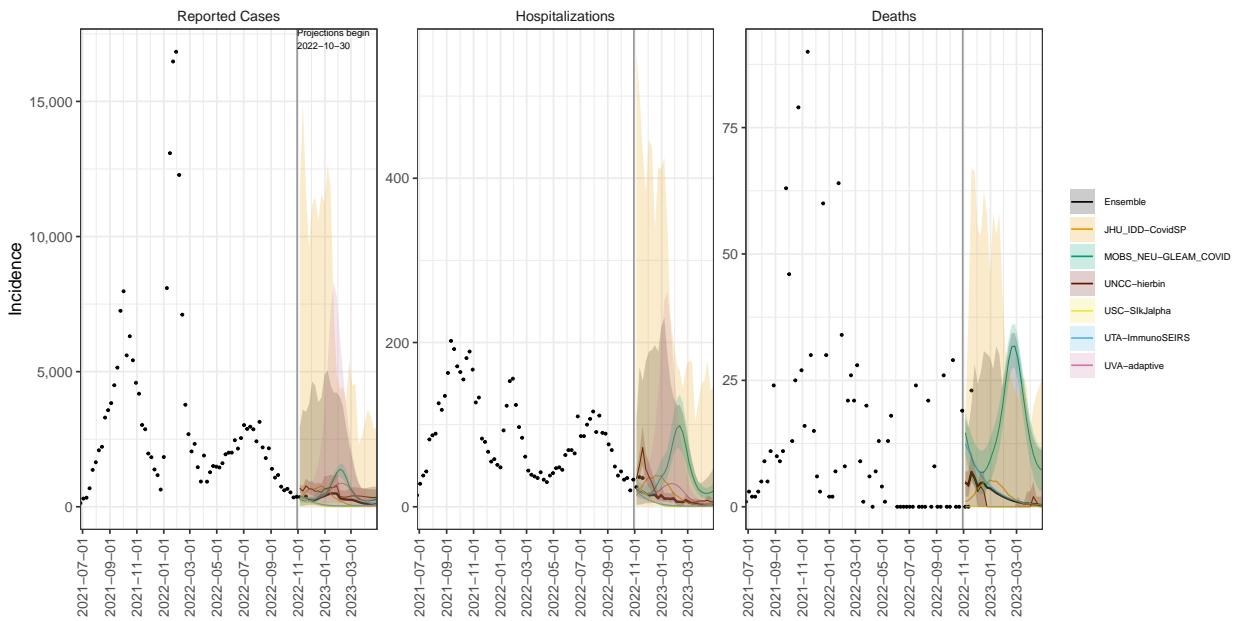
## State-level model variation

National model variation for High booster, Moderate immune escape variant scenario.

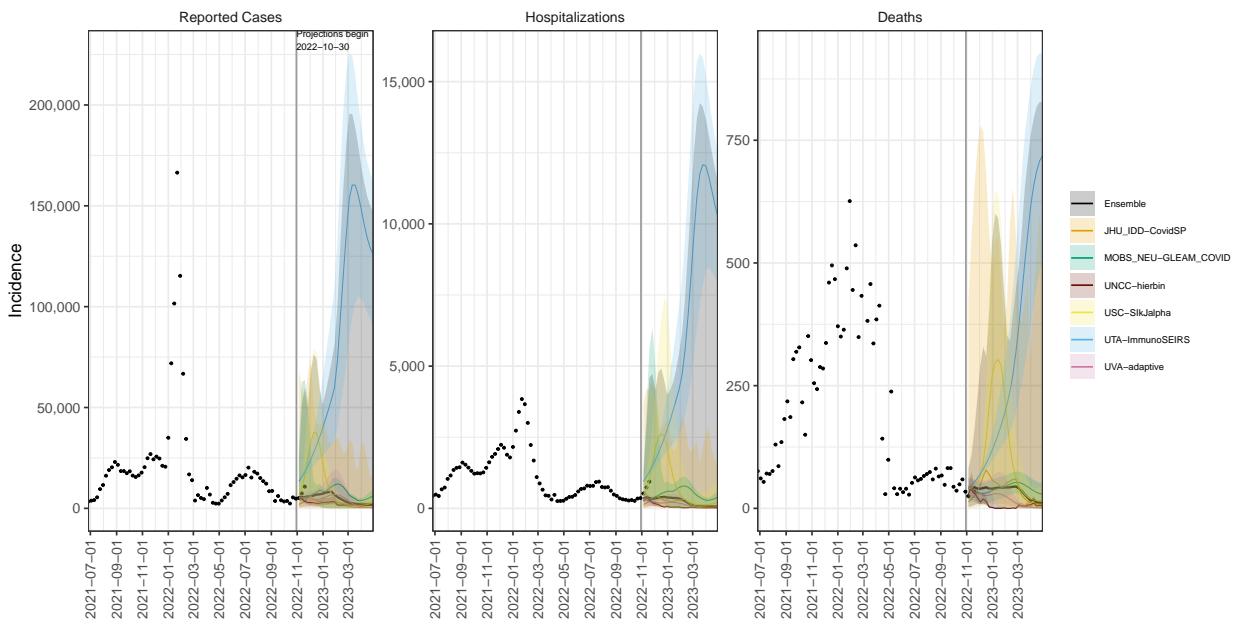
### AL model variance & 95% projection intervals – High booster, Moderate immune escape variant



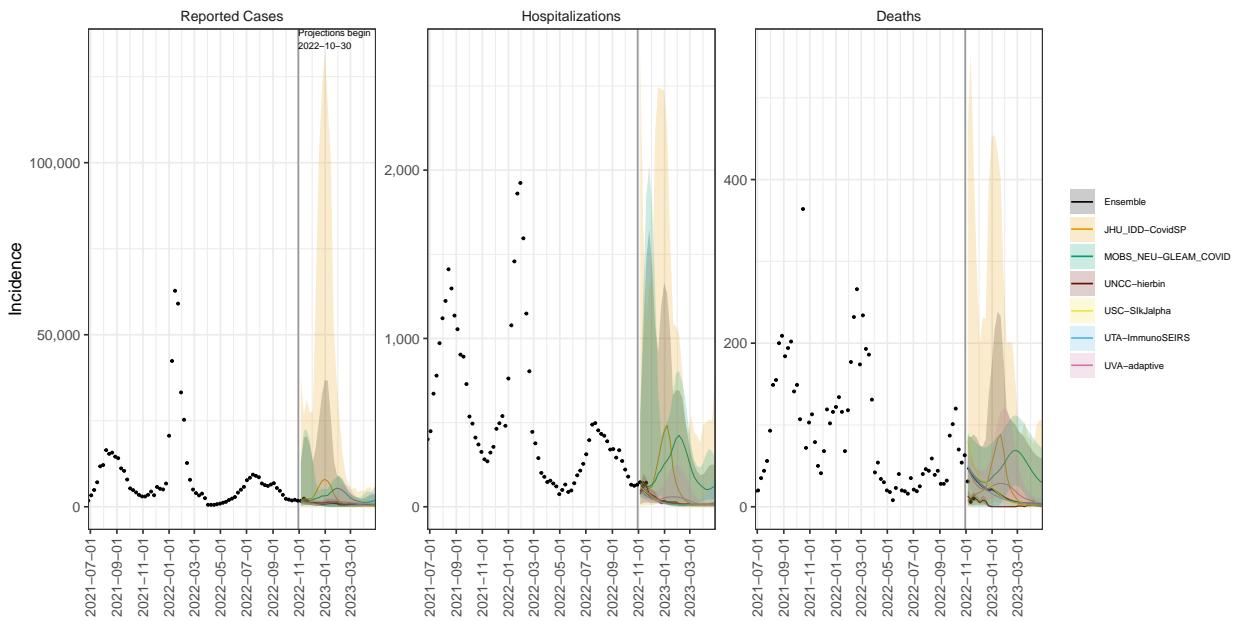
### AK model variance & 95% projection intervals – High booster, Moderate immune escape variant



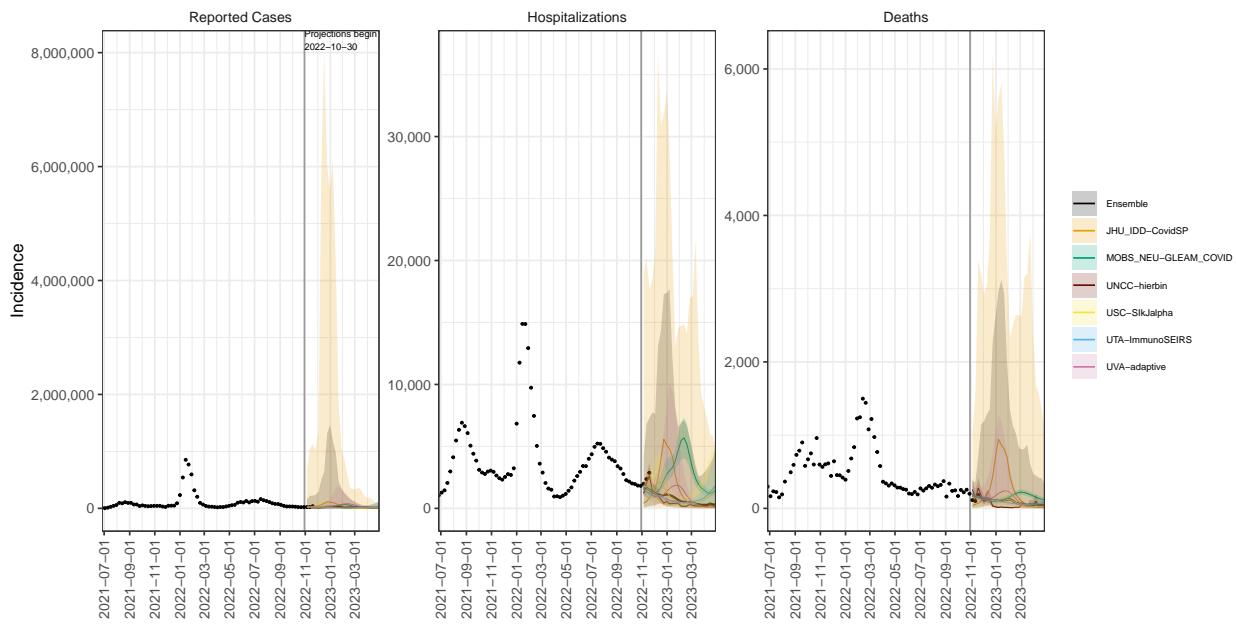
AZ model variance & 95% projection intervals – High booster, Moderate immune escape variant



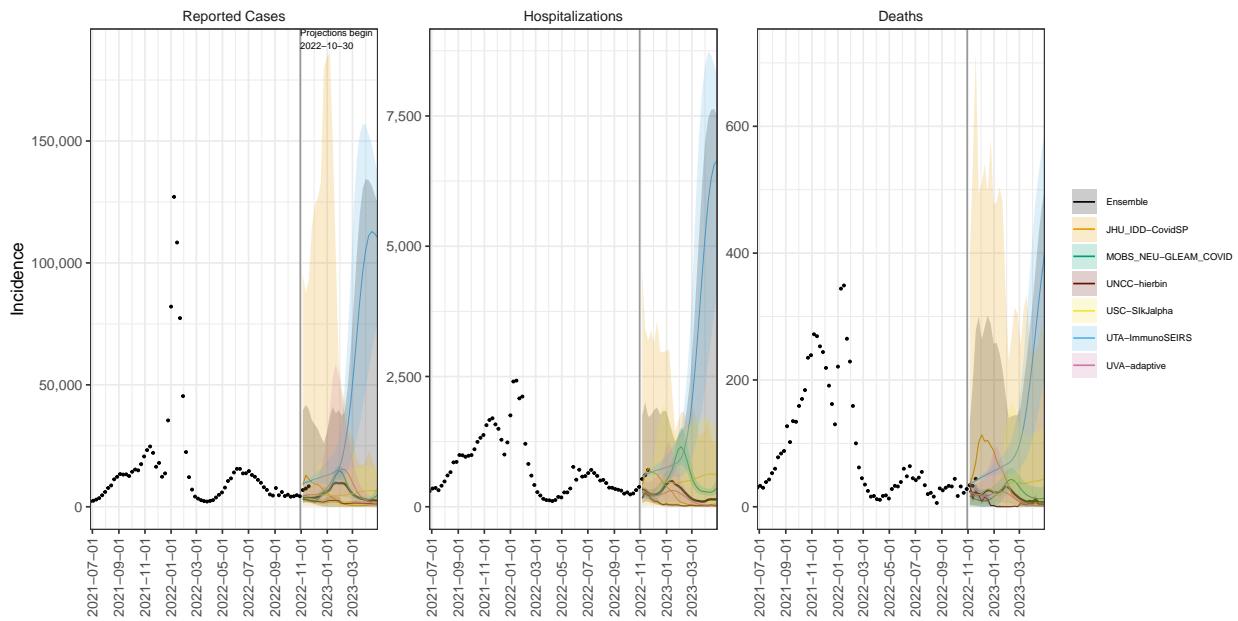
AR model variance & 95% projection intervals – High booster, Moderate immune escape variant



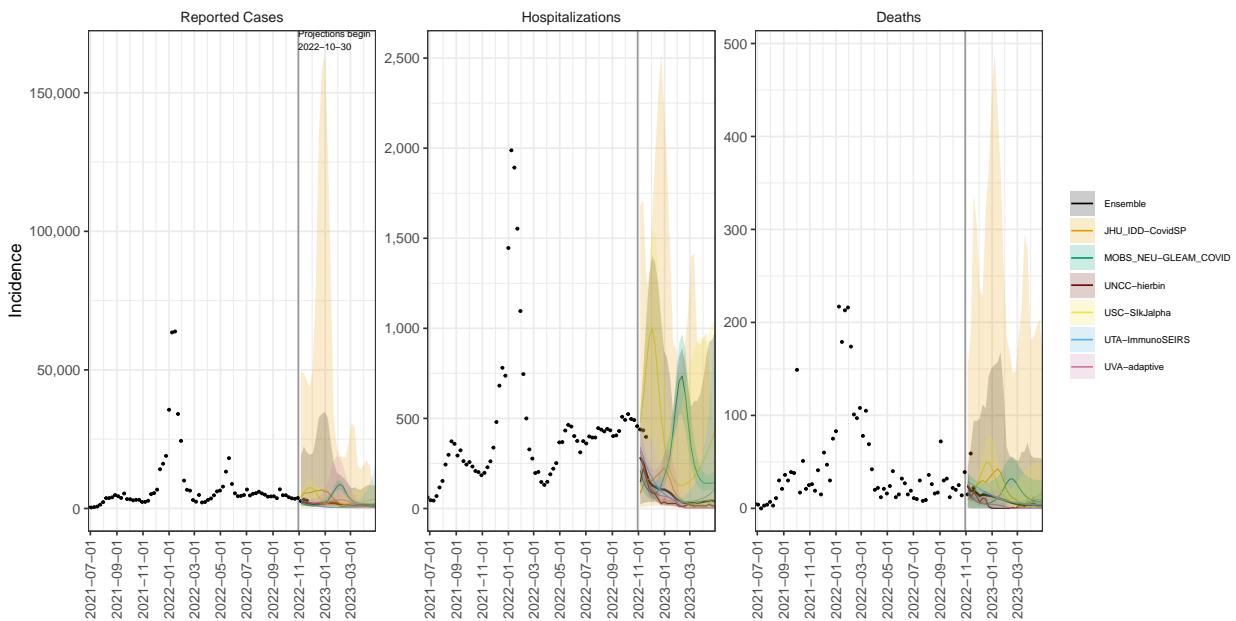
### CA model variance & 95% projection intervals – High booster, Moderate immune escape variant



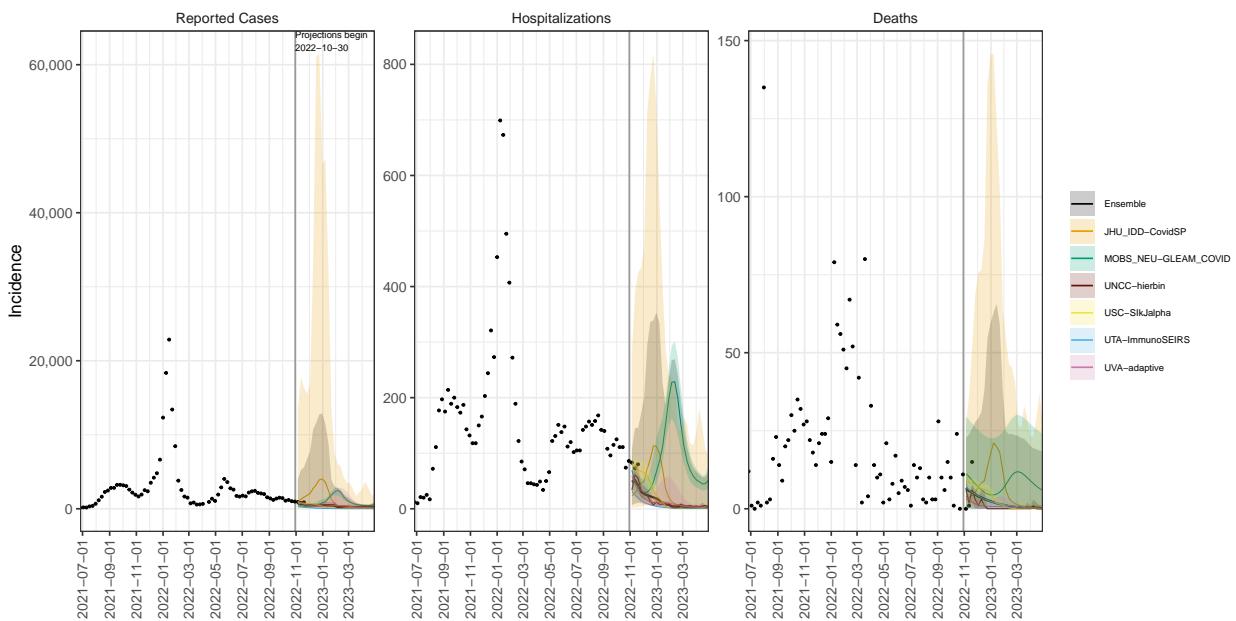
### CO model variance & 95% projection intervals – High booster, Moderate immune escape variant



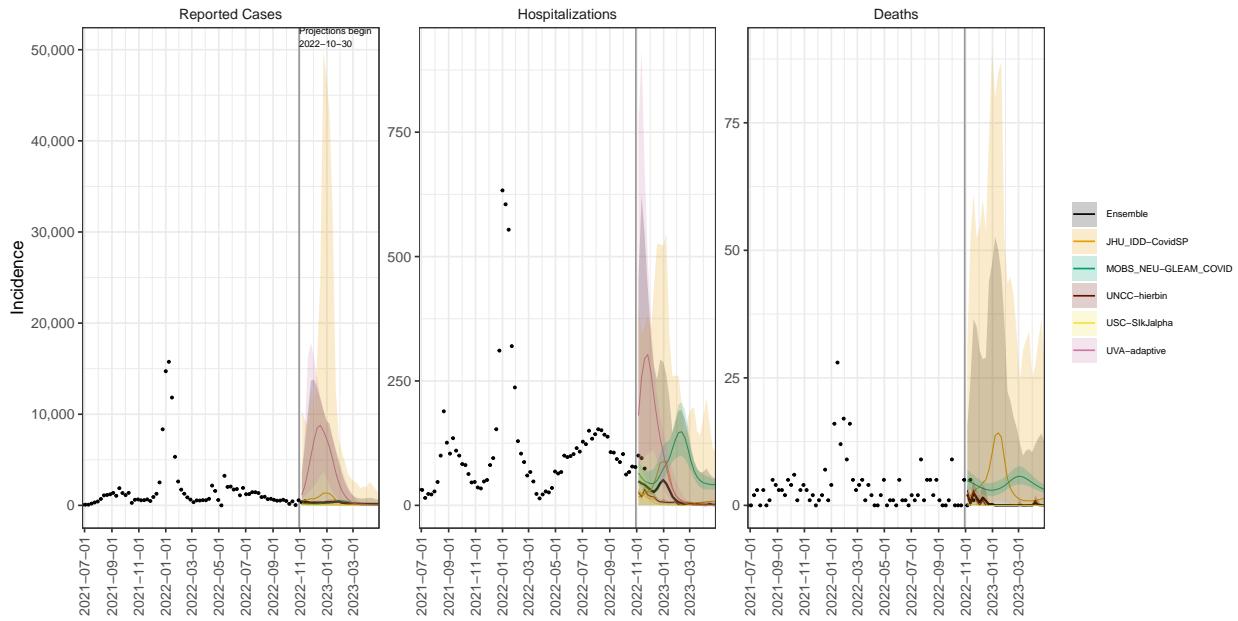
### CT model variance & 95% projection intervals – High booster, Moderate immune escape variant



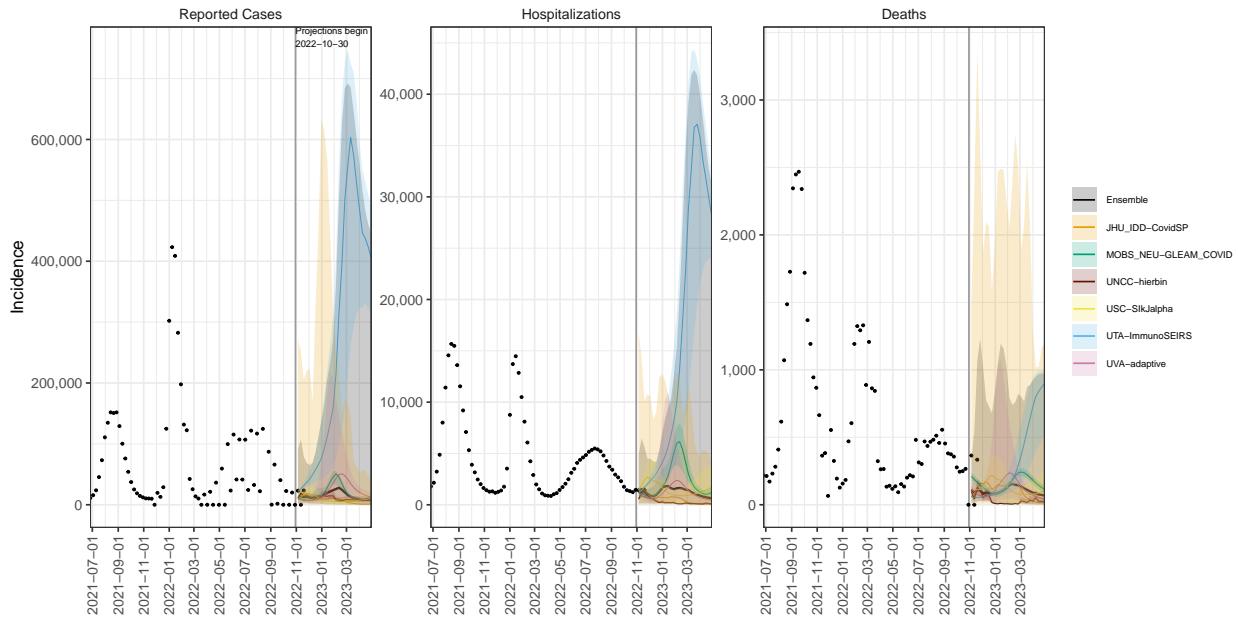
### DE model variance & 95% projection intervals – High booster, Moderate immune escape variant



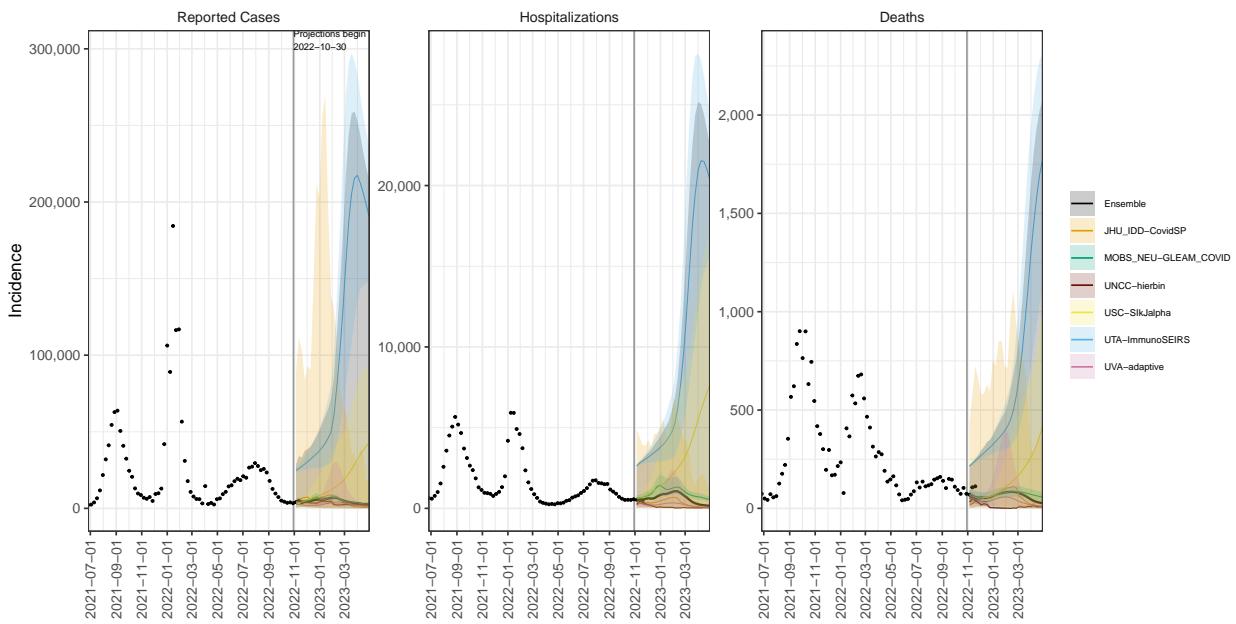
### DC model variance & 95% projection intervals – High booster, Moderate immune escape variant



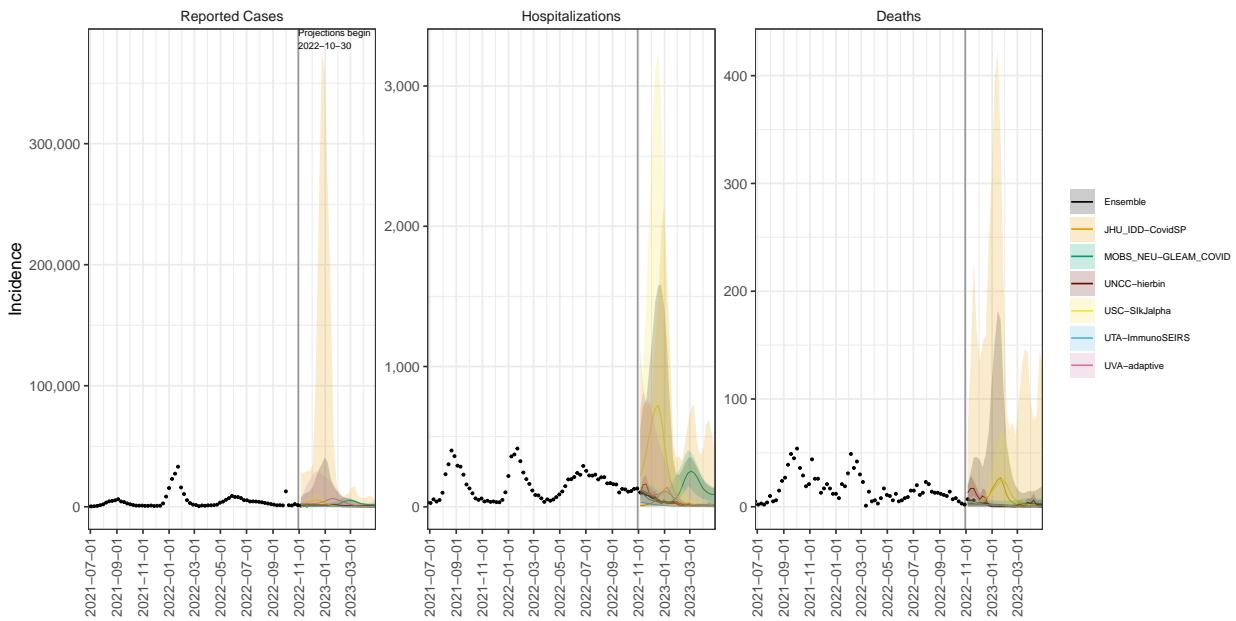
### FL model variance & 95% projection intervals – High booster, Moderate immune escape variant



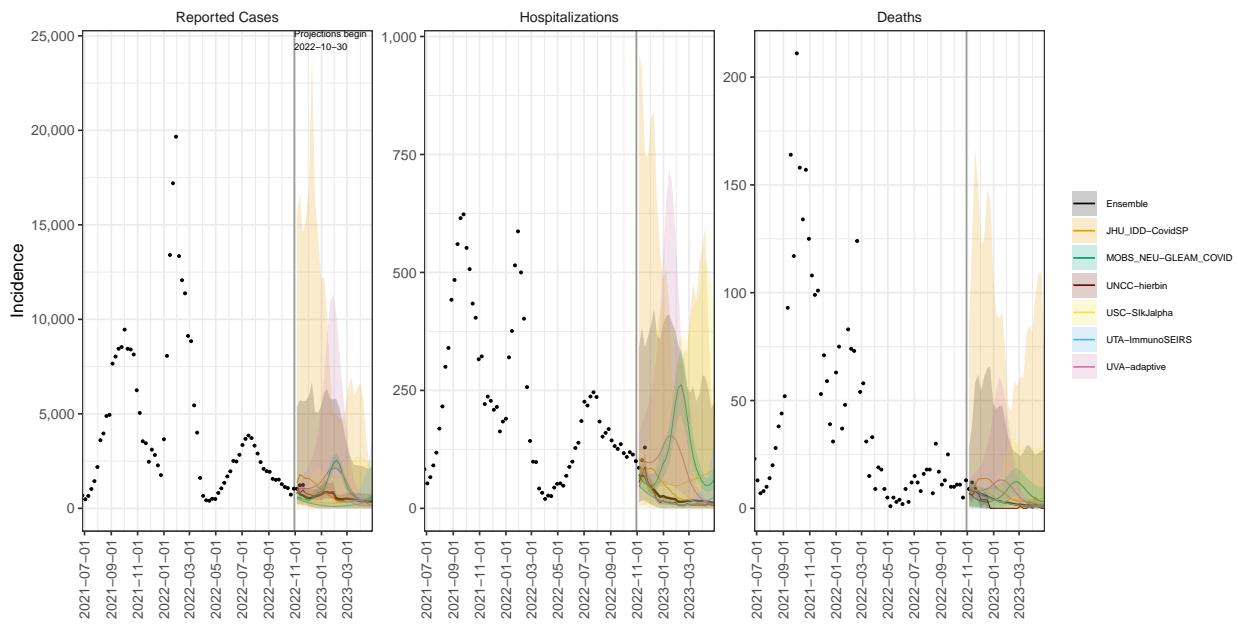
GA model variance & 95% projection intervals – High booster, Moderate immune escape variant



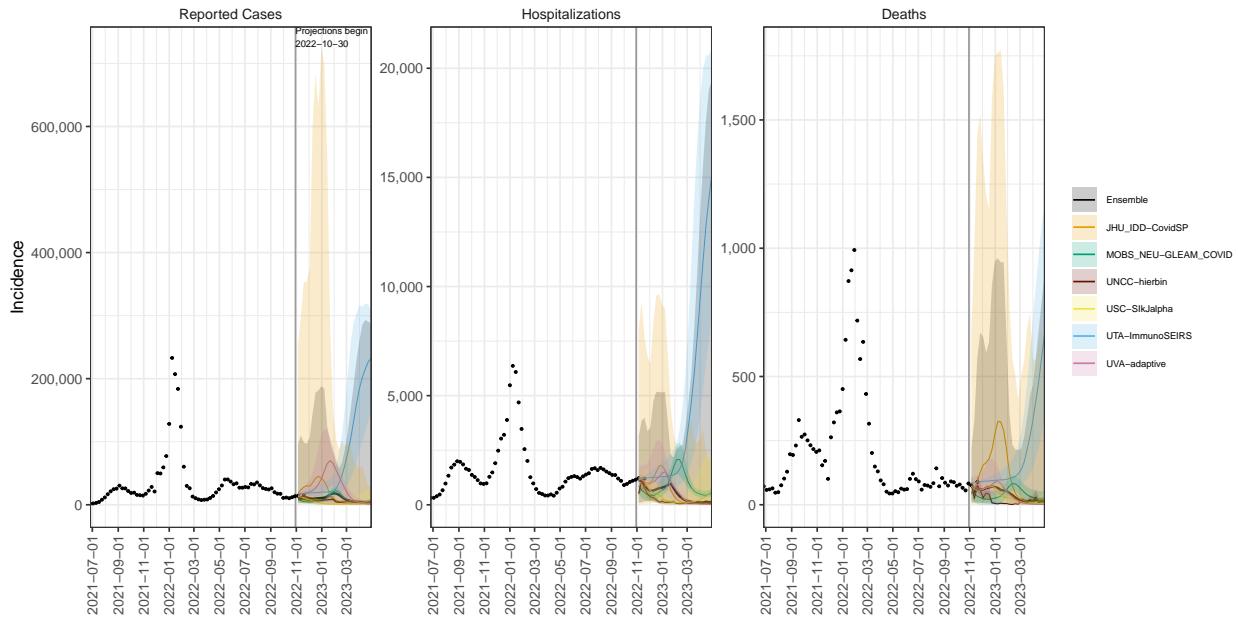
HI model variance & 95% projection intervals – High booster, Moderate immune escape variant



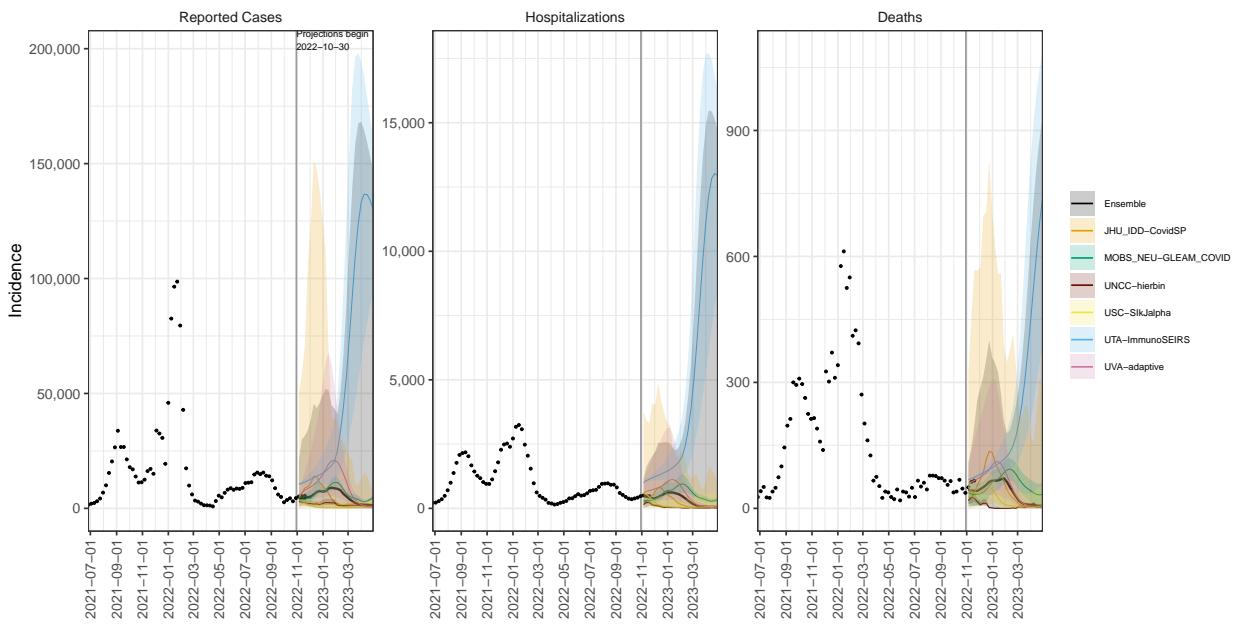
ID model variance & 95% projection intervals – High booster, Moderate immune escape variant



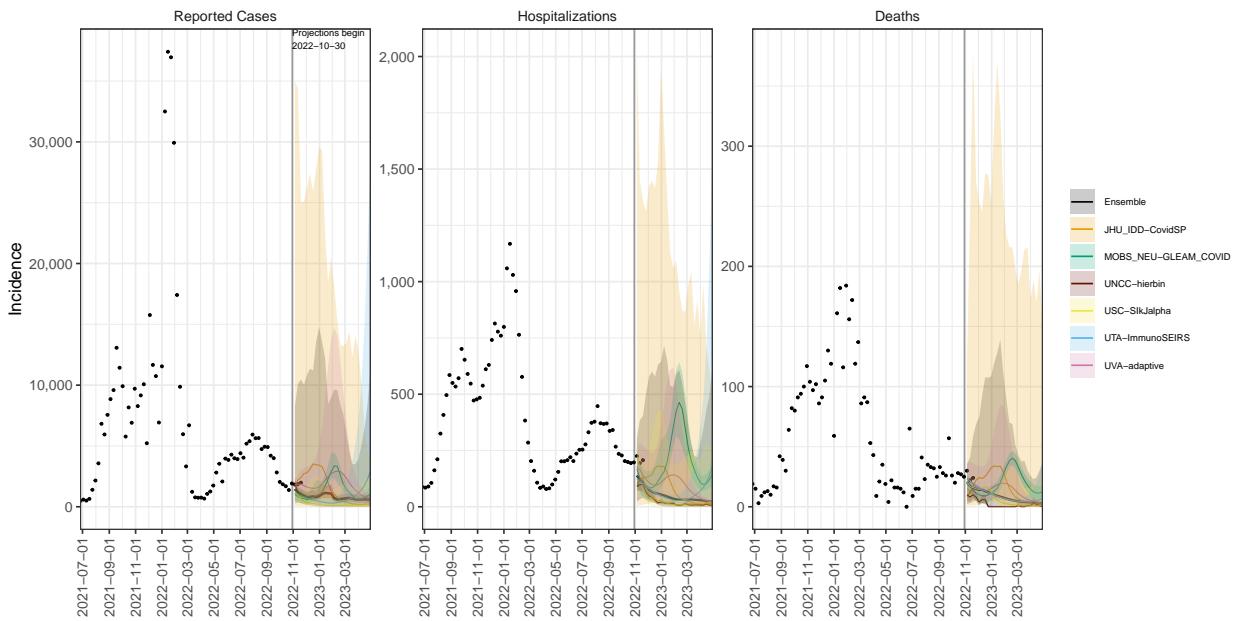
IL model variance & 95% projection intervals – High booster, Moderate immune escape variant



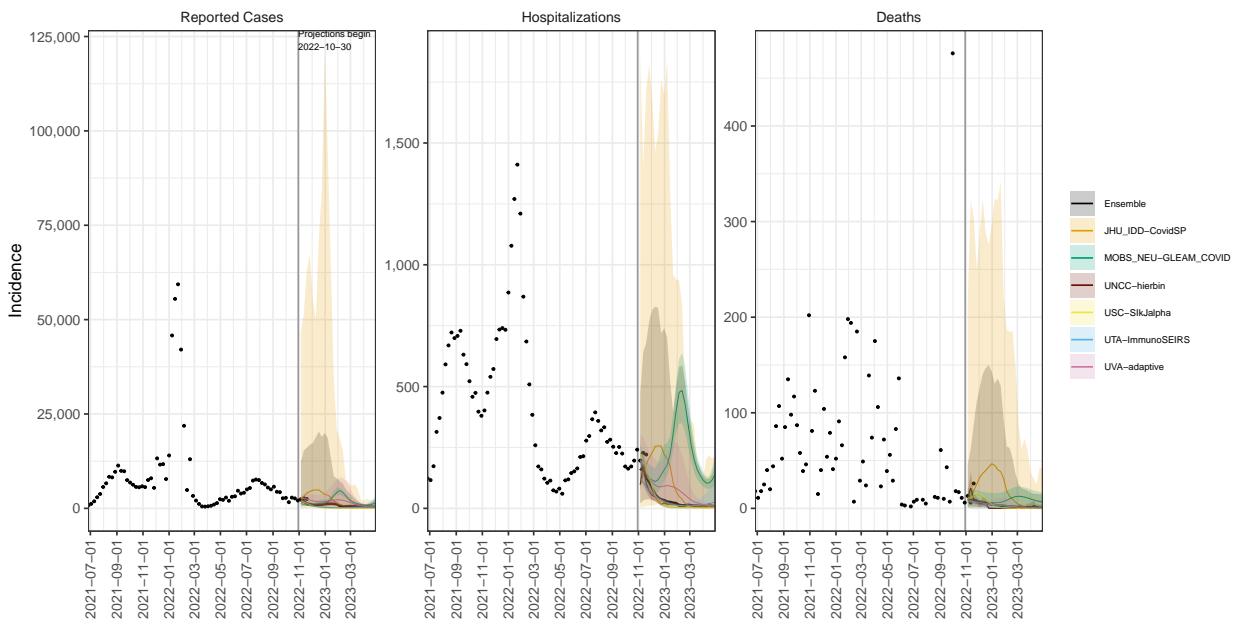
IN model variance & 95% projection intervals – High booster, Moderate immune escape variant



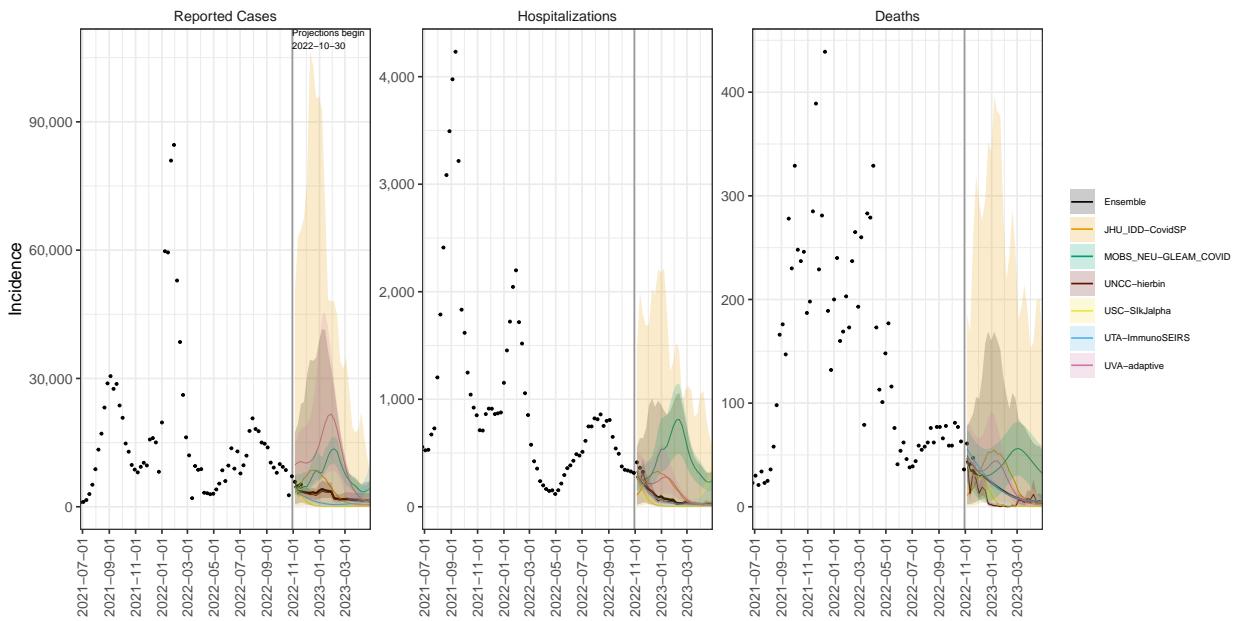
IA model variance & 95% projection intervals – High booster, Moderate immune escape variant



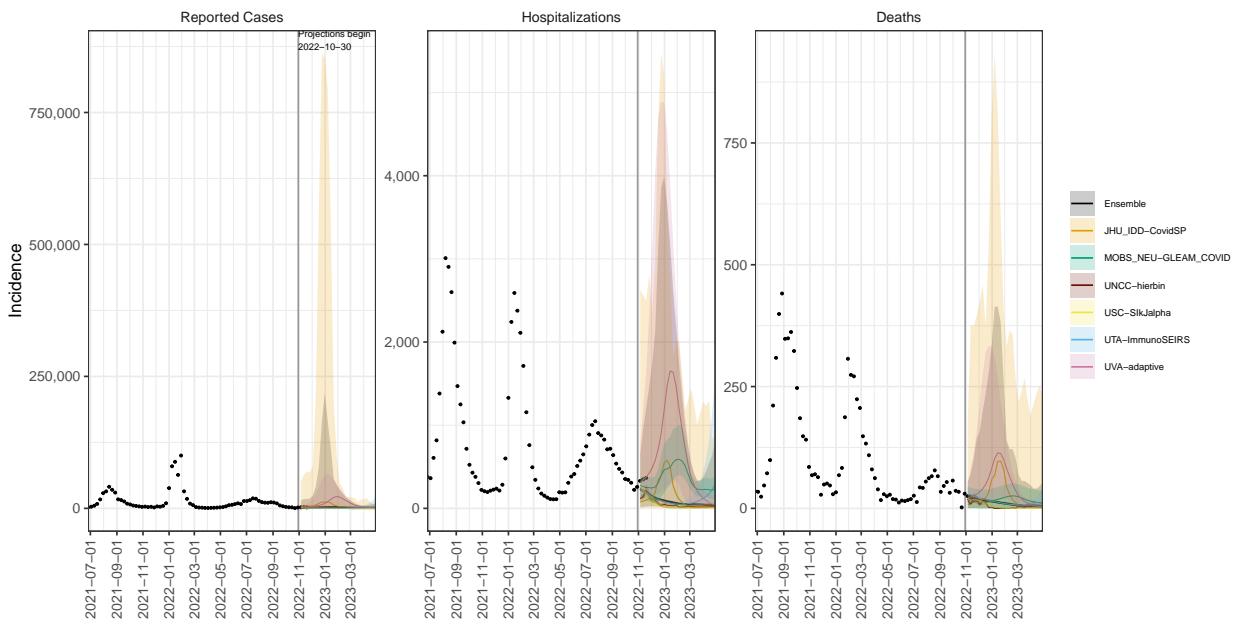
KS model variance & 95% projection intervals – High booster, Moderate immune escape variant



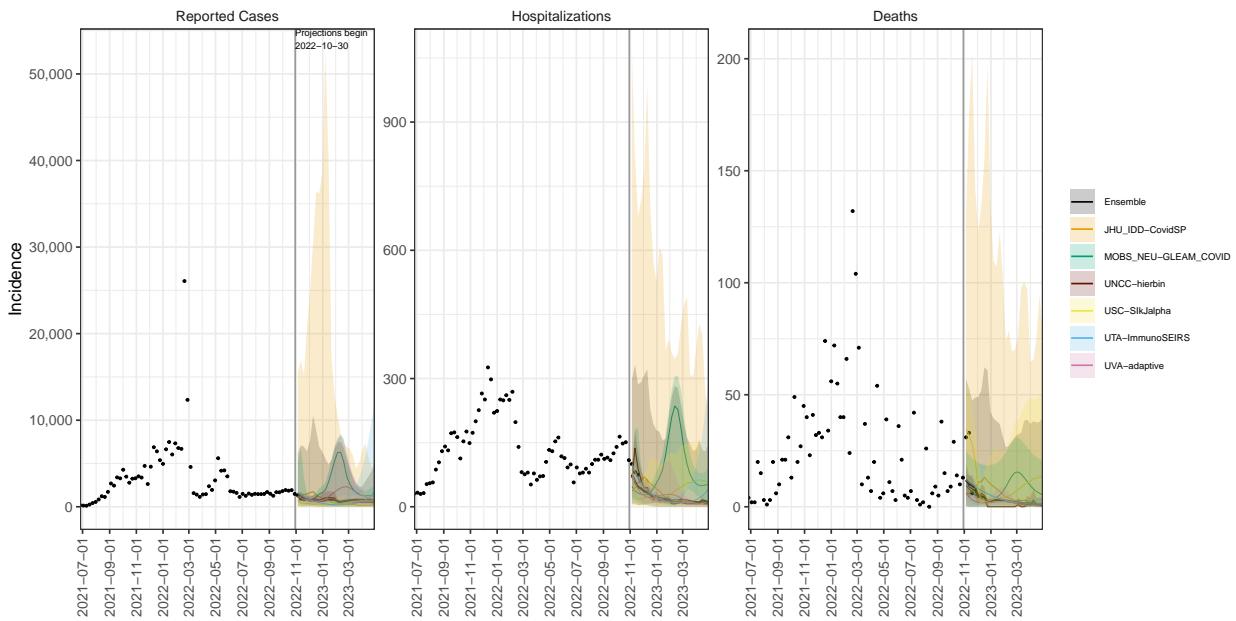
KY model variance & 95% projection intervals – High booster, Moderate immune escape variant



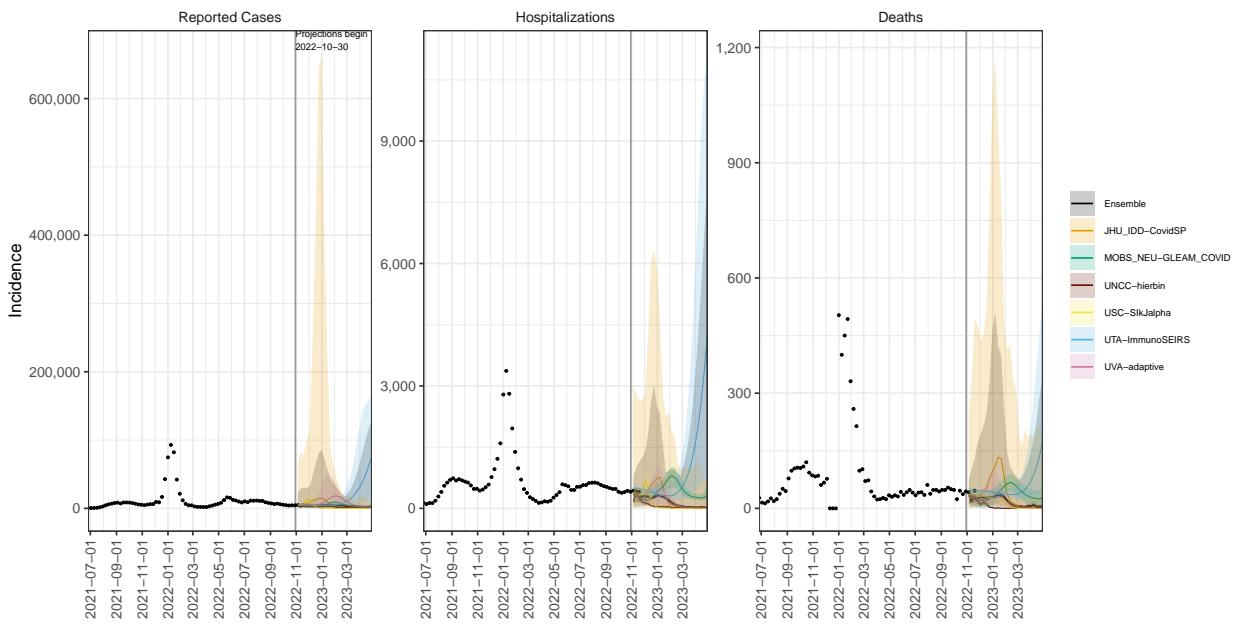
### LA model variance & 95% projection intervals – High booster, Moderate immune escape variant



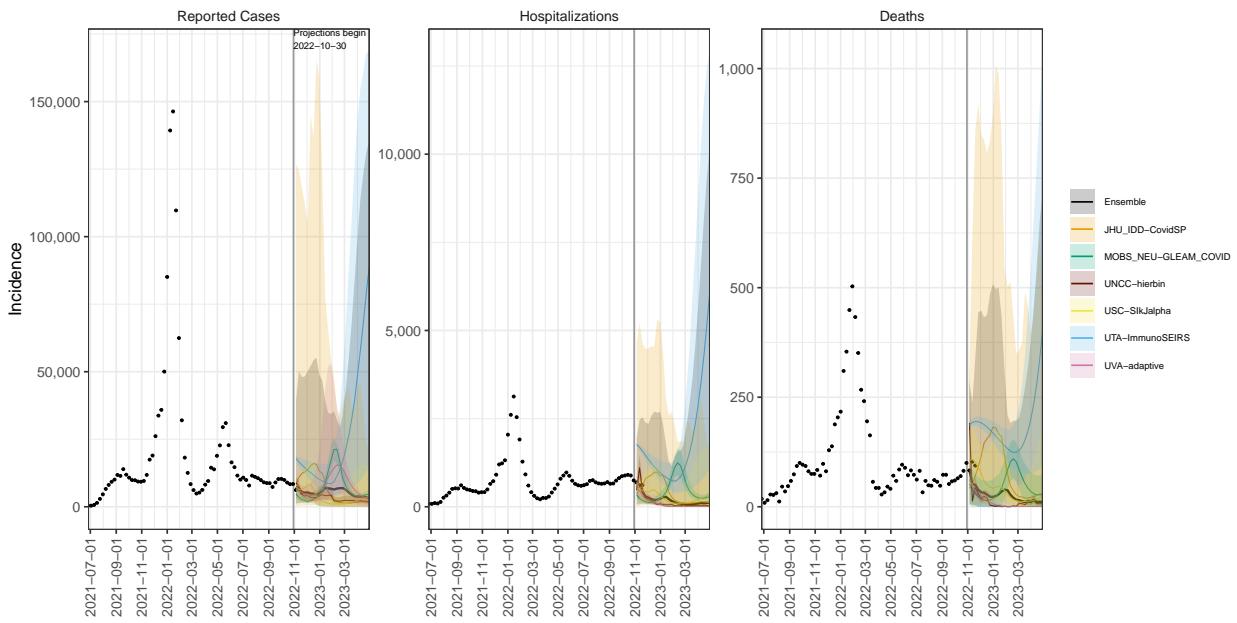
### ME model variance & 95% projection intervals – High booster, Moderate immune escape variant



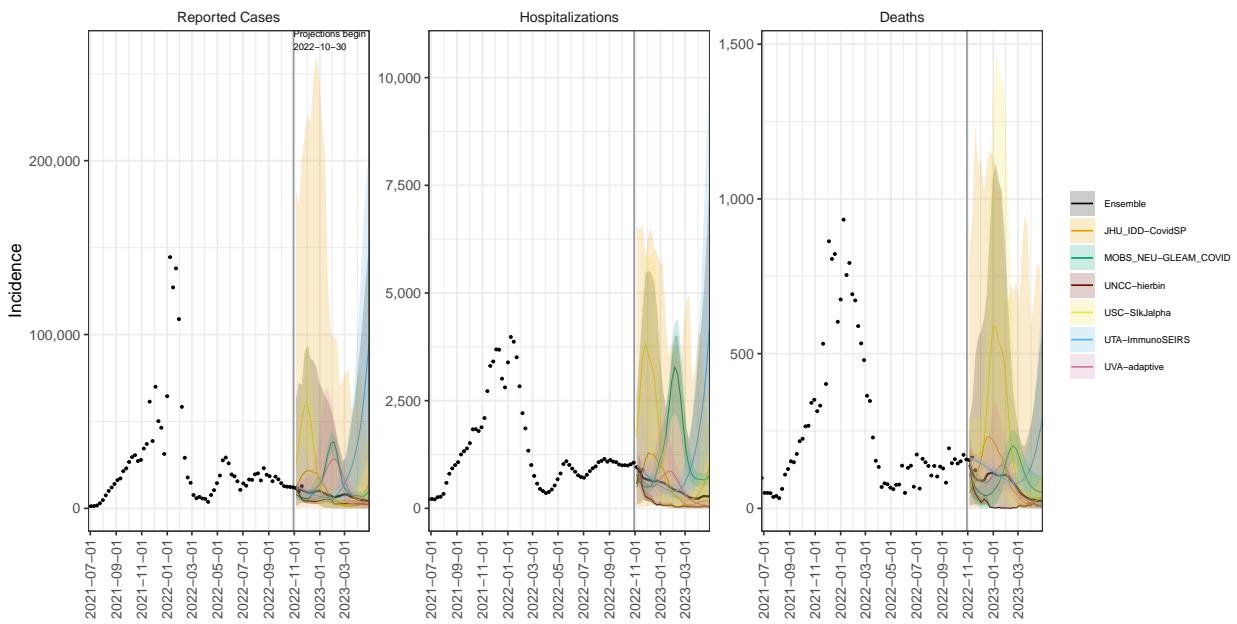
MD model variance & 95% projection intervals – High booster, Moderate immune escape variant



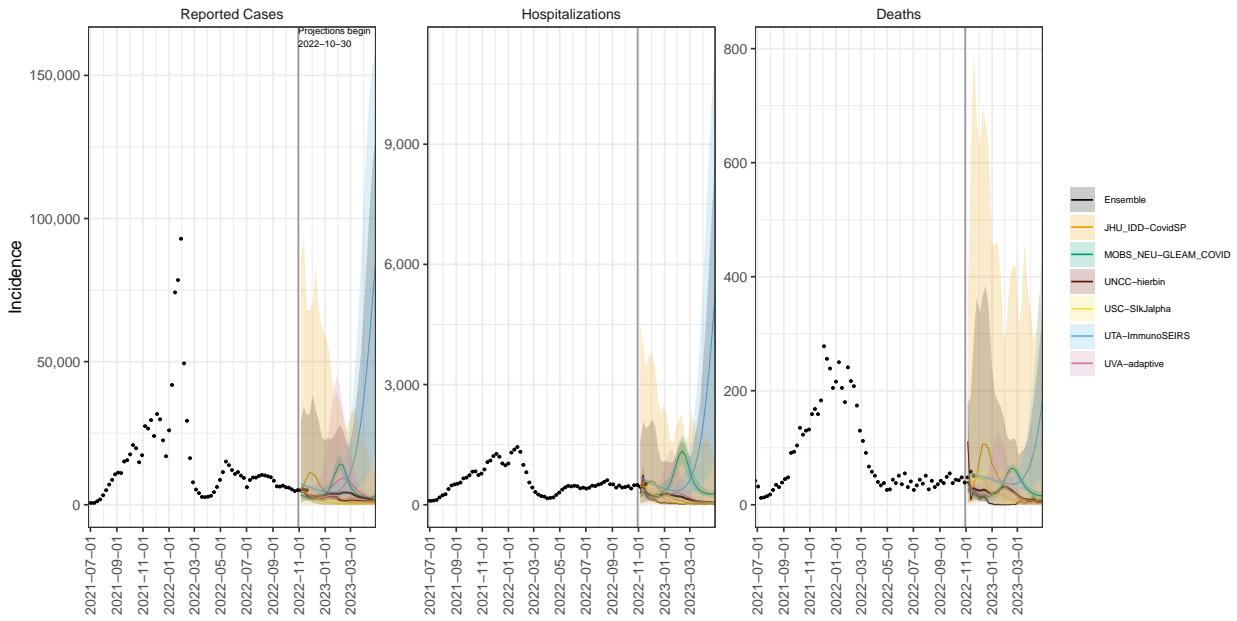
MA model variance & 95% projection intervals – High booster, Moderate immune escape variant



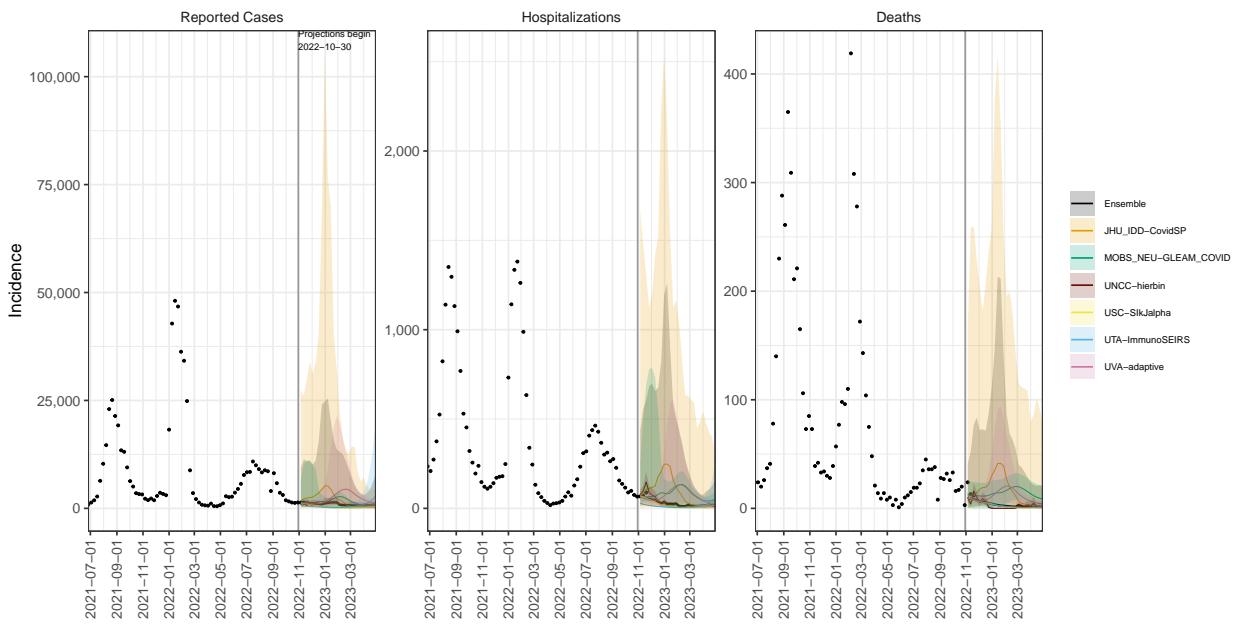
### MI model variance & 95% projection intervals – High booster, Moderate immune escape variant



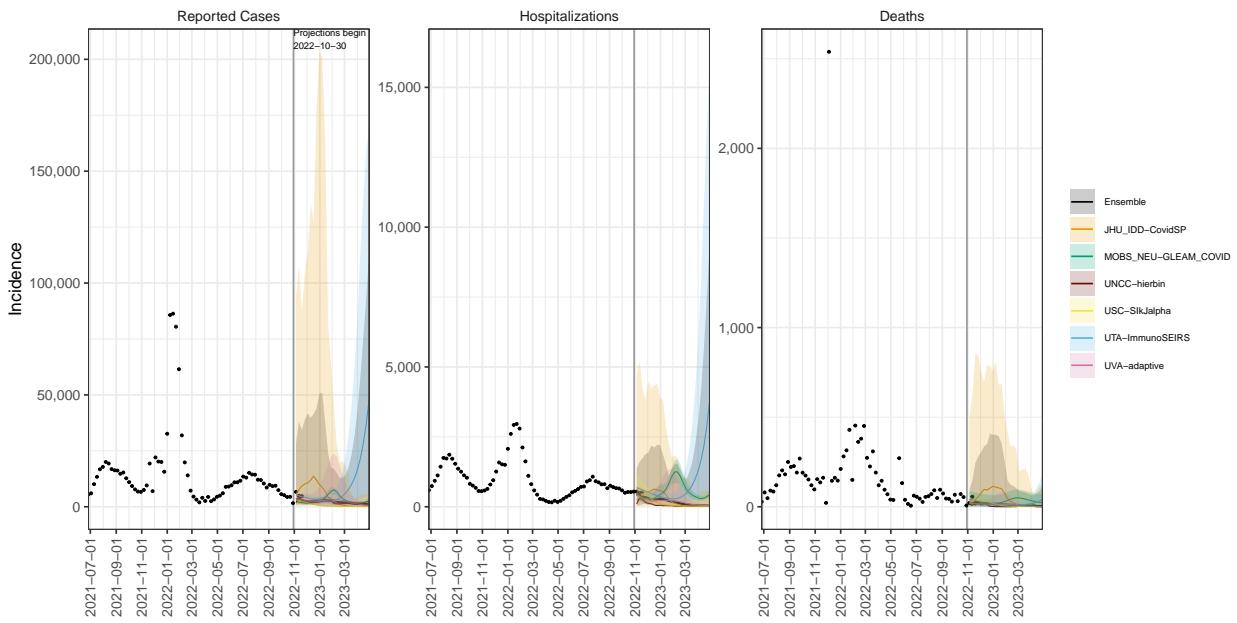
### MN model variance & 95% projection intervals – High booster, Moderate immune escape variant



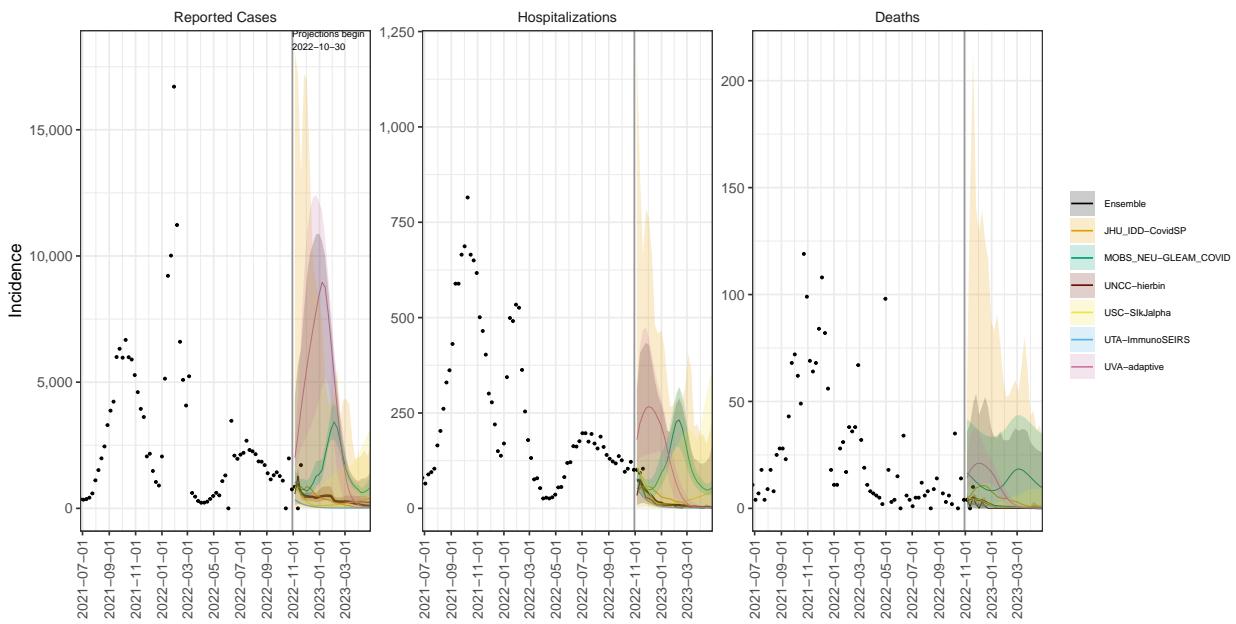
### MS model variance & 95% projection intervals – High booster, Moderate immune escape variant



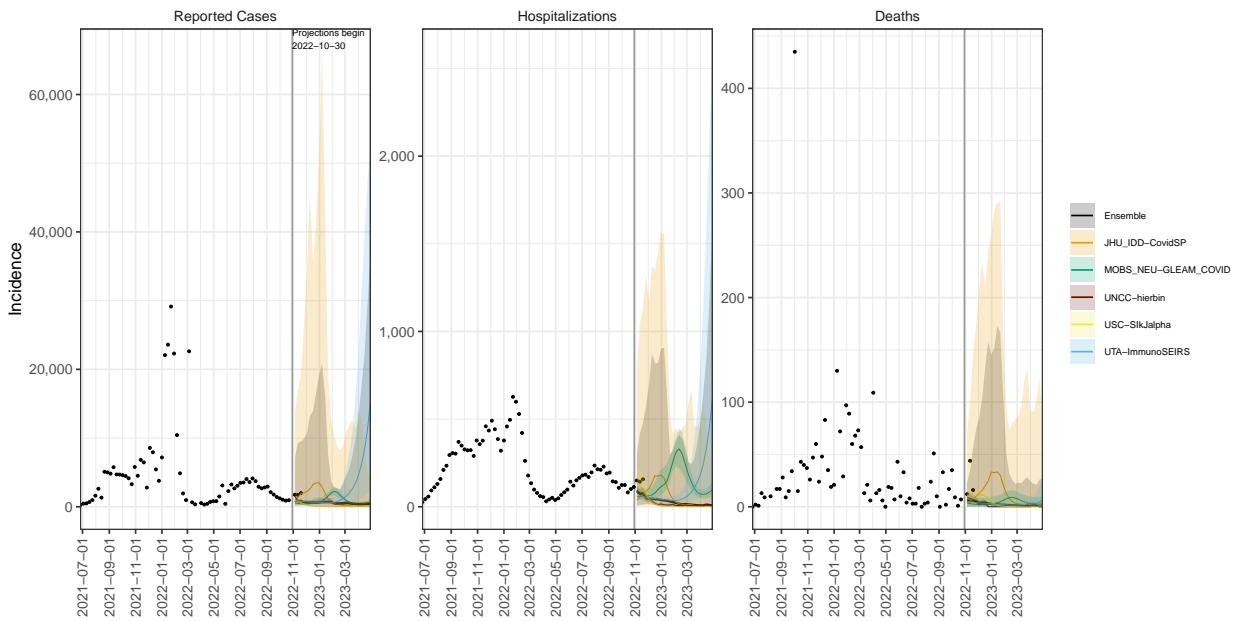
### MO model variance & 95% projection intervals – High booster, Moderate immune escape variant



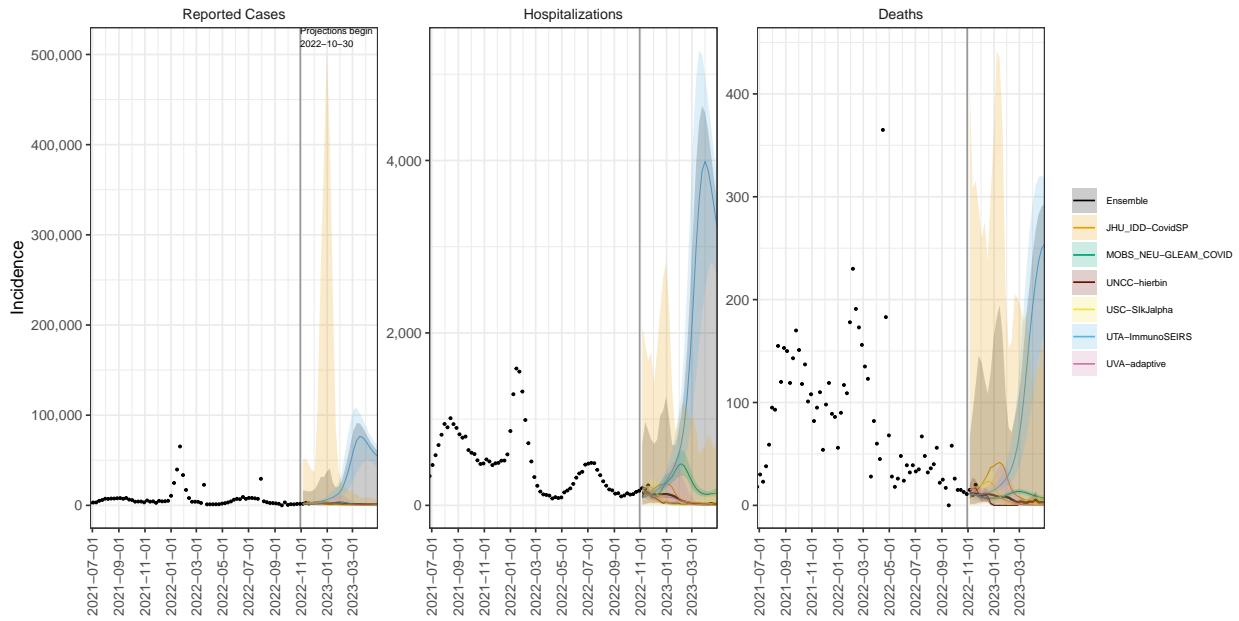
### MT model variance & 95% projection intervals – High booster, Moderate immune escape variant



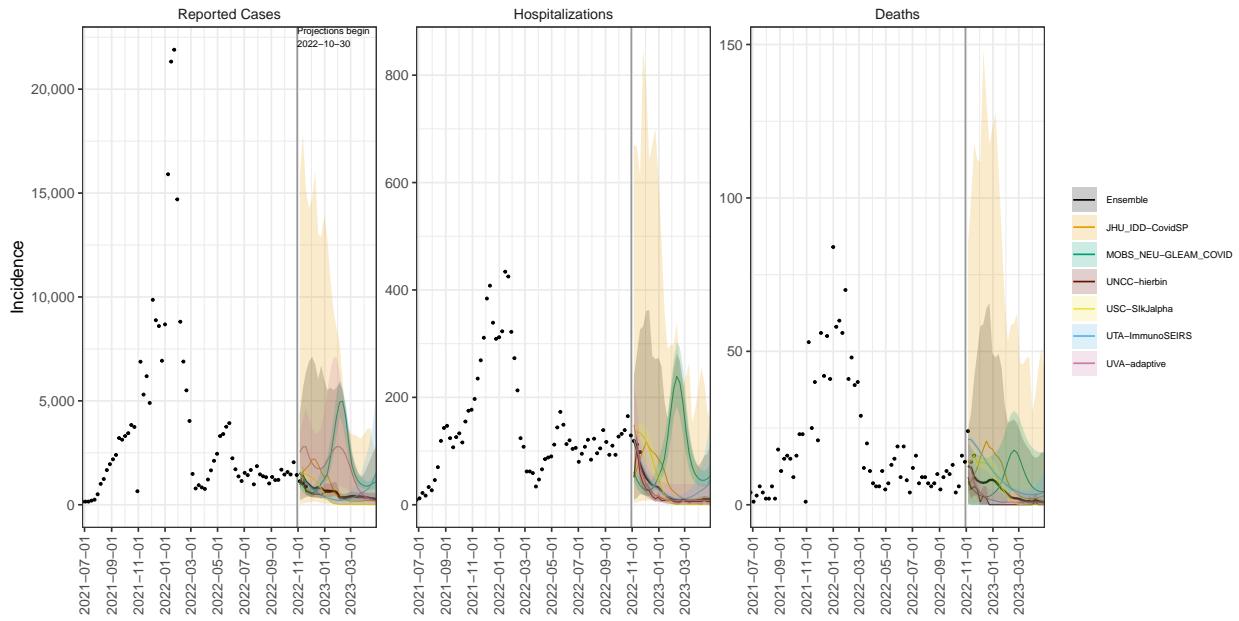
### NE model variance & 95% projection intervals – High booster, Moderate immune escape variant



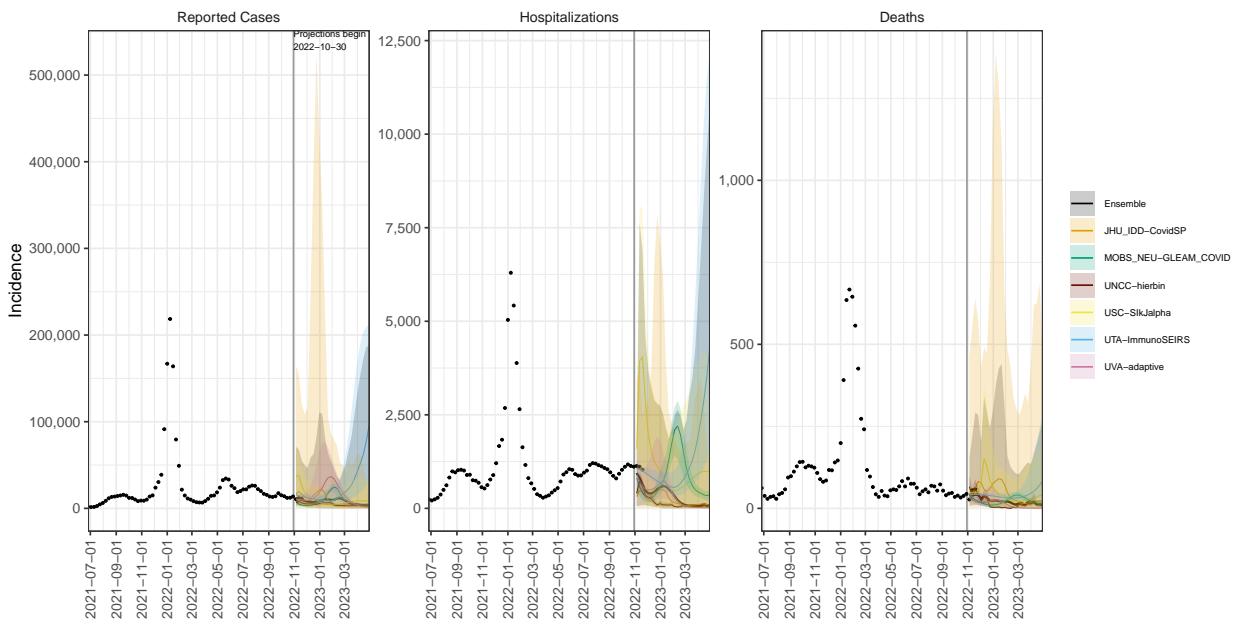
### NV model variance & 95% projection intervals – High booster, Moderate immune escape variant



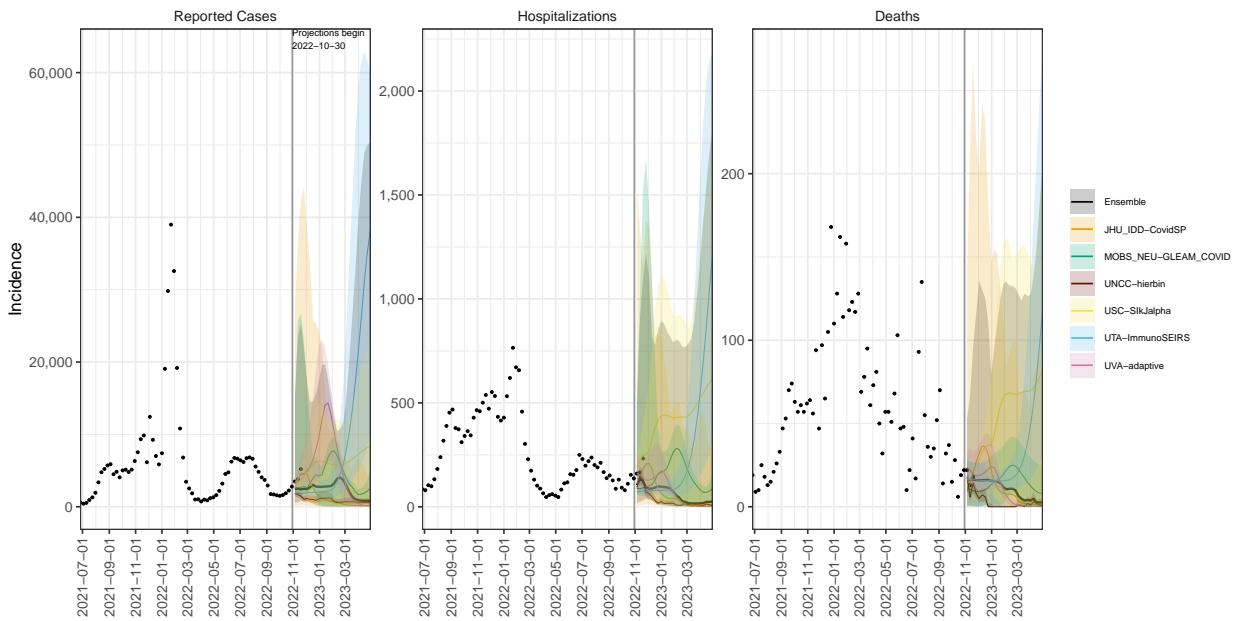
### NH model variance & 95% projection intervals – High booster, Moderate immune escape variant



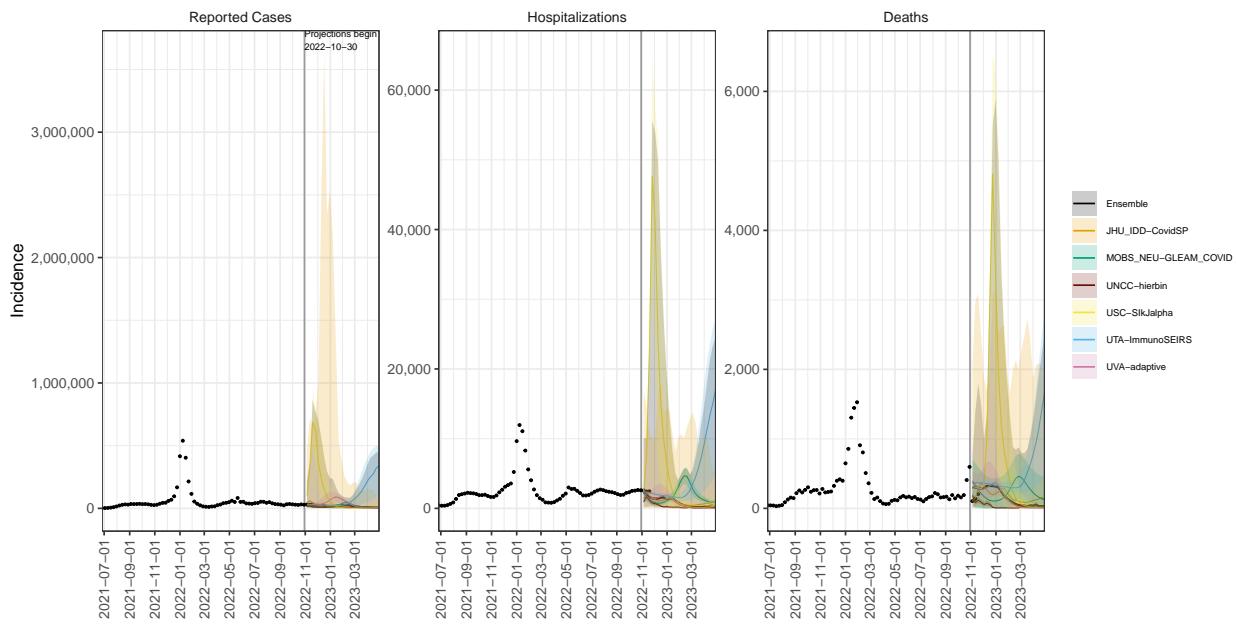
### NJ model variance & 95% projection intervals – High booster, Moderate immune escape variant



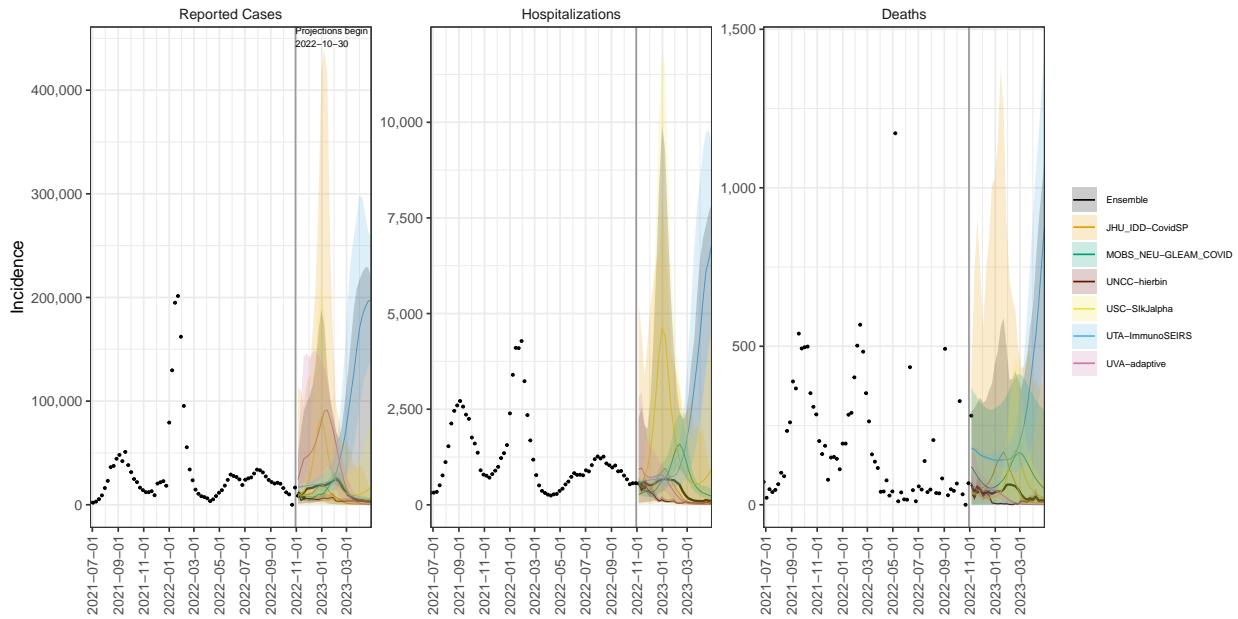
### NM model variance & 95% projection intervals – High booster, Moderate immune escape variant



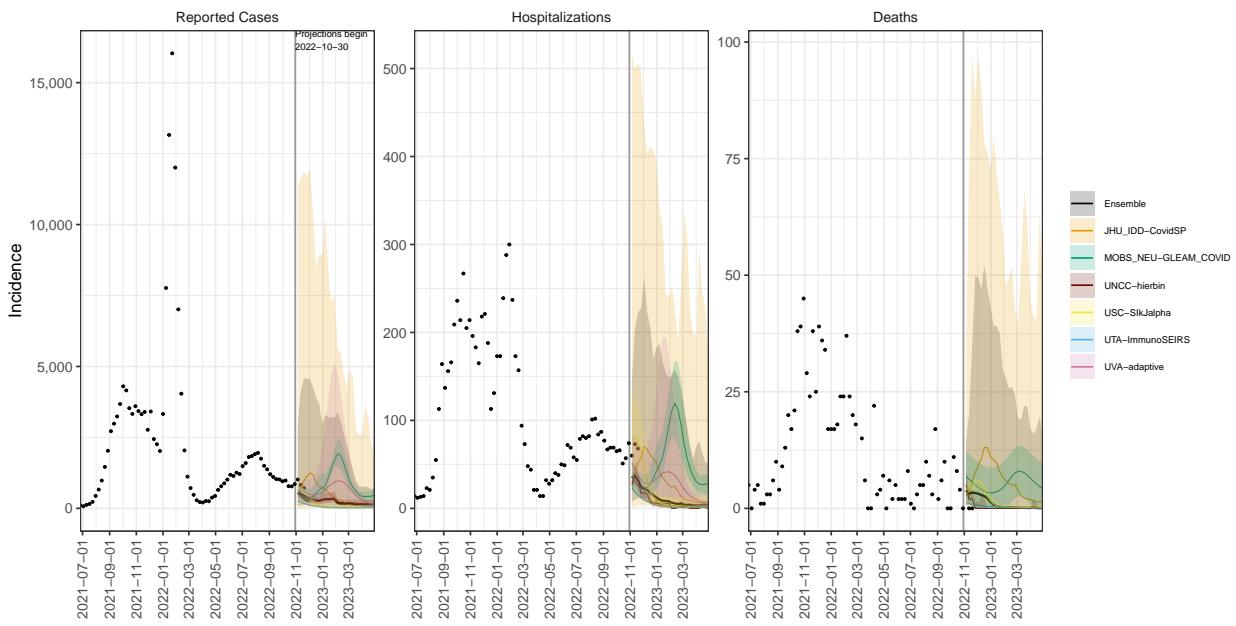
### NY model variance & 95% projection intervals – High booster, Moderate immune escape variant



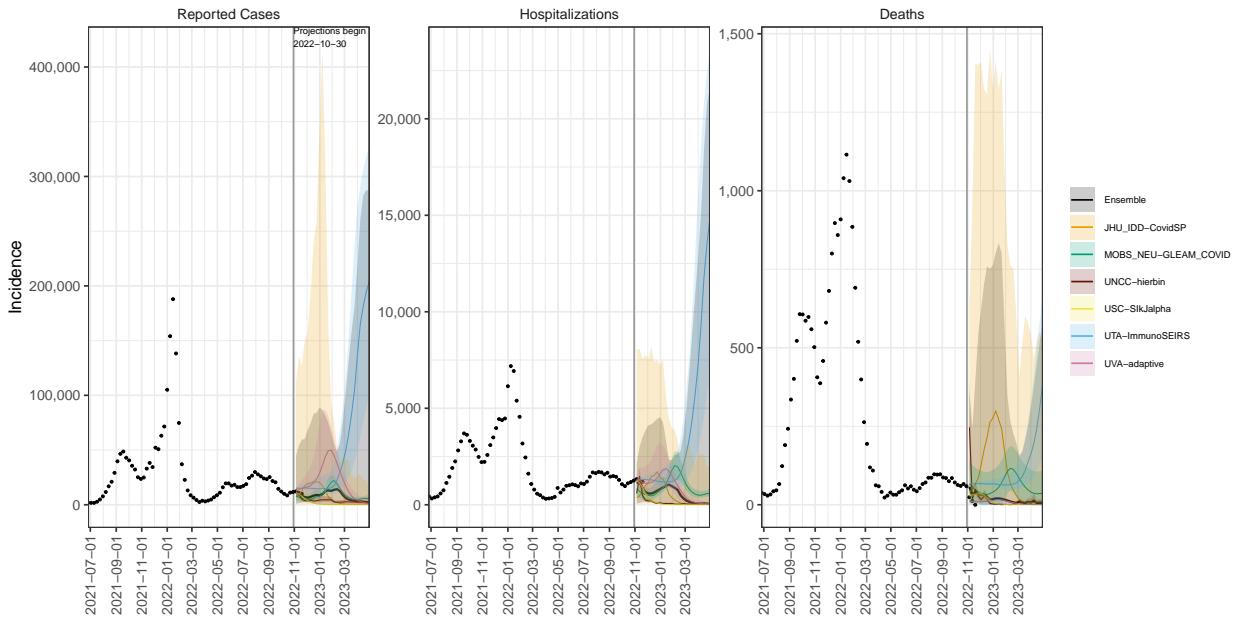
### NC model variance & 95% projection intervals – High booster, Moderate immune escape variant



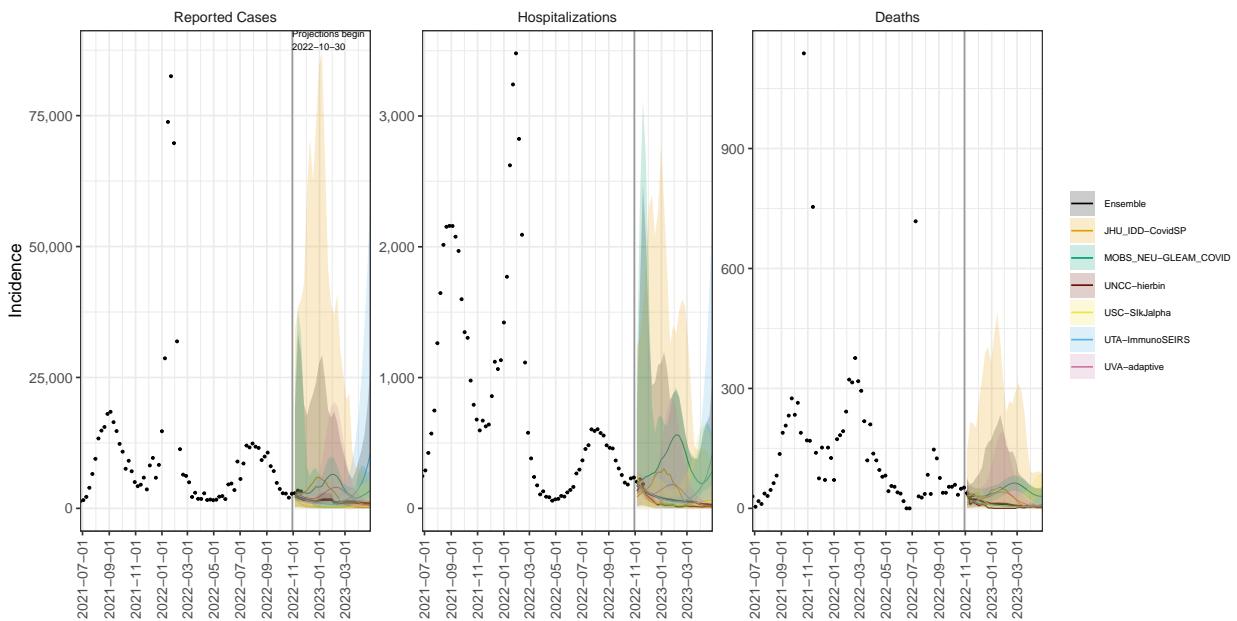
### ND model variance & 95% projection intervals – High booster, Moderate immune escape variant



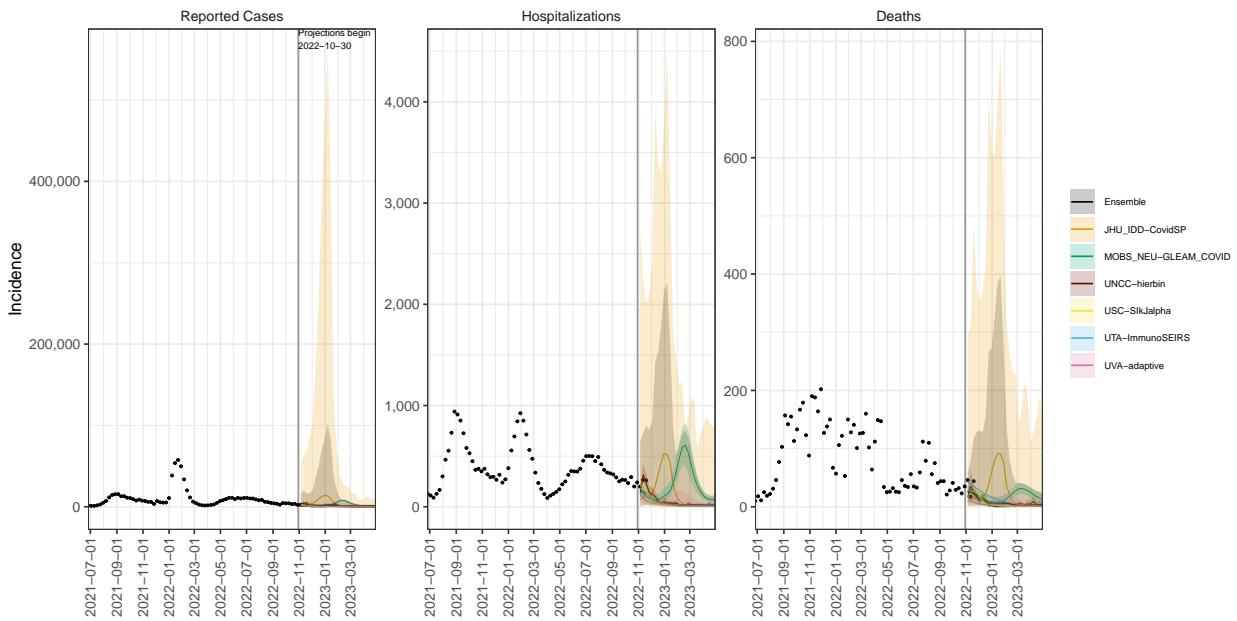
### OH model variance & 95% projection intervals – High booster, Moderate immune escape variant



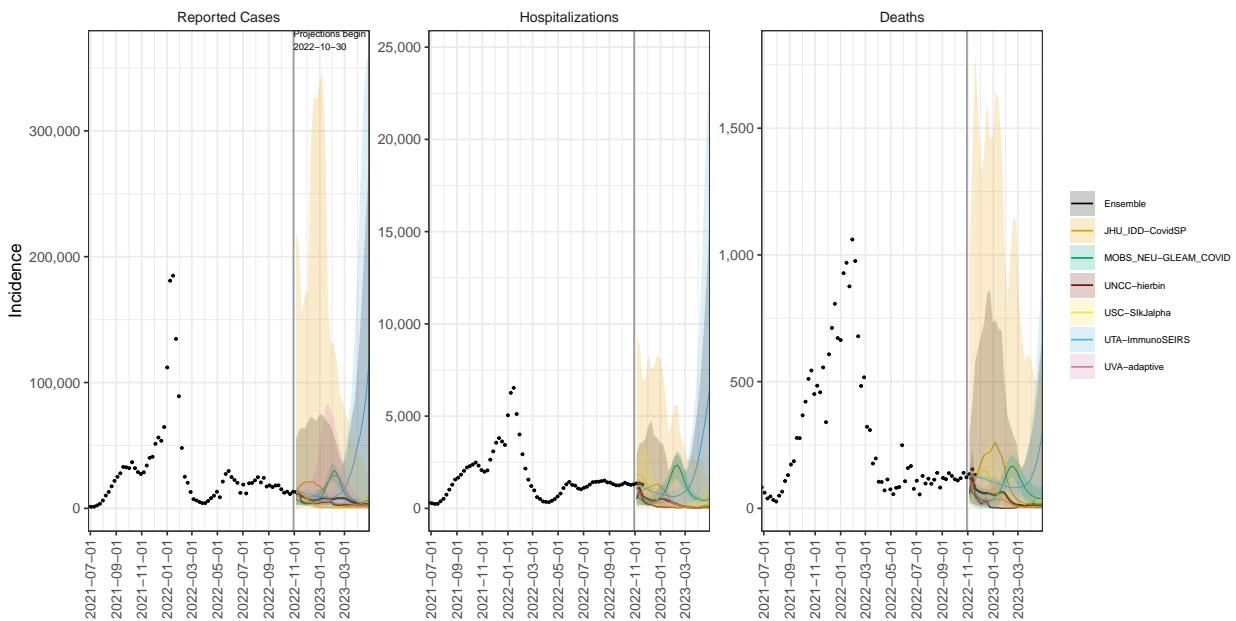
### OK model variance & 95% projection intervals – High booster, Moderate immune escape variant



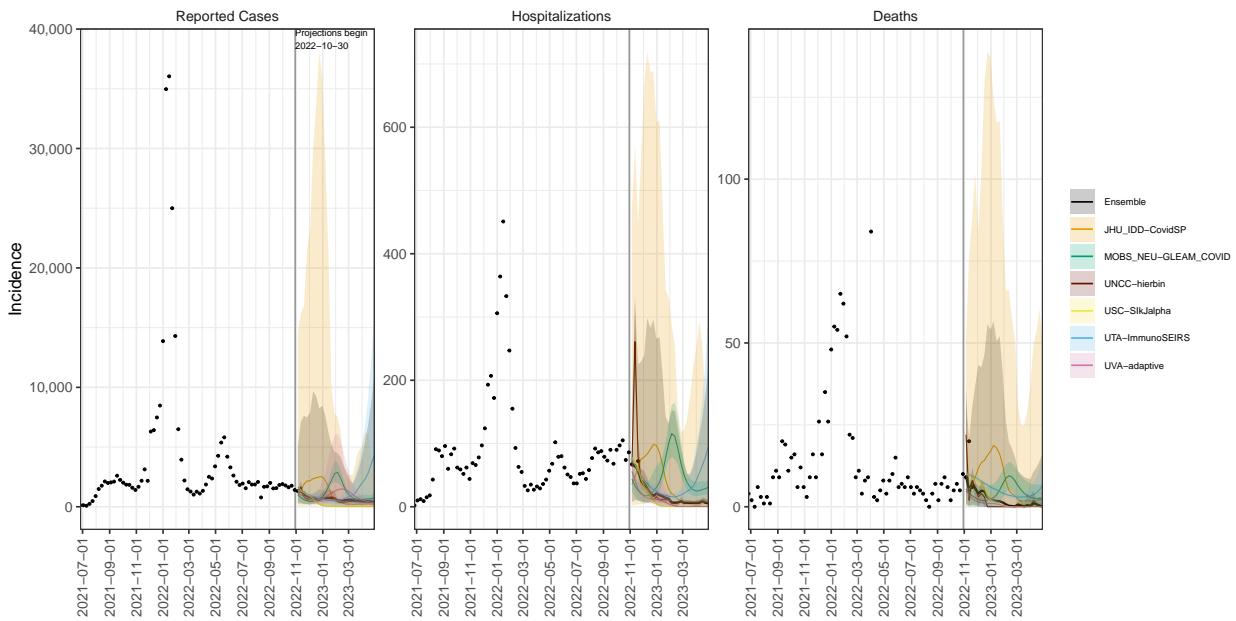
### OR model variance & 95% projection intervals – High booster, Moderate immune escape variant



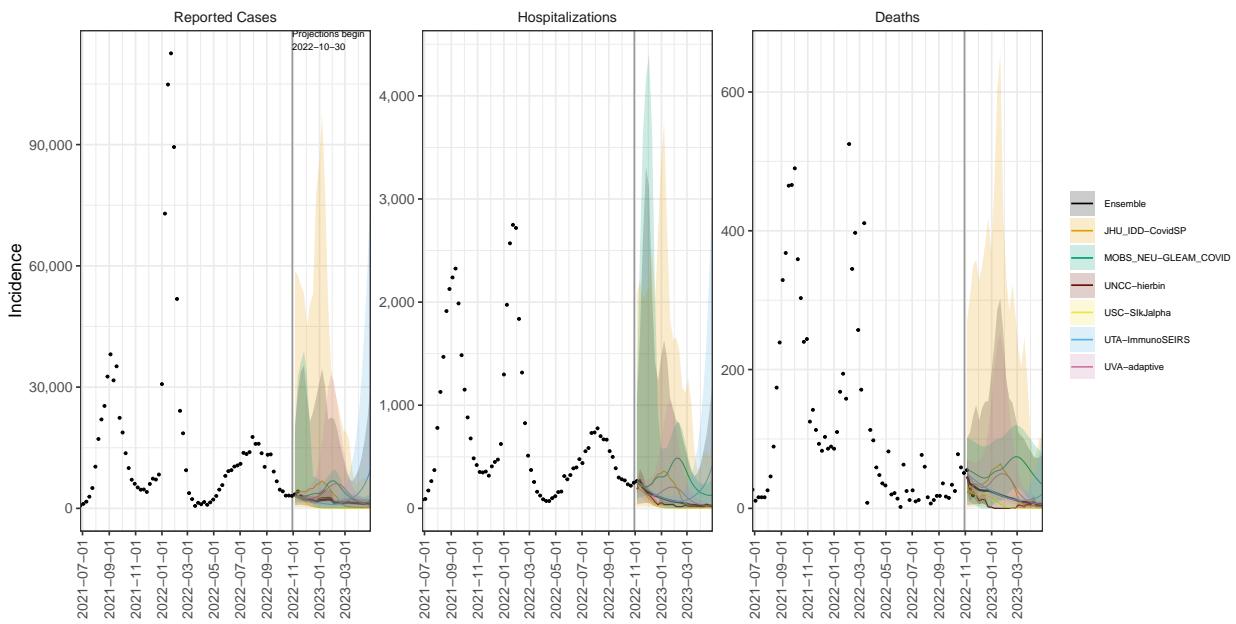
PA model variance & 95% projection intervals – High booster, Moderate immune escape variant



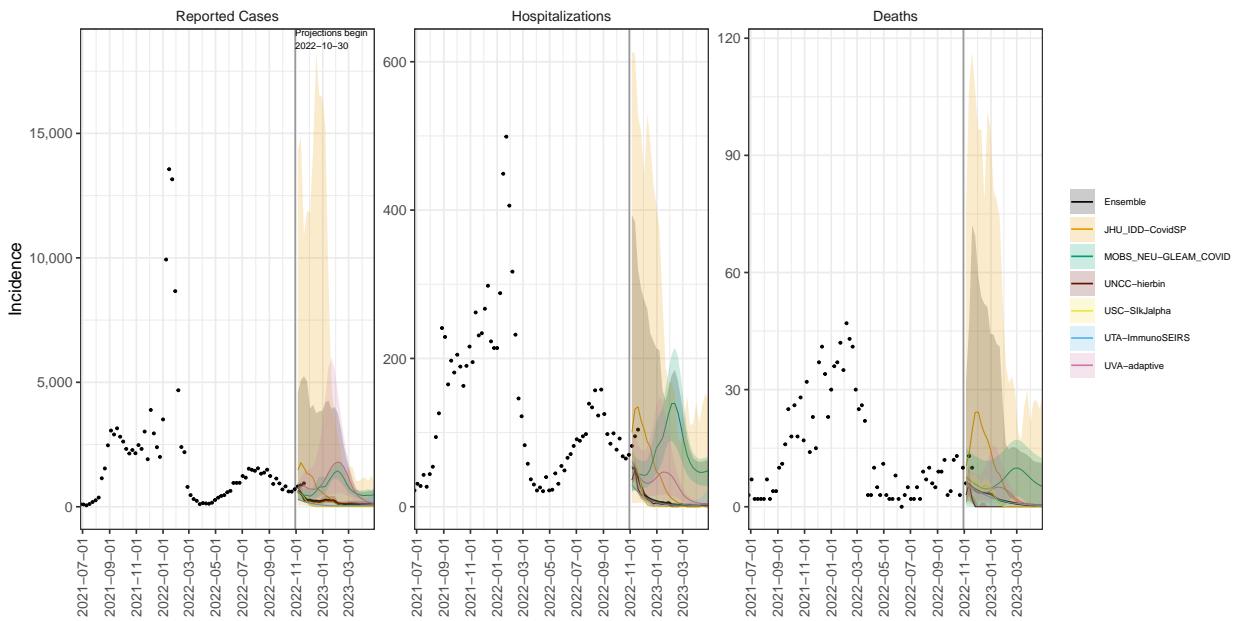
RI model variance & 95% projection intervals – High booster, Moderate immune escape variant



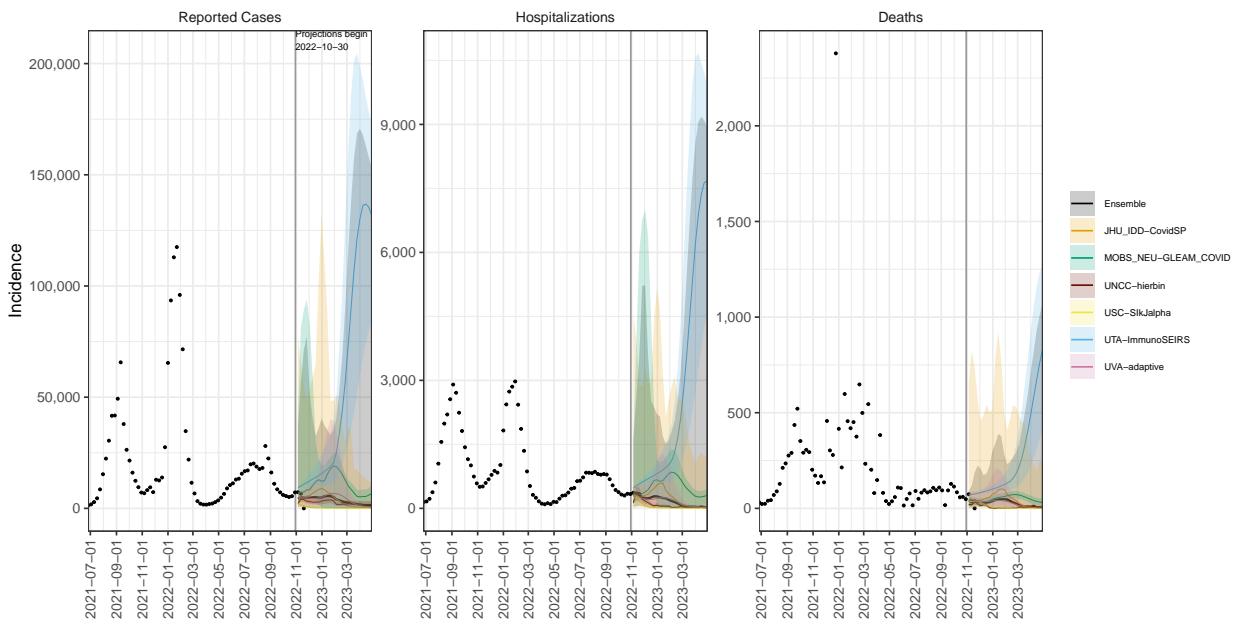
### SC model variance & 95% projection intervals – High booster, Moderate immune escape variant



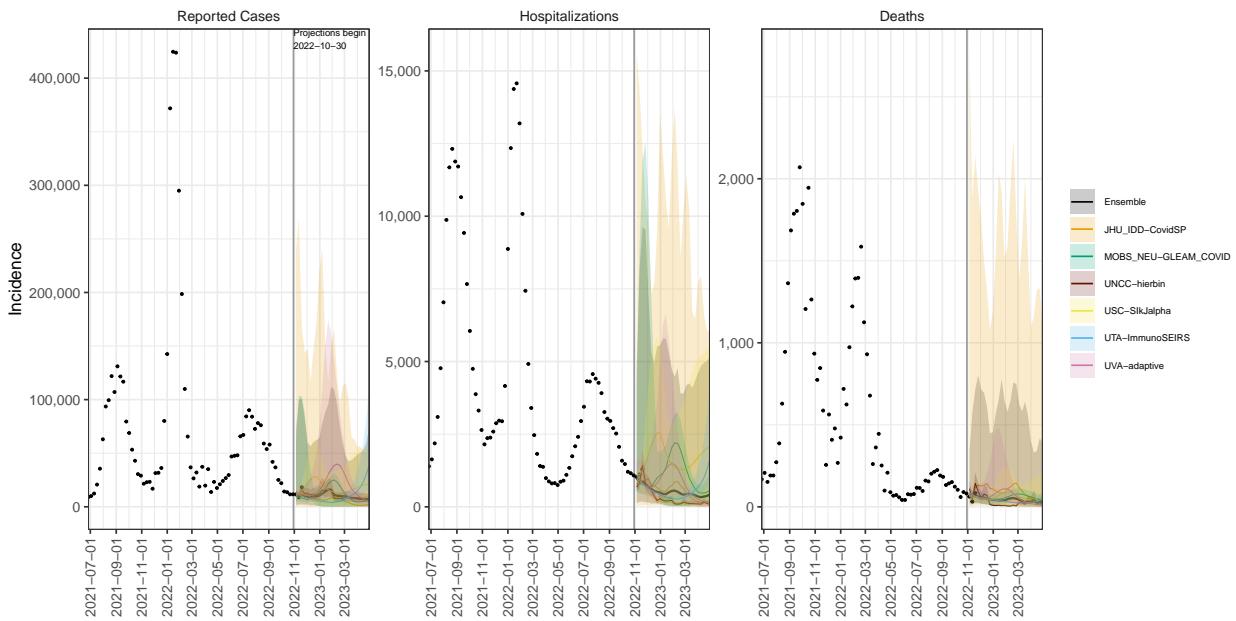
### SD model variance & 95% projection intervals – High booster, Moderate immune escape variant



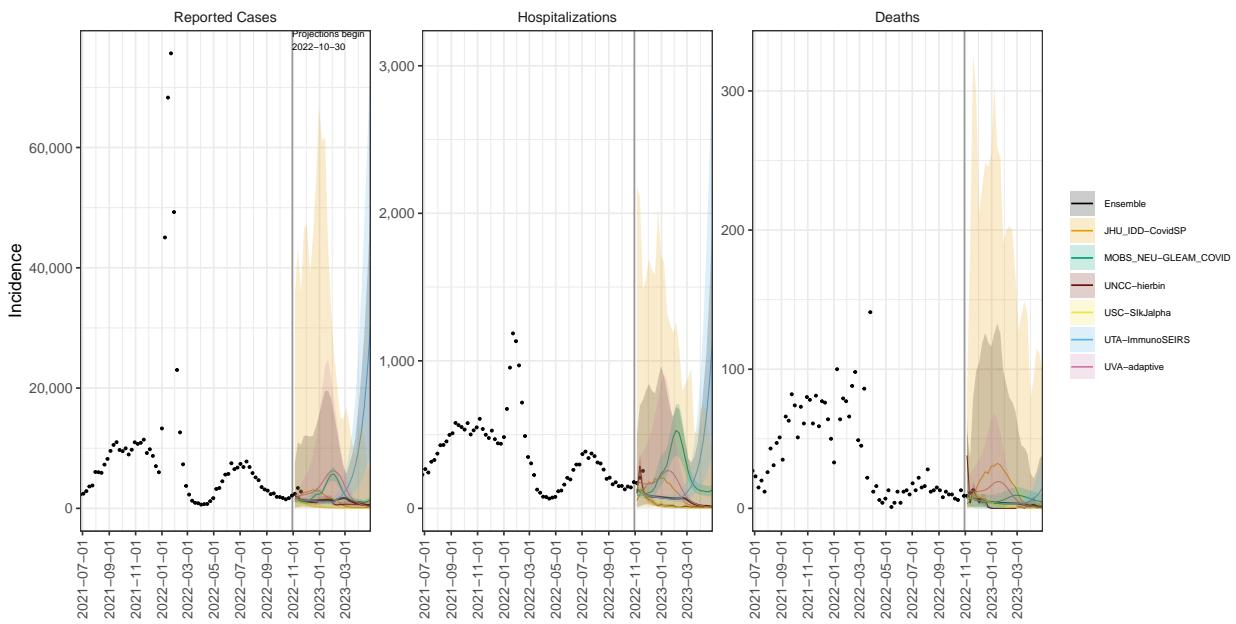
### TN model variance & 95% projection intervals – High booster, Moderate immune escape variant



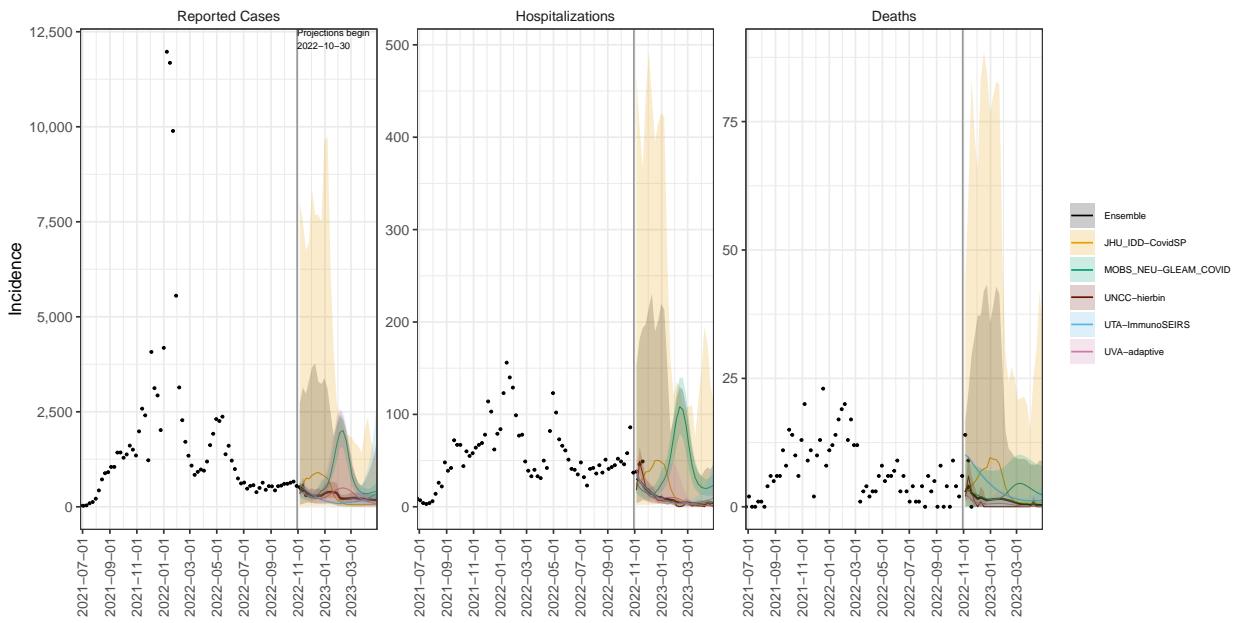
### TX model variance & 95% projection intervals – High booster, Moderate immune escape variant



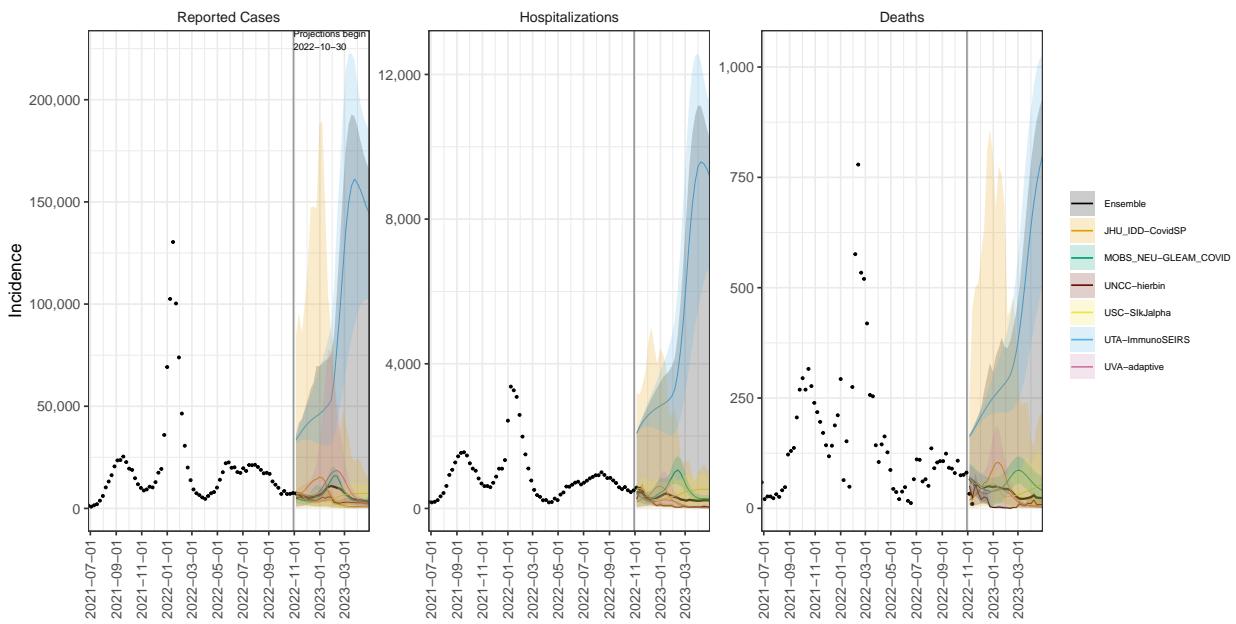
### UT model variance & 95% projection intervals – High booster, Moderate immune escape variant



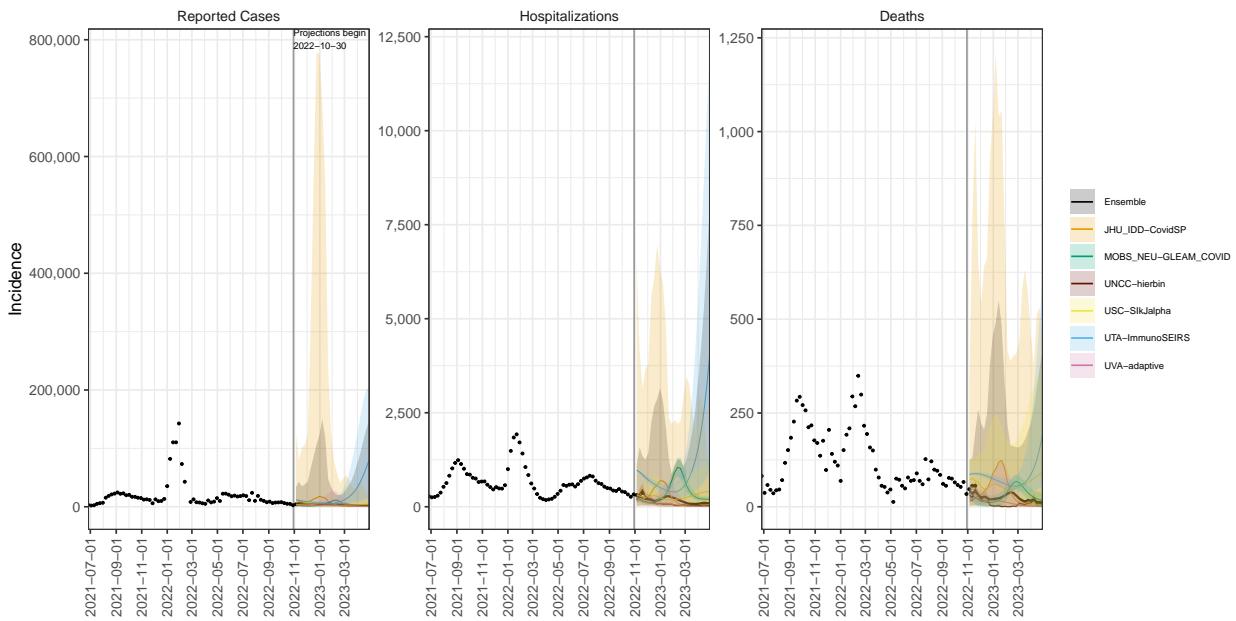
### VT model variance & 95% projection intervals – High booster, Moderate immune escape variant



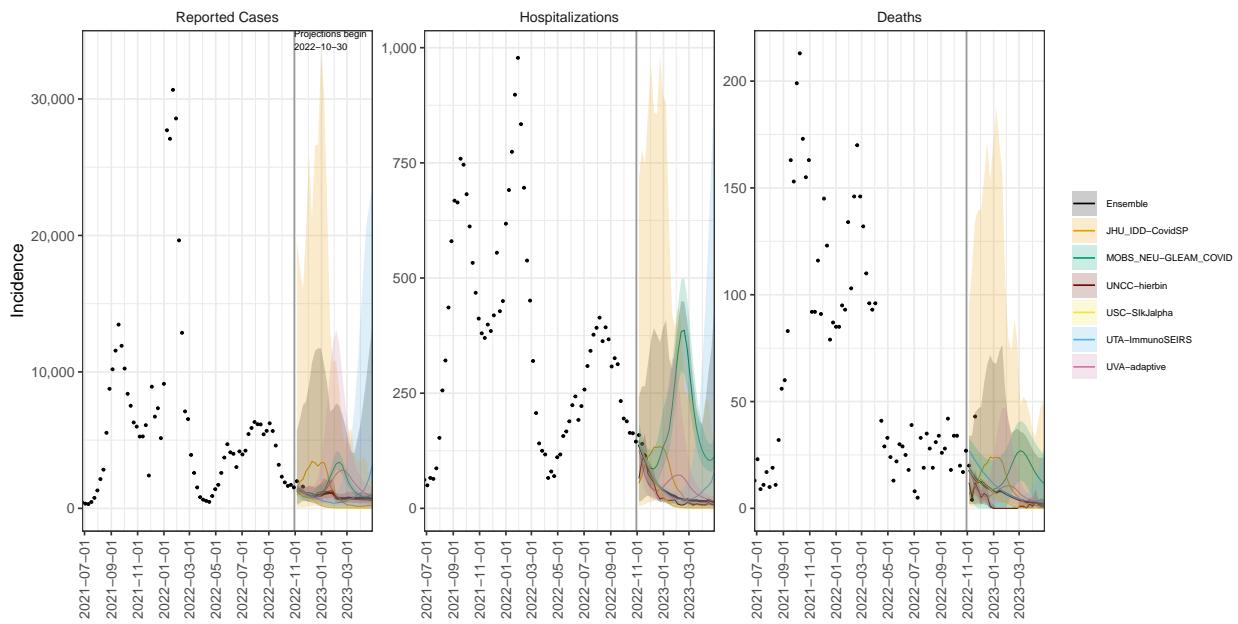
VA model variance & 95% projection intervals – High booster, Moderate immune escape variant



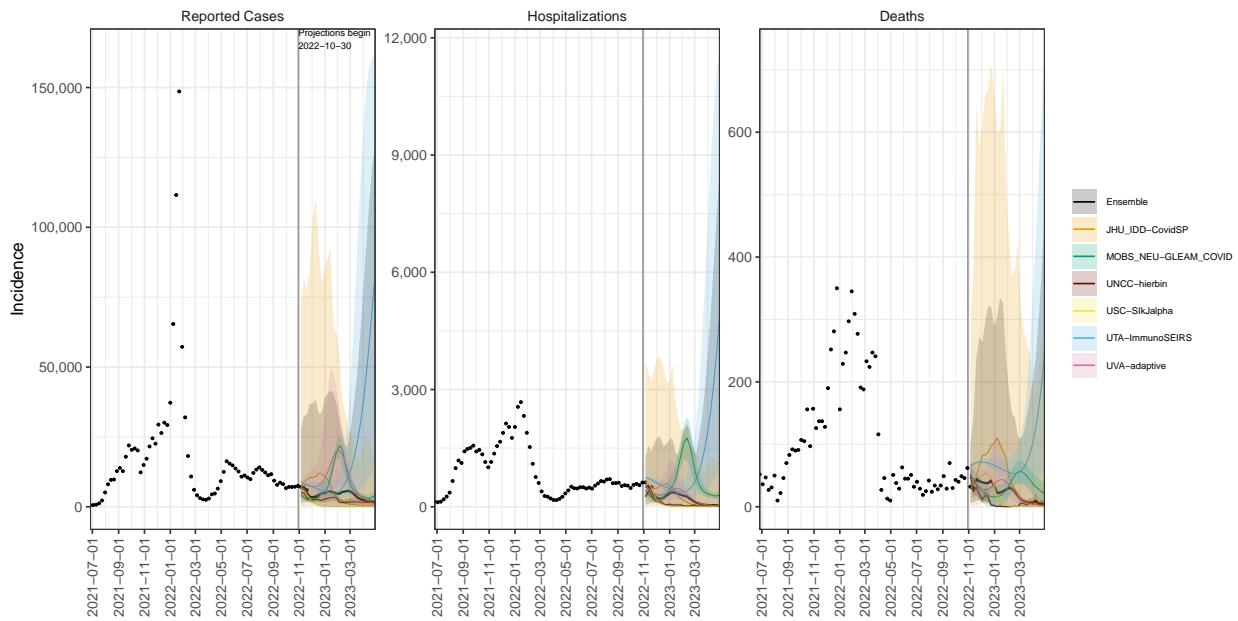
WA model variance & 95% projection intervals – High booster, Moderate immune escape variant



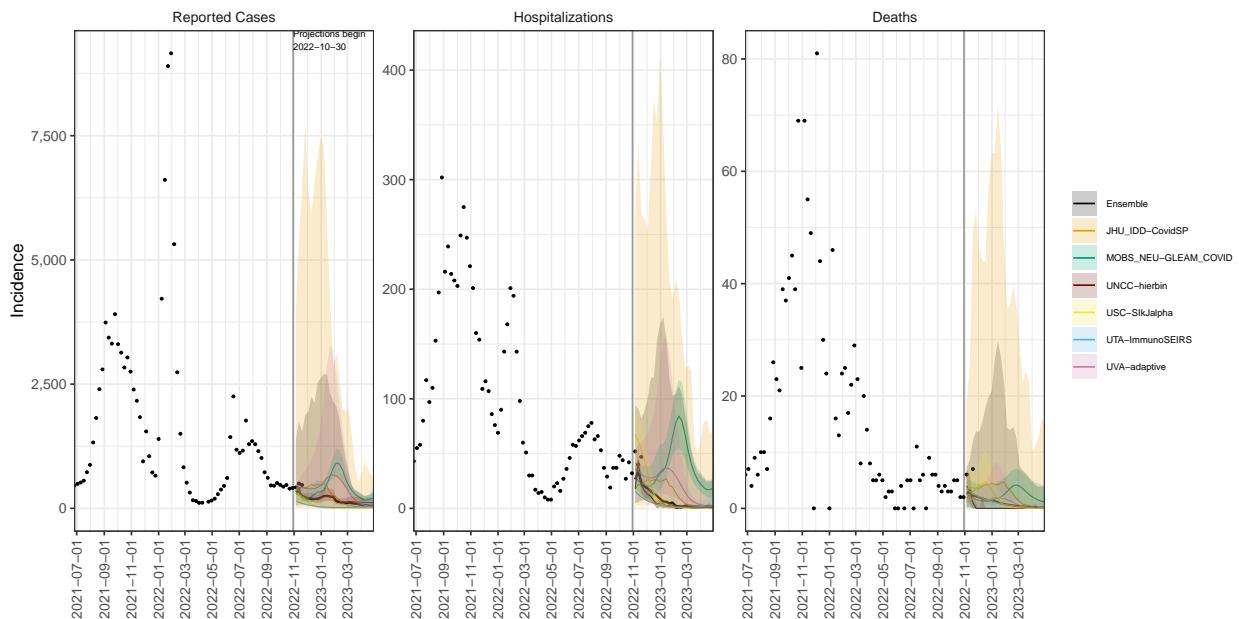
### WV model variance & 95% projection intervals – High booster, Moderate immune escape variant



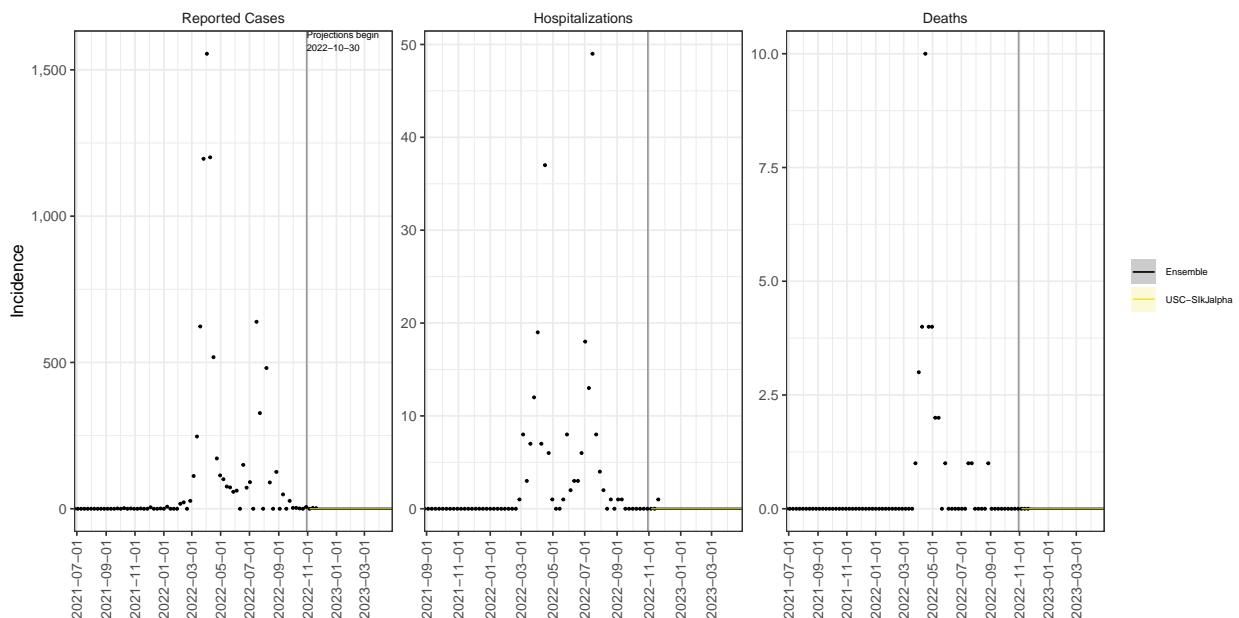
### WI model variance & 95% projection intervals – High booster, Moderate immune escape variant



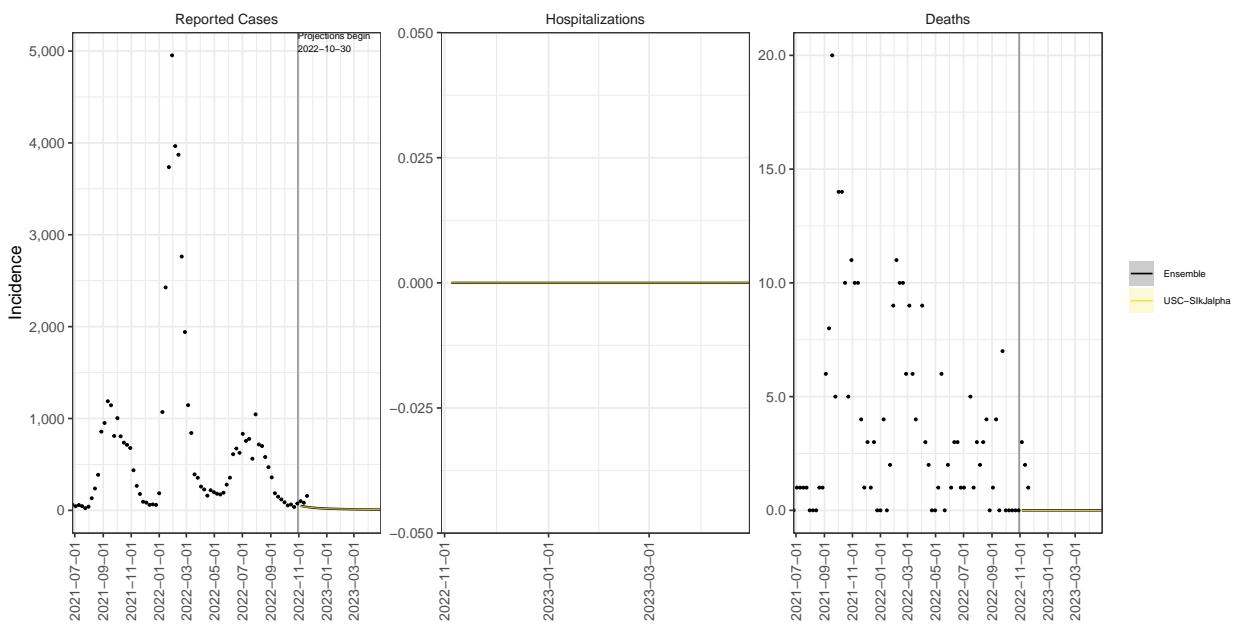
WY model variance & 95% projection intervals – High booster, Moderate immune escape variant



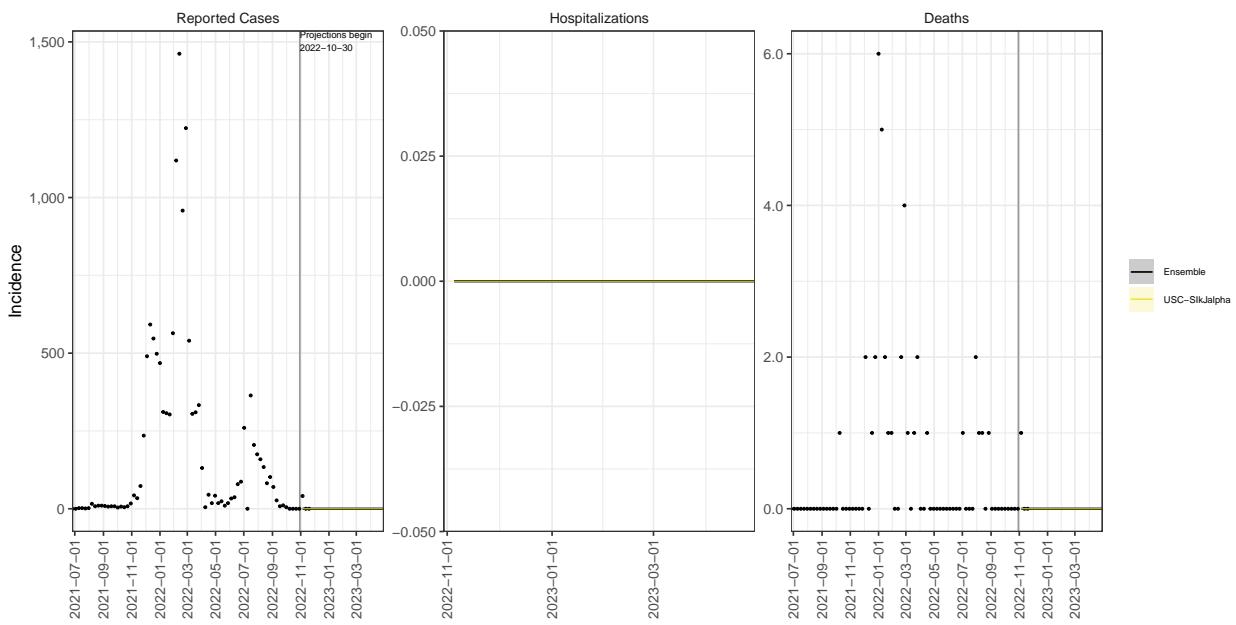
AS model variance & 95% projection intervals – High booster, Moderate immune escape variant



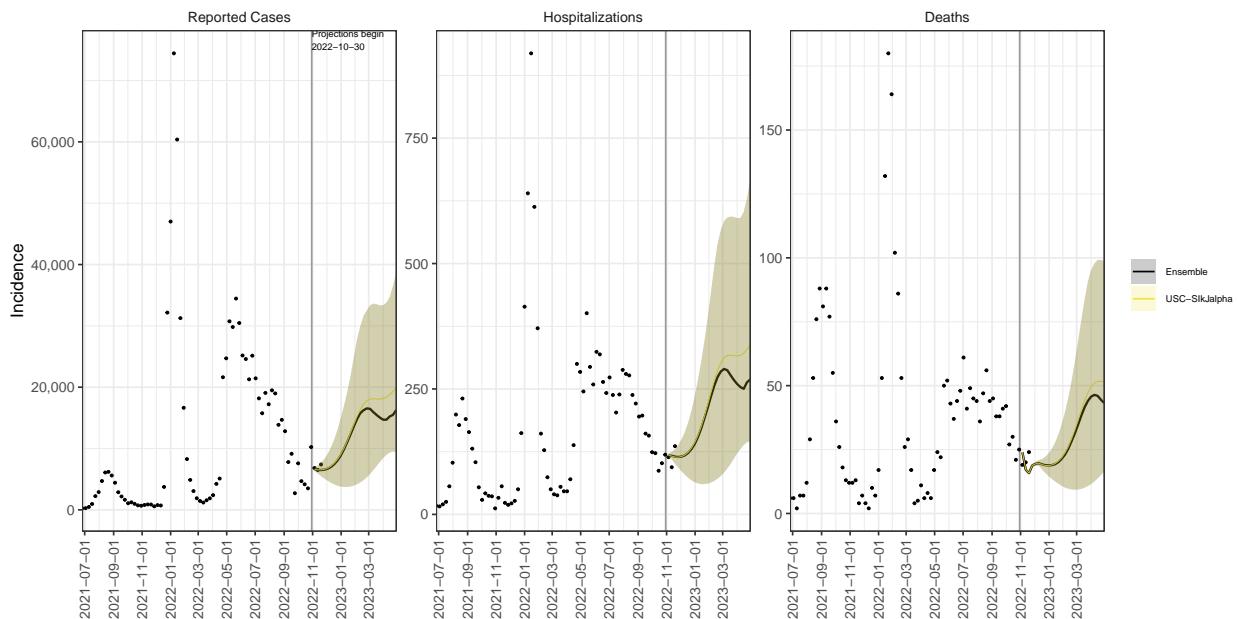
GU model variance & 95% projection intervals – High booster, Moderate immune escape variant



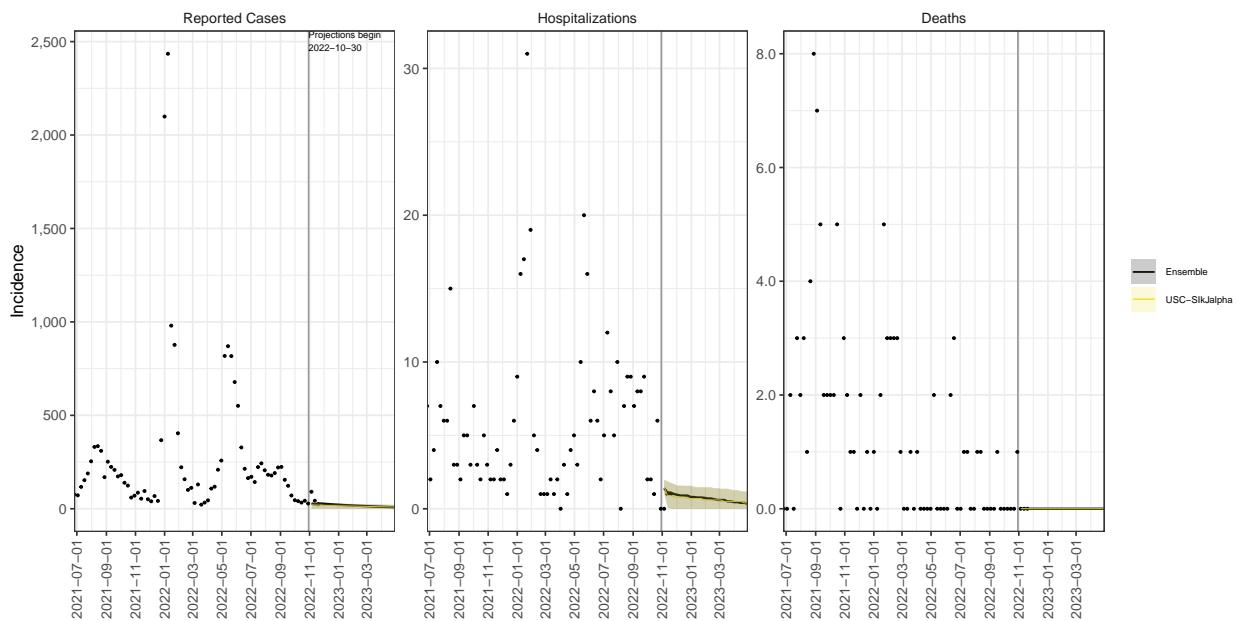
MP model variance & 95% projection intervals – High booster, Moderate immune escape variant



PR model variance & 95% projection intervals – High booster, Moderate immune escape variant

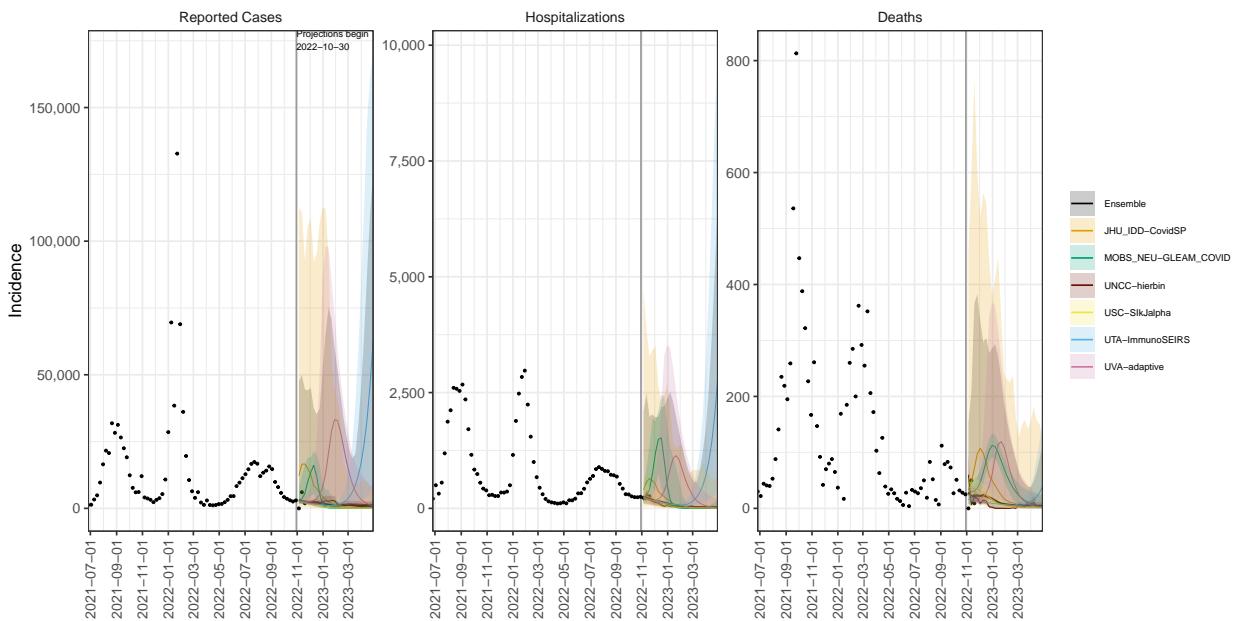


VI model variance & 95% projection intervals – High booster, Moderate immune escape variant

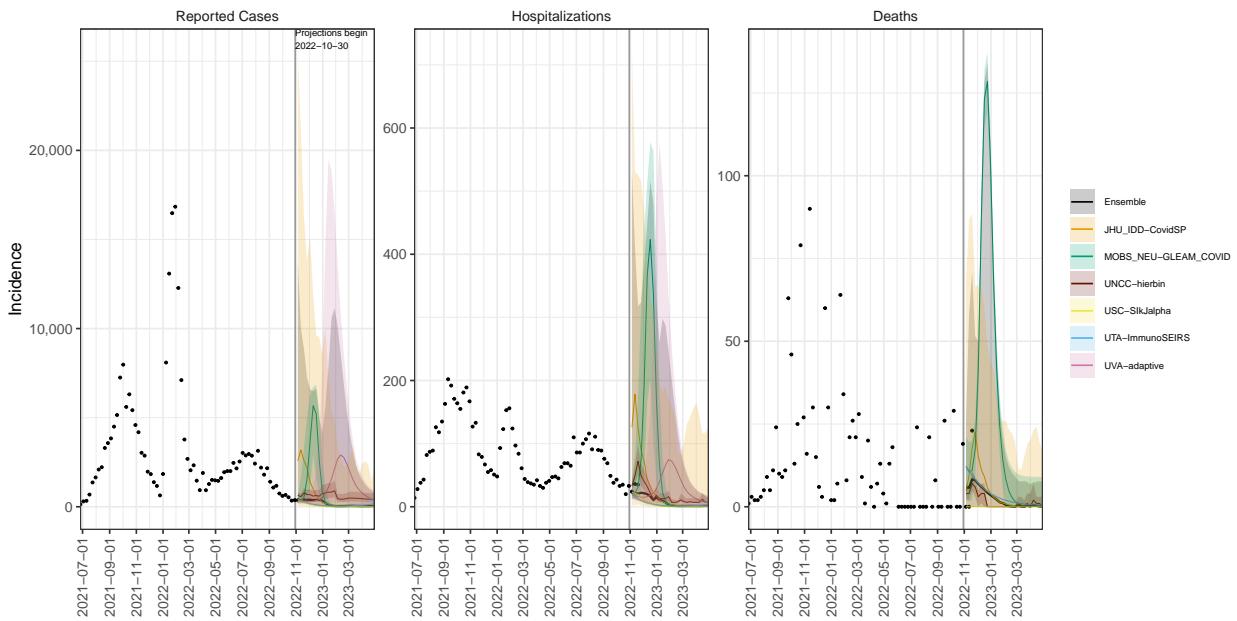


National model variation for High booster, High immune escape variant scenario.

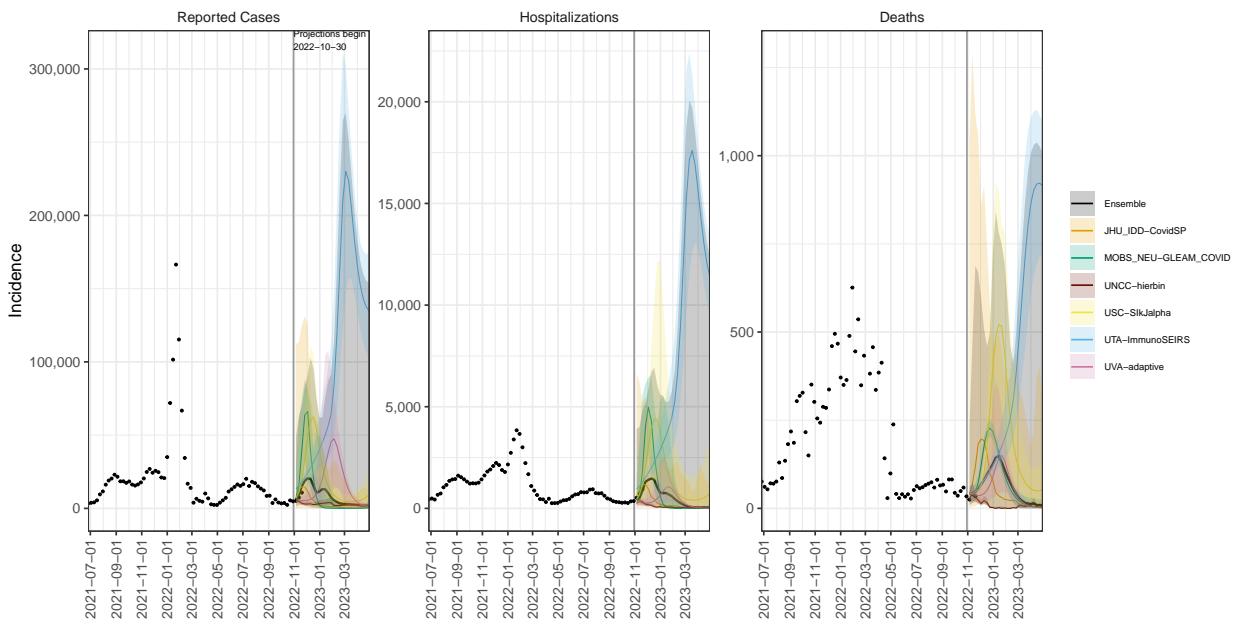
AL model variance & 95% projection intervals – High booster, High immune escape variant



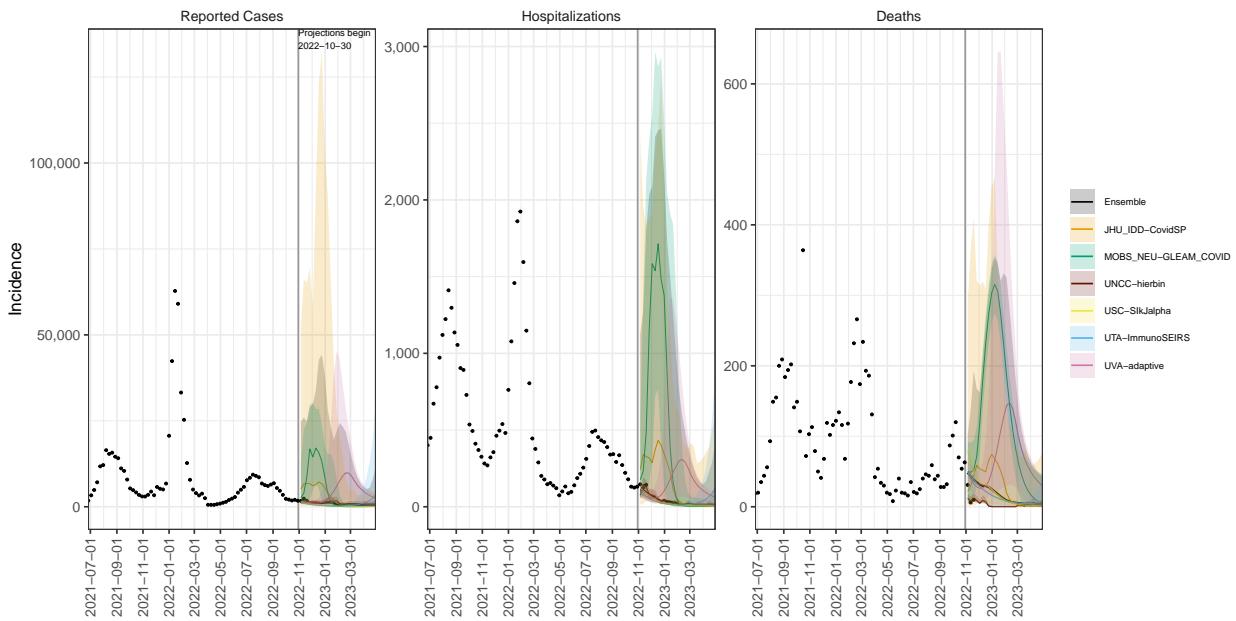
AK model variance & 95% projection intervals – High booster, High immune escape variant



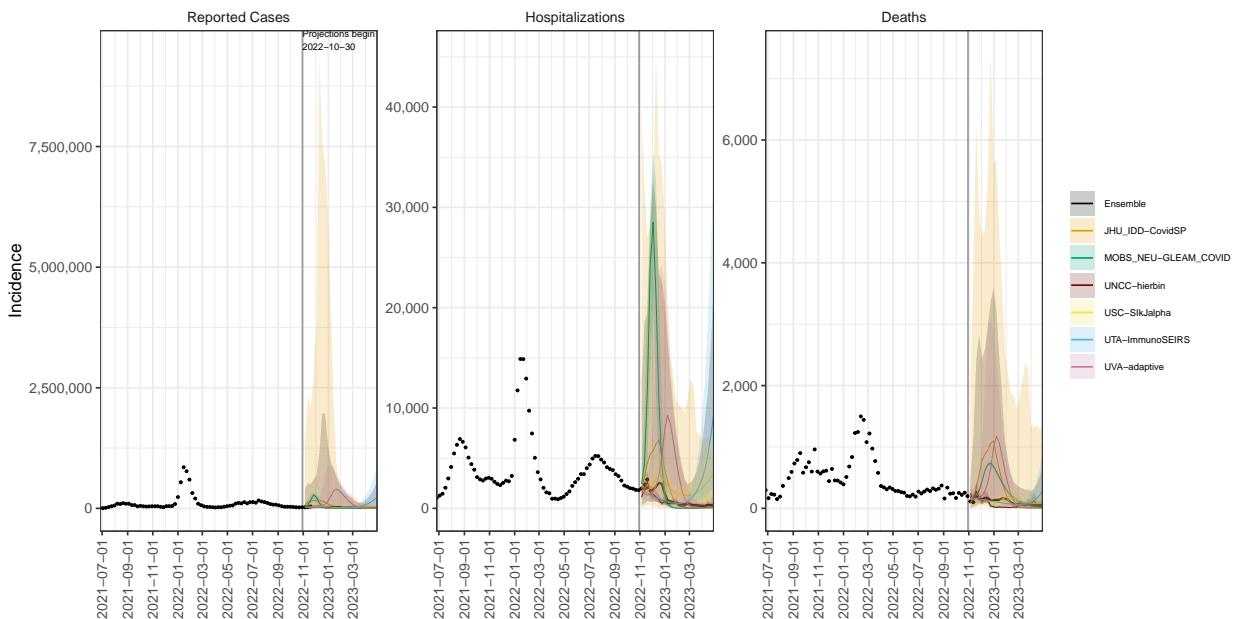
AZ model variance & 95% projection intervals – High booster, High immune escape variant



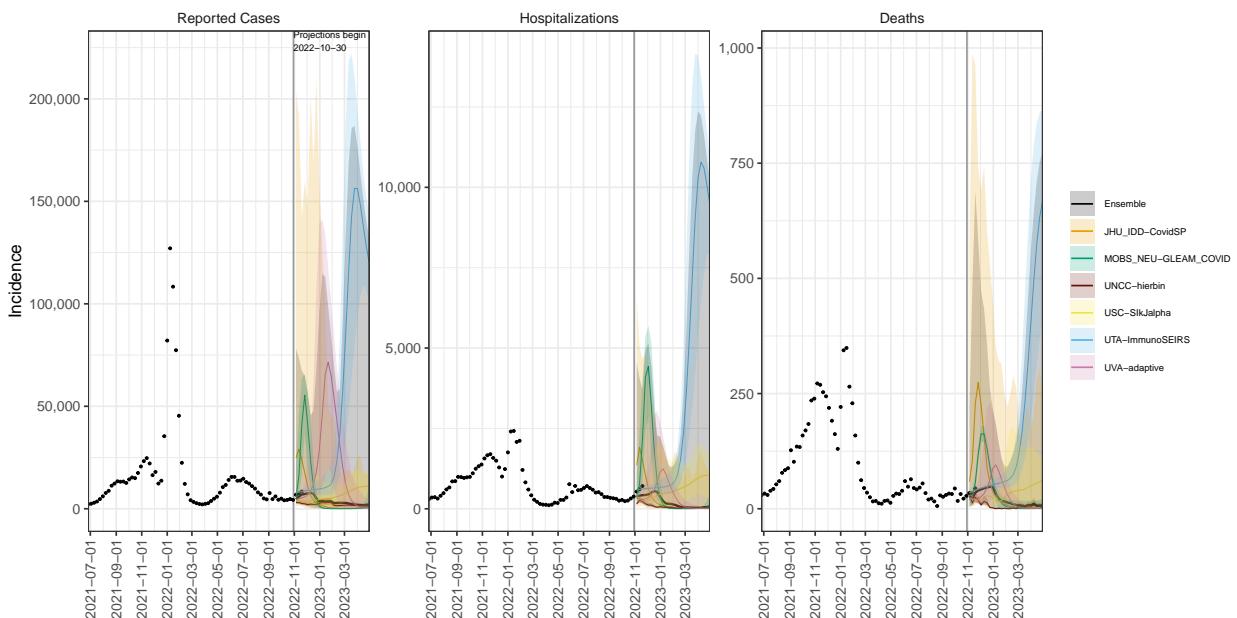
AR model variance & 95% projection intervals – High booster, High immune escape variant



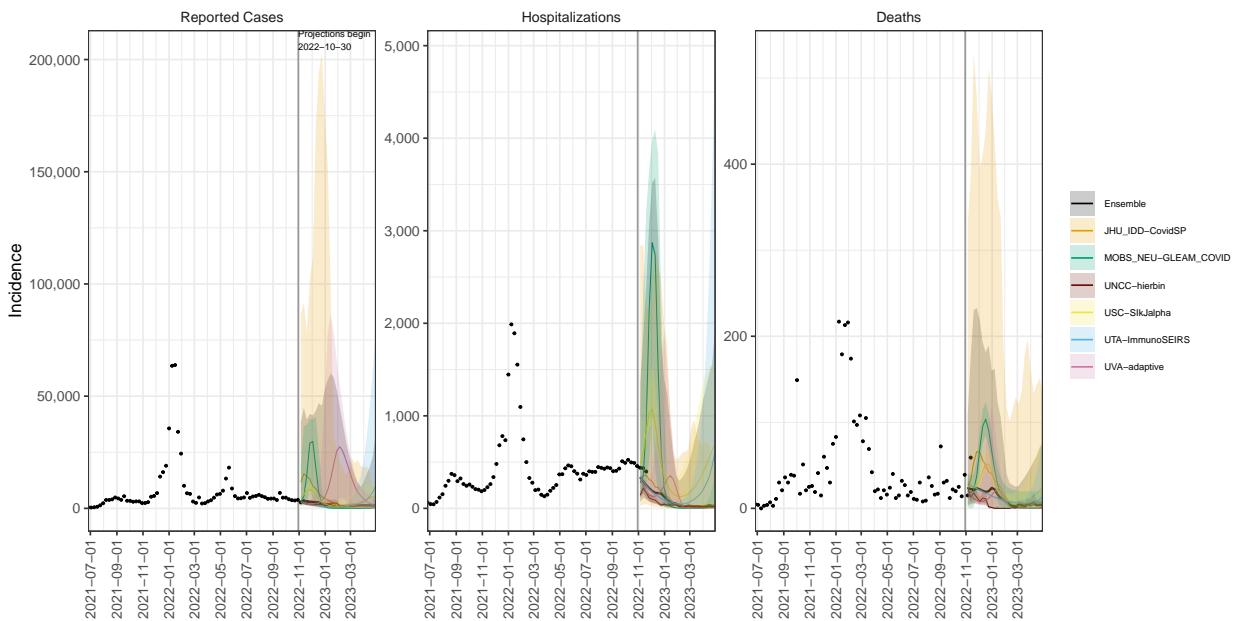
### CA model variance & 95% projection intervals – High booster, High immune escape variant



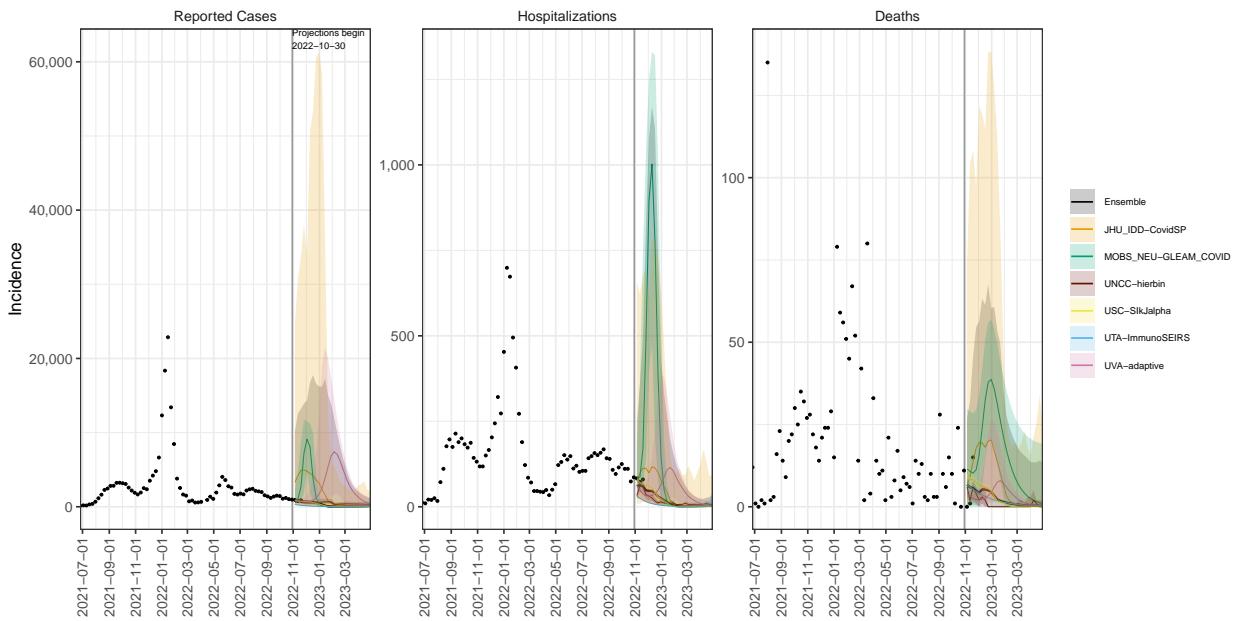
### CO model variance & 95% projection intervals – High booster, High immune escape variant



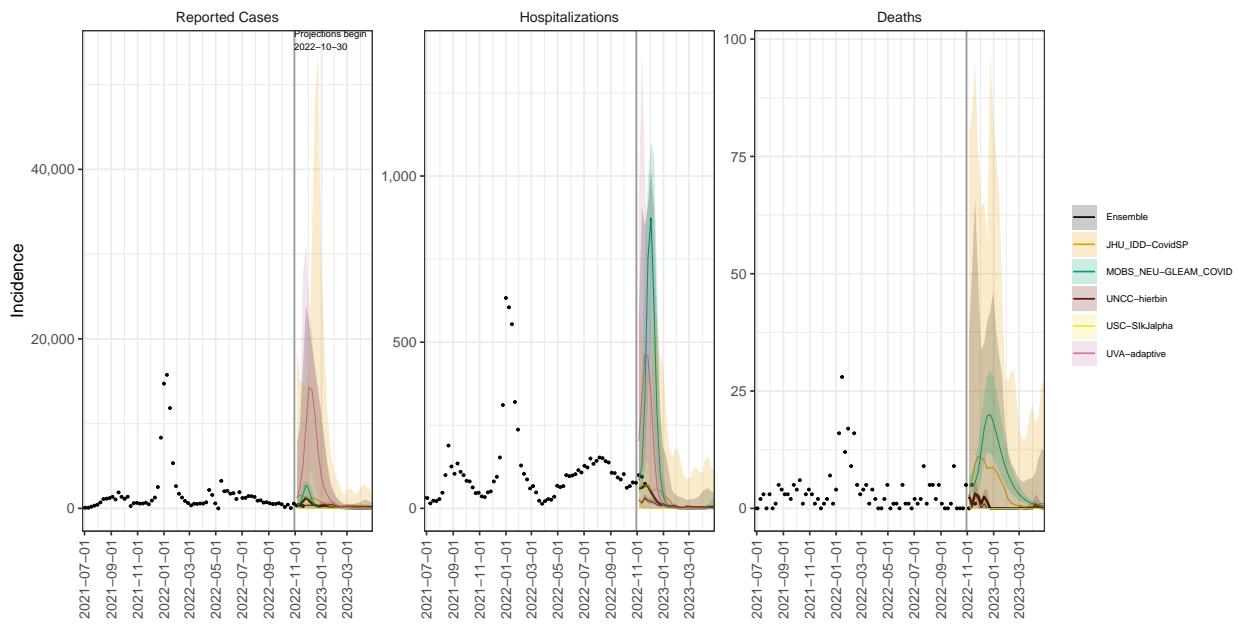
CT model variance & 95% projection intervals – High booster, High immune escape variant



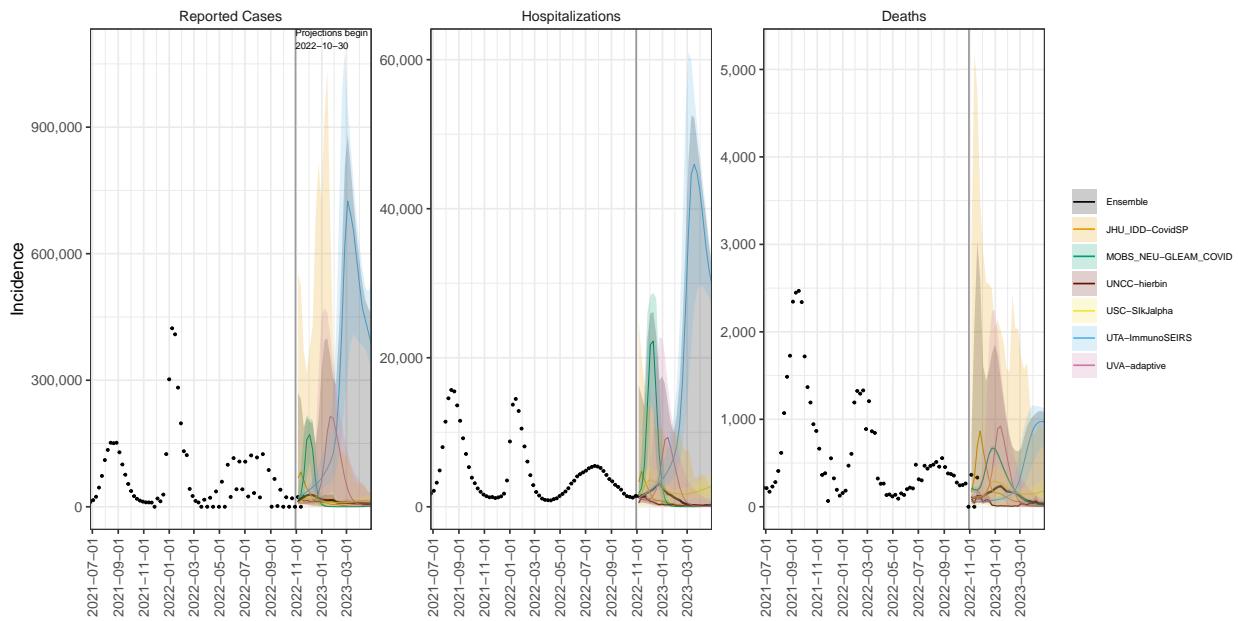
DE model variance & 95% projection intervals – High booster, High immune escape variant



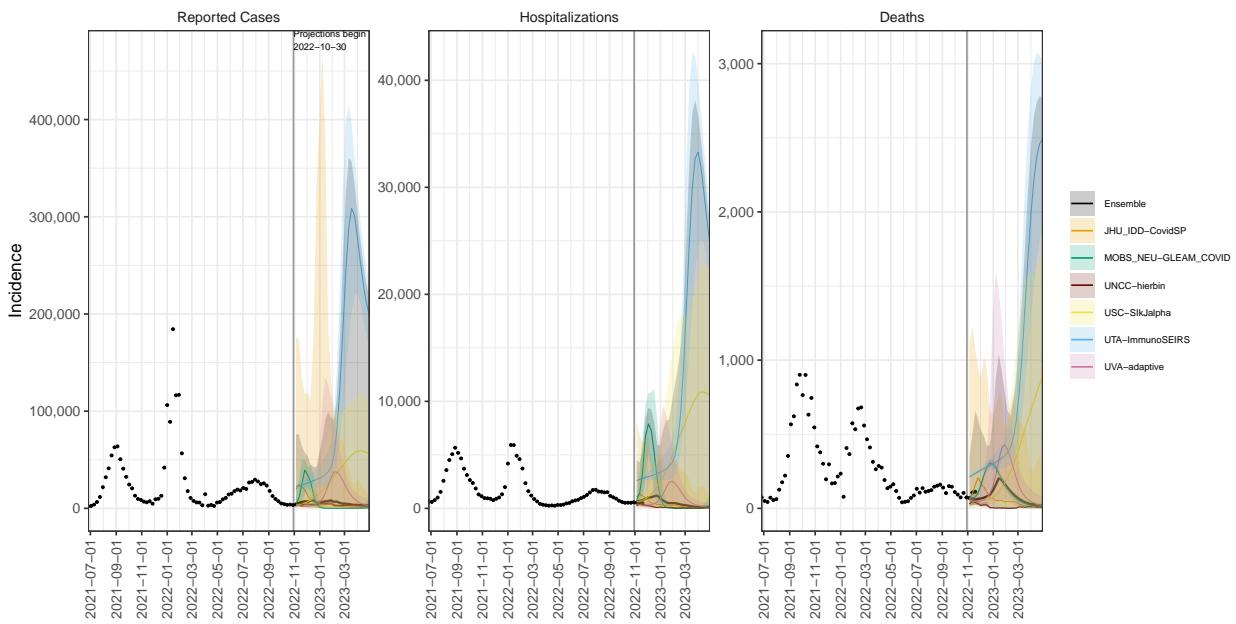
DC model variance & 95% projection intervals – High booster, High immune escape variant



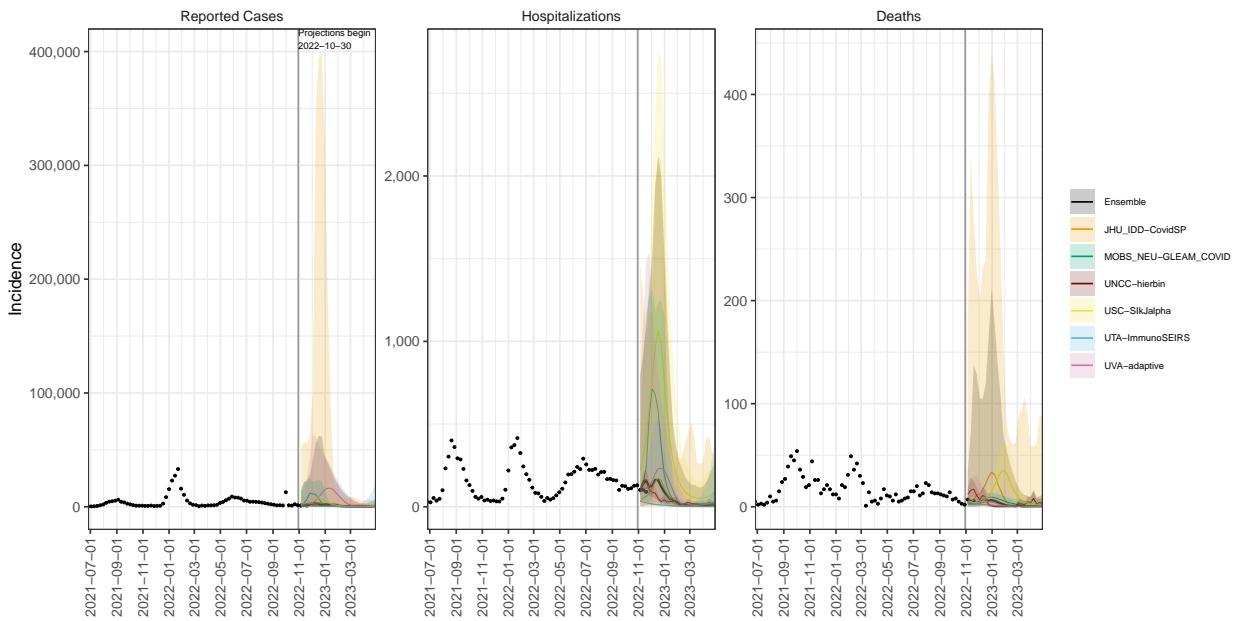
FL model variance & 95% projection intervals – High booster, High immune escape variant



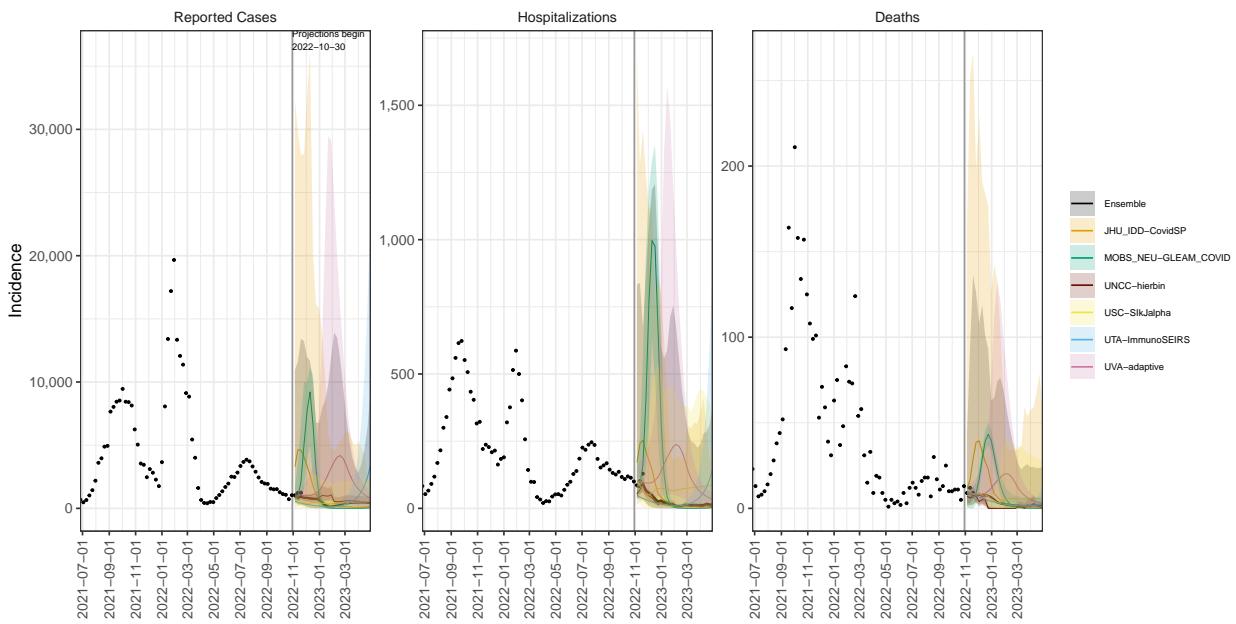
### GA model variance & 95% projection intervals – High booster, High immune escape variant



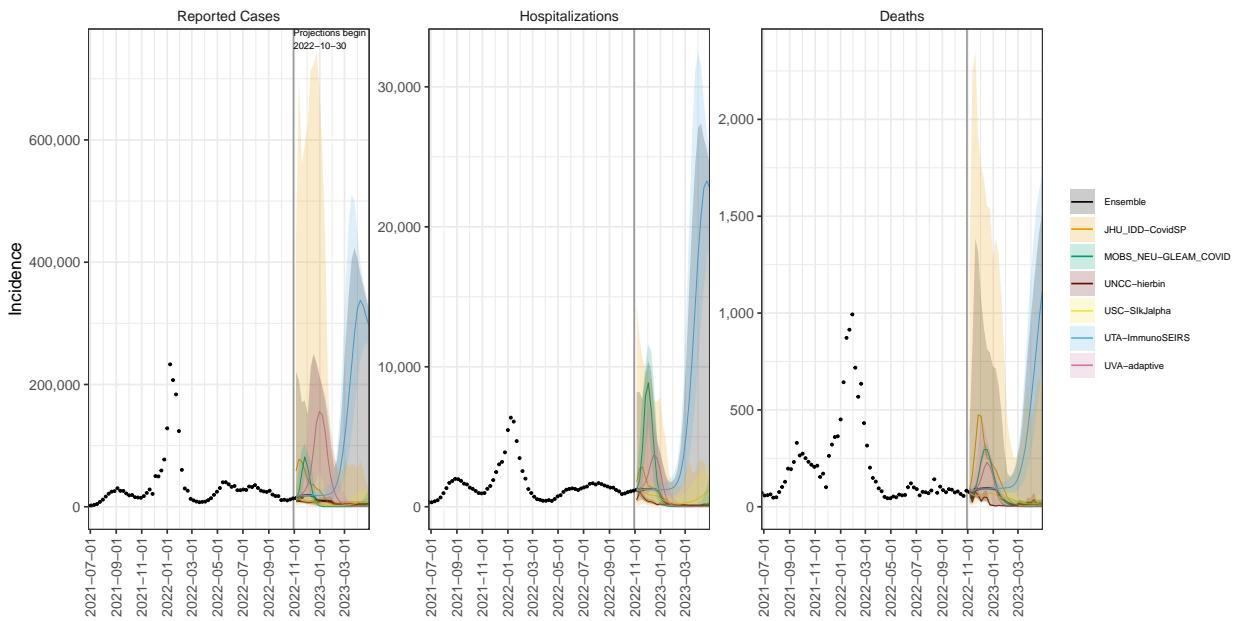
### HI model variance & 95% projection intervals – High booster, High immune escape variant



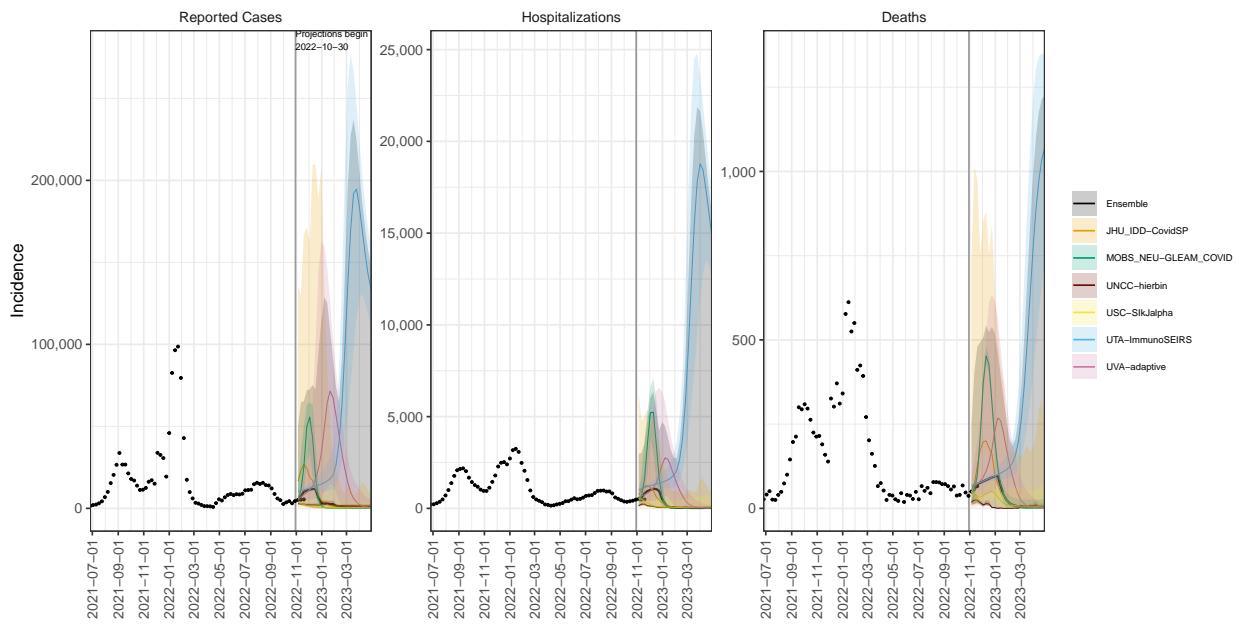
ID model variance & 95% projection intervals – High booster, High immune escape variant



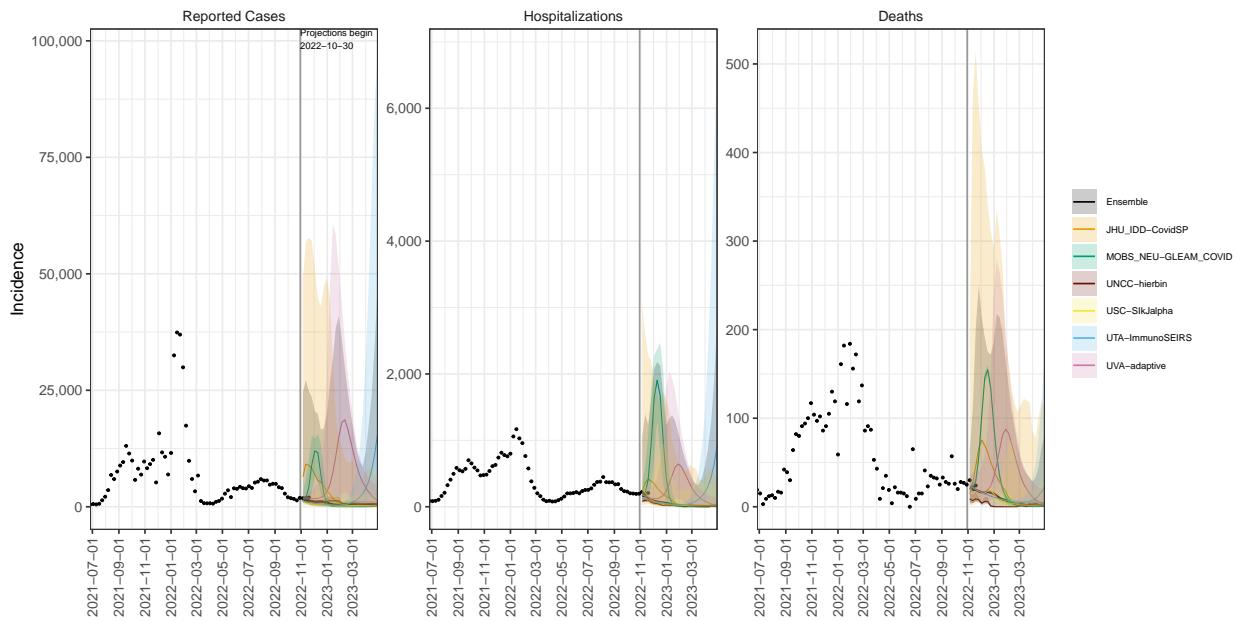
IL model variance & 95% projection intervals – High booster, High immune escape variant



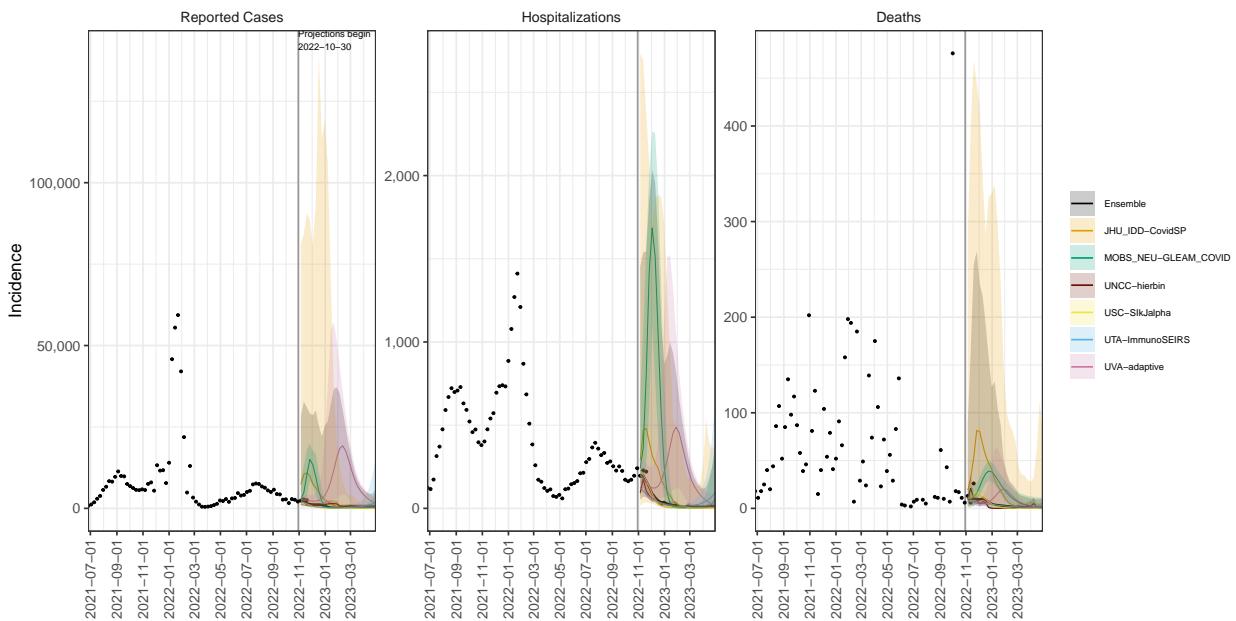
IN model variance & 95% projection intervals – High booster, High immune escape variant



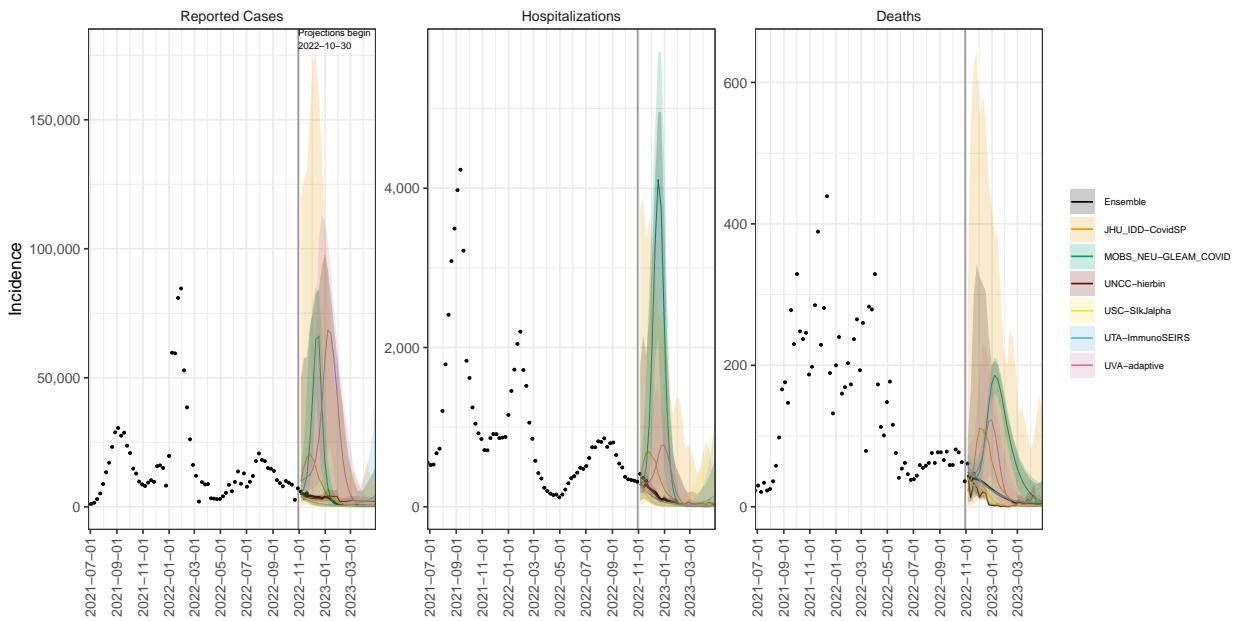
IA model variance & 95% projection intervals – High booster, High immune escape variant



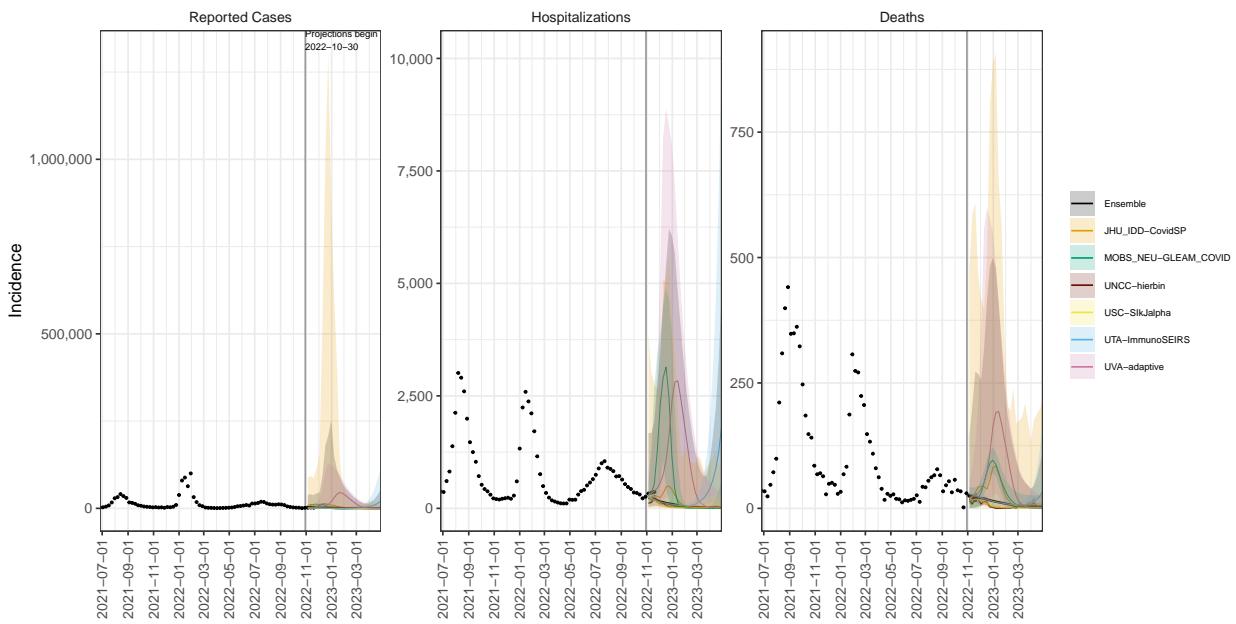
KS model variance & 95% projection intervals – High booster, High immune escape variant



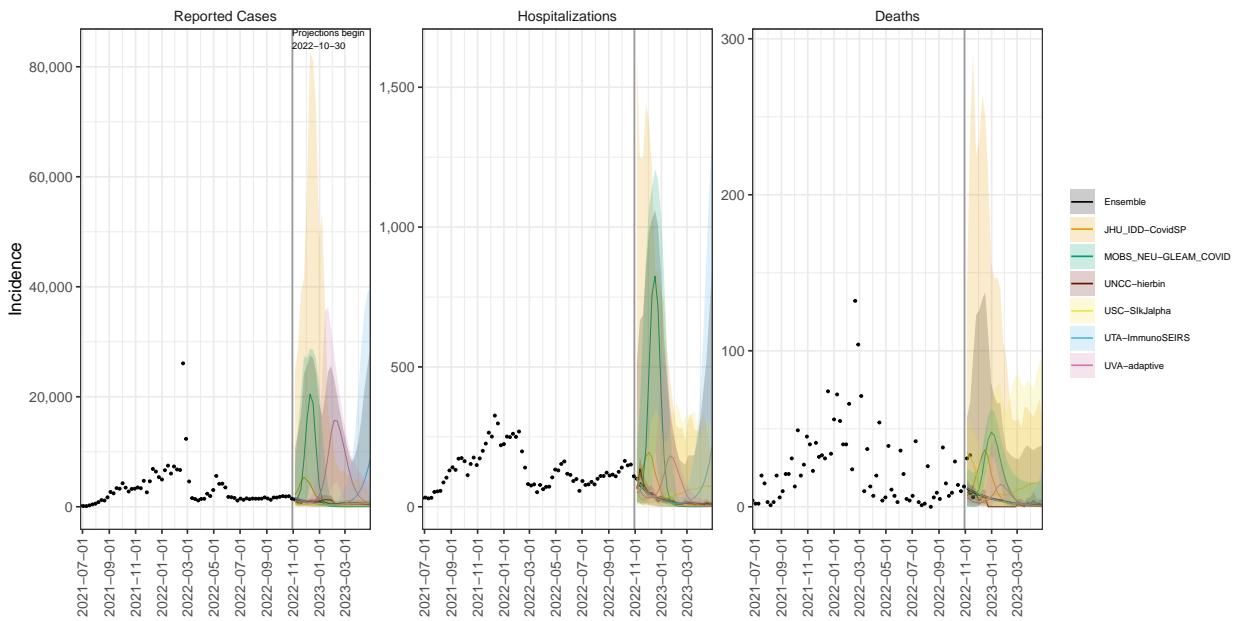
KY model variance & 95% projection intervals – High booster, High immune escape variant



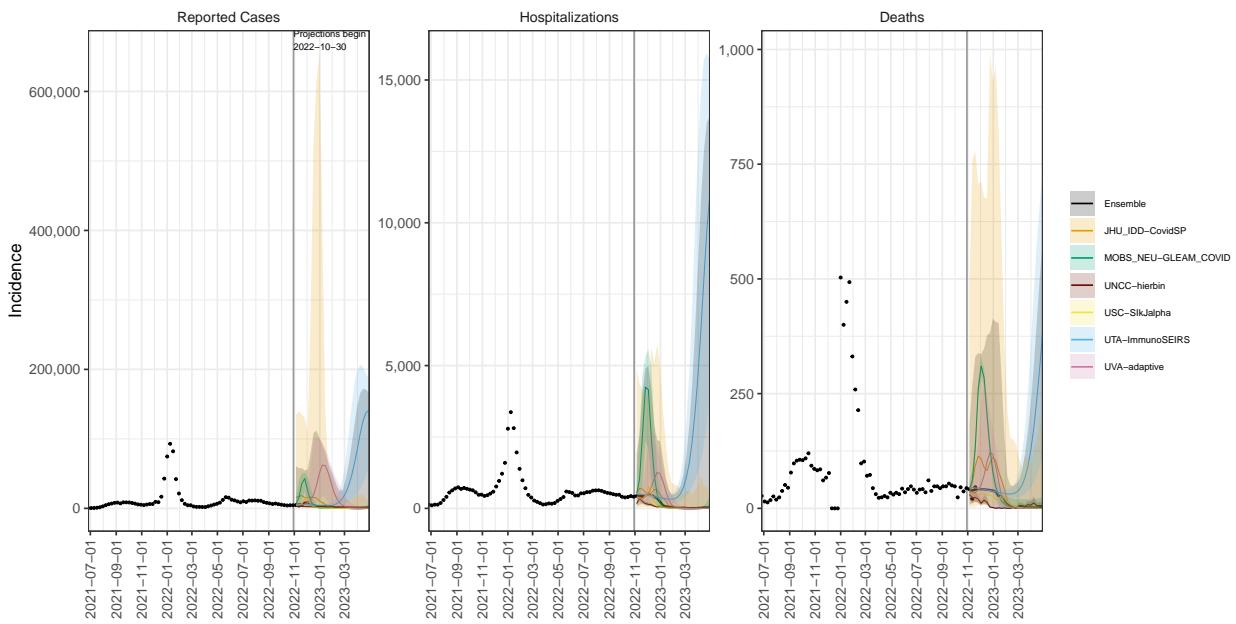
LA model variance & 95% projection intervals – High booster, High immune escape variant



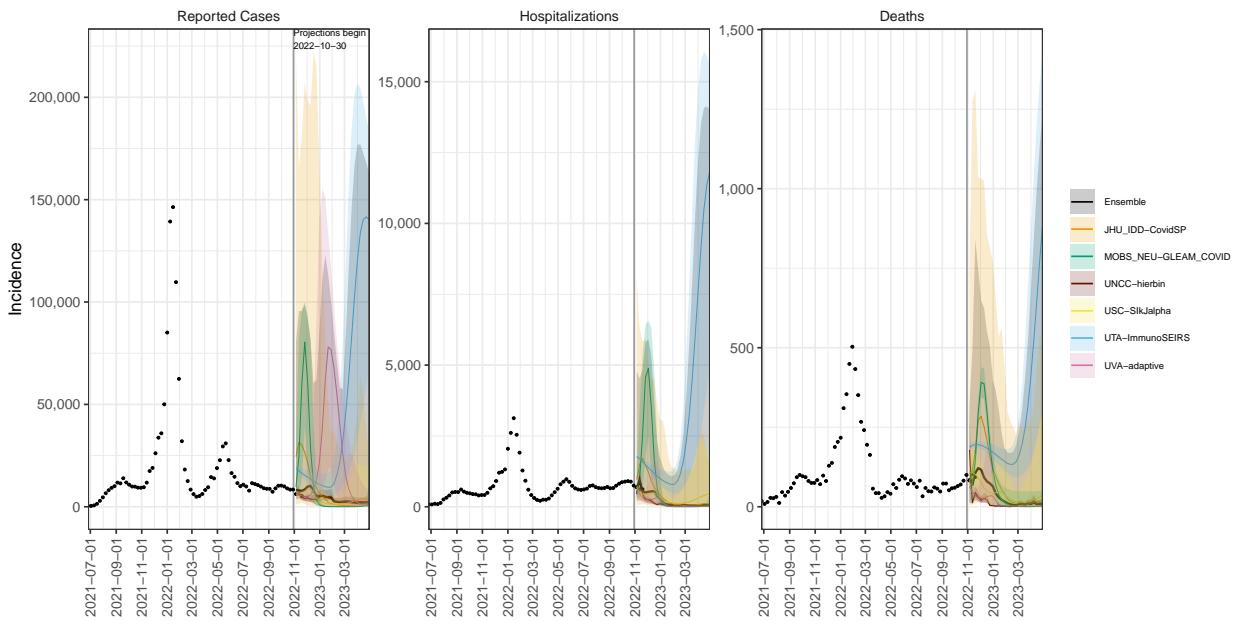
ME model variance & 95% projection intervals – High booster, High immune escape variant



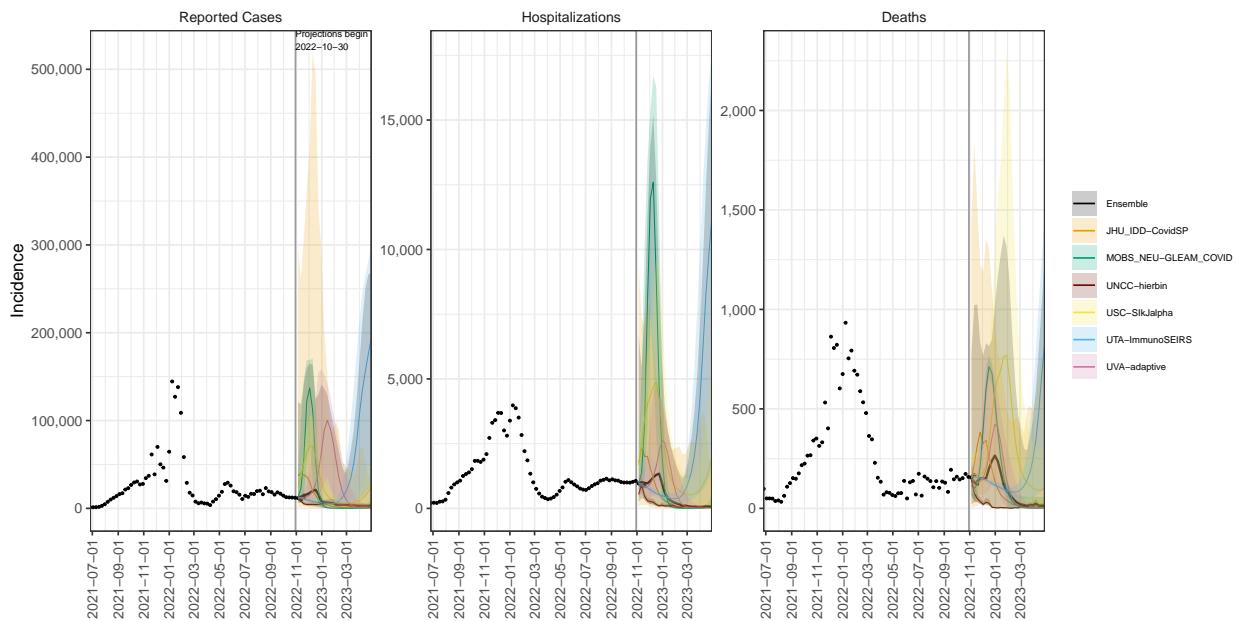
MD model variance & 95% projection intervals – High booster, High immune escape variant



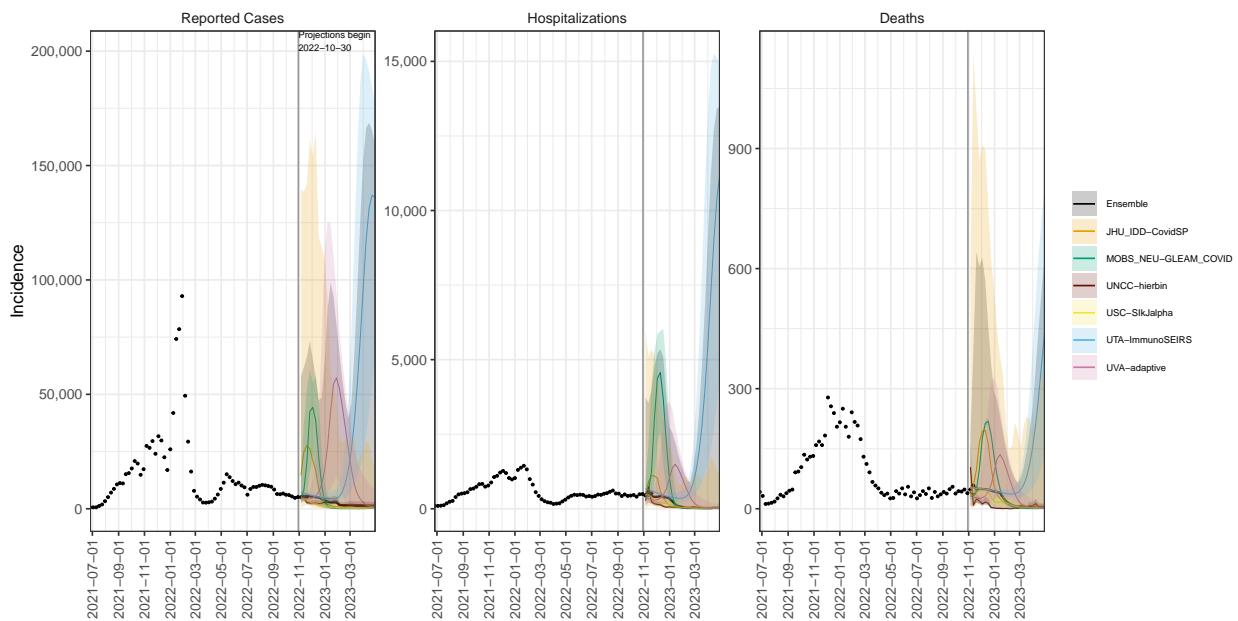
MA model variance & 95% projection intervals – High booster, High immune escape variant



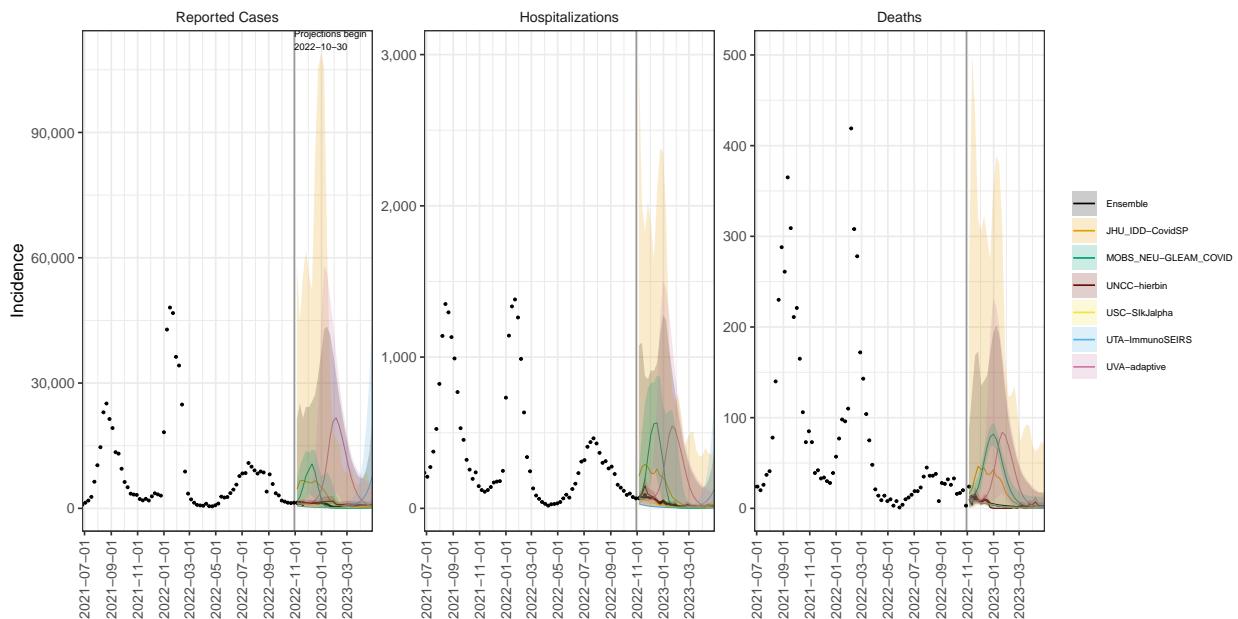
MI model variance & 95% projection intervals – High booster, High immune escape variant



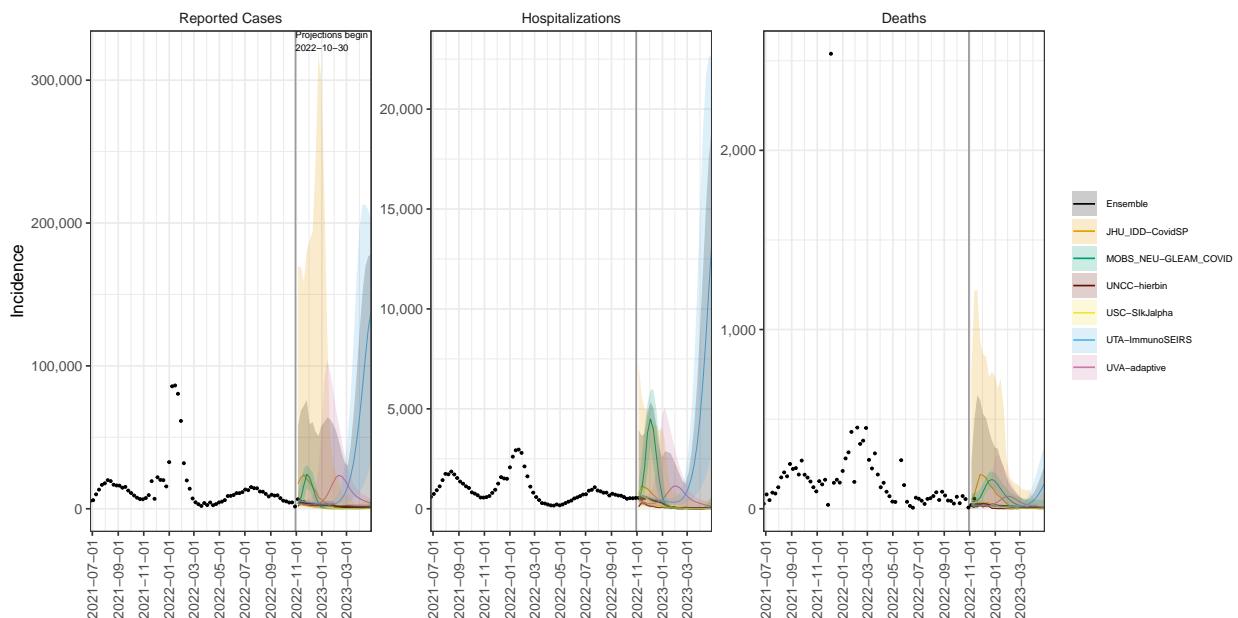
MN model variance & 95% projection intervals – High booster, High immune escape variant



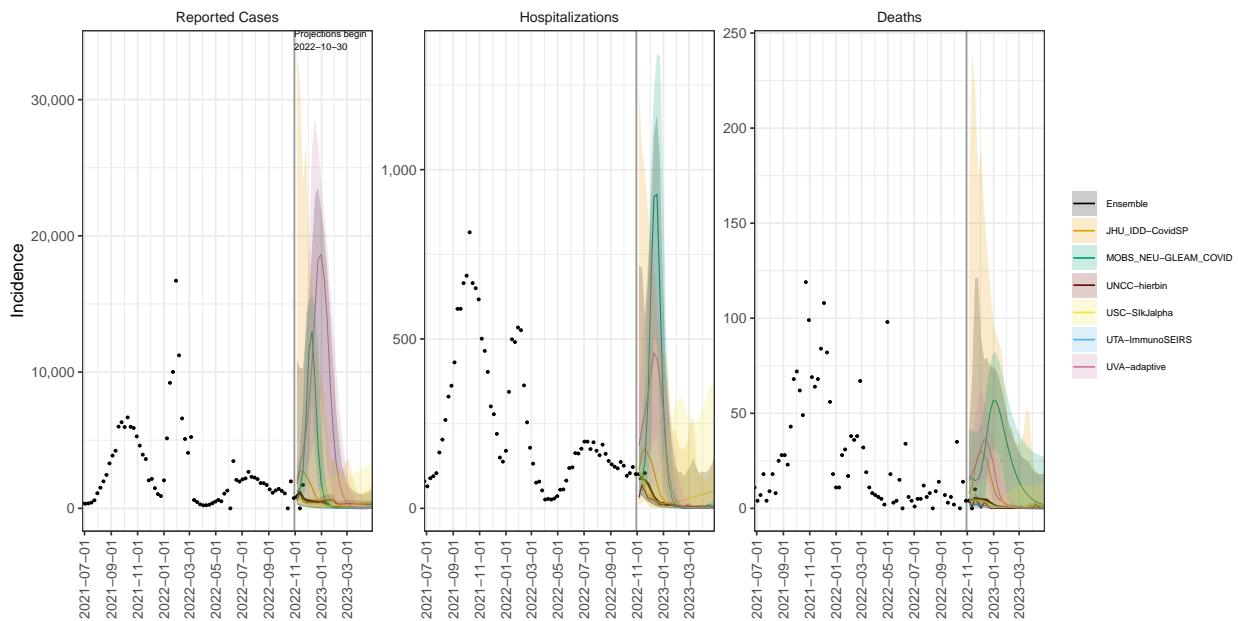
MS model variance & 95% projection intervals – High booster, High immune escape variant



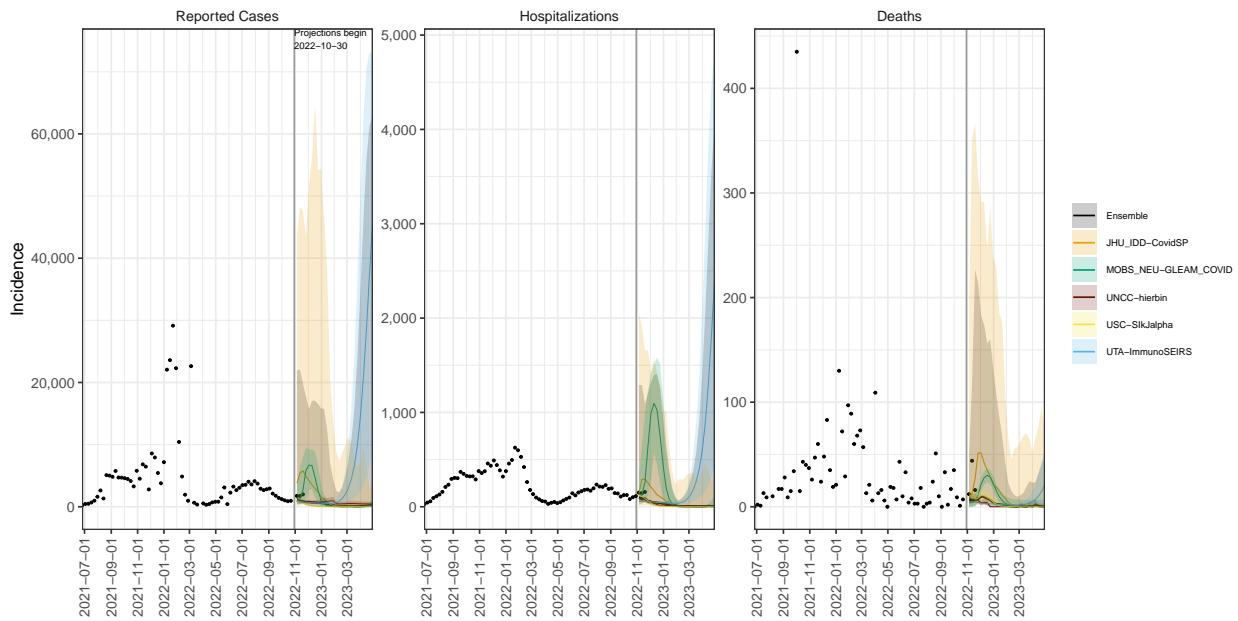
MO model variance & 95% projection intervals – High booster, High immune escape variant



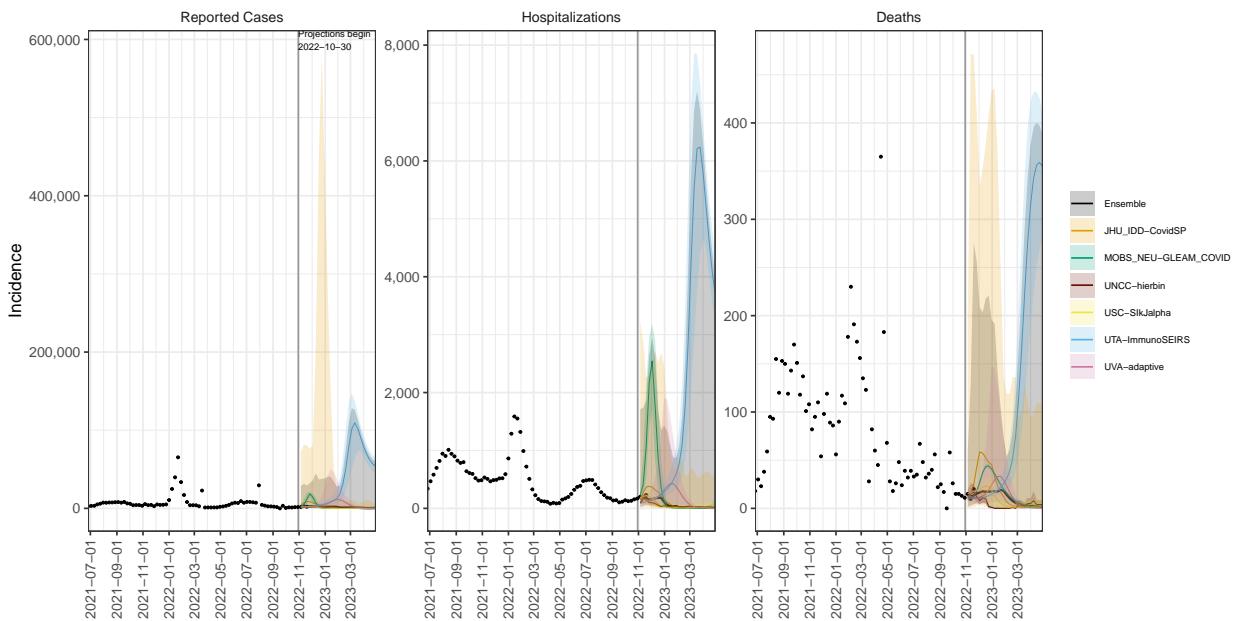
### MT model variance & 95% projection intervals – High booster, High immune escape variant



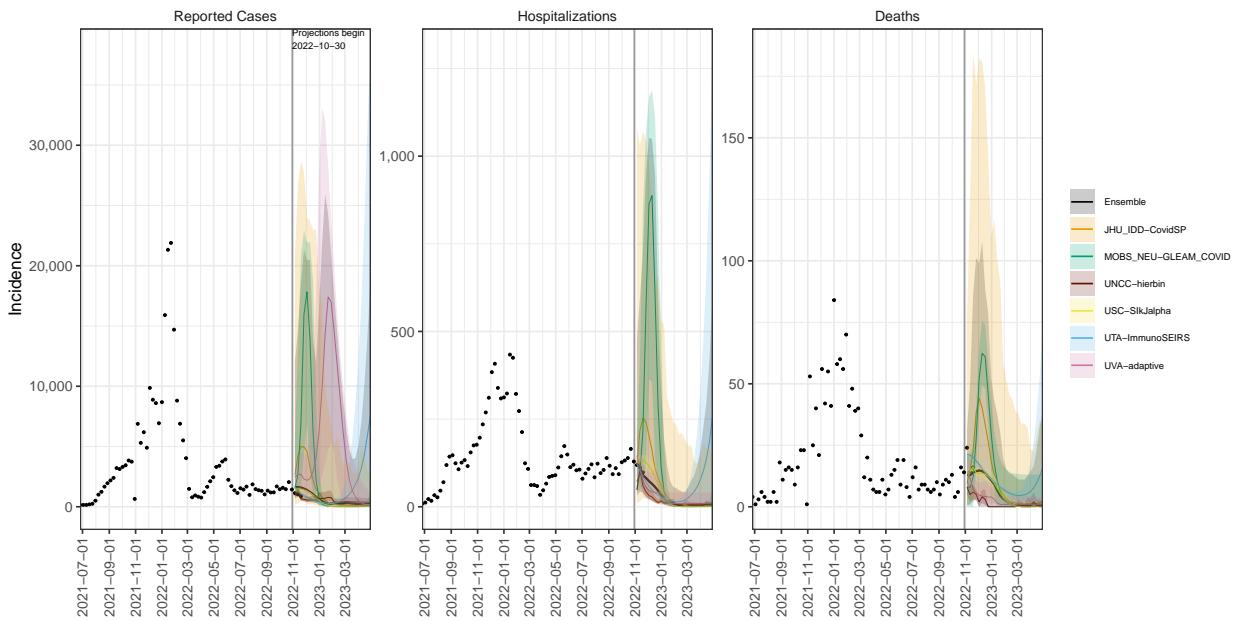
### NE model variance & 95% projection intervals – High booster, High immune escape variant



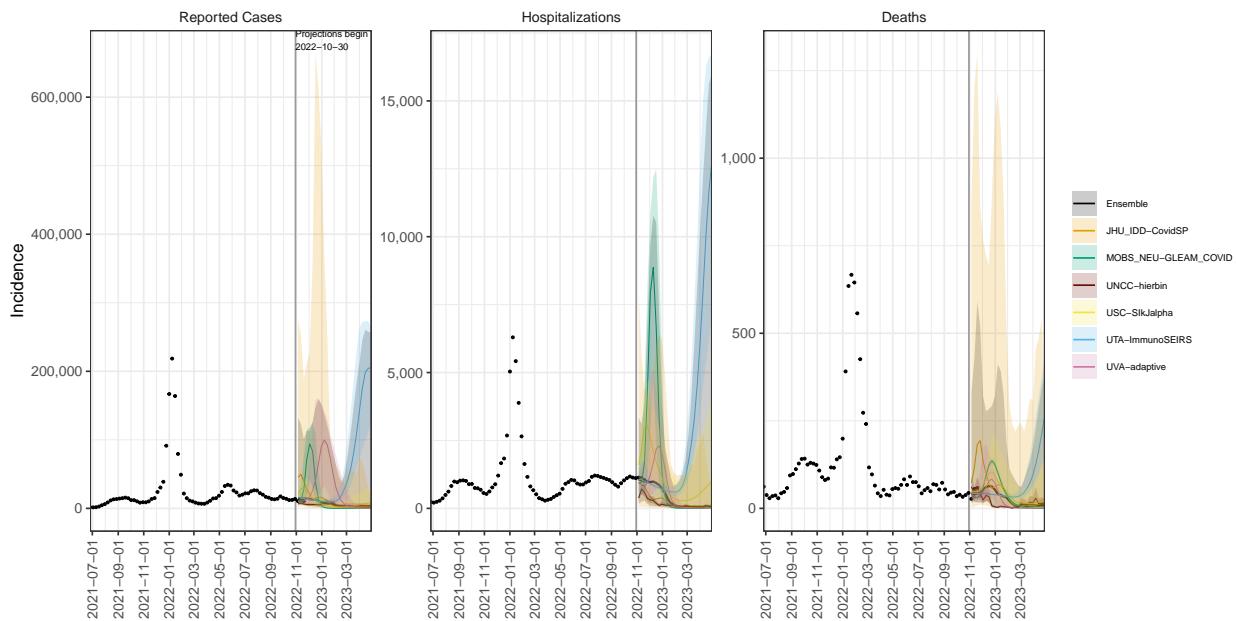
### NV model variance & 95% projection intervals – High booster, High immune escape variant



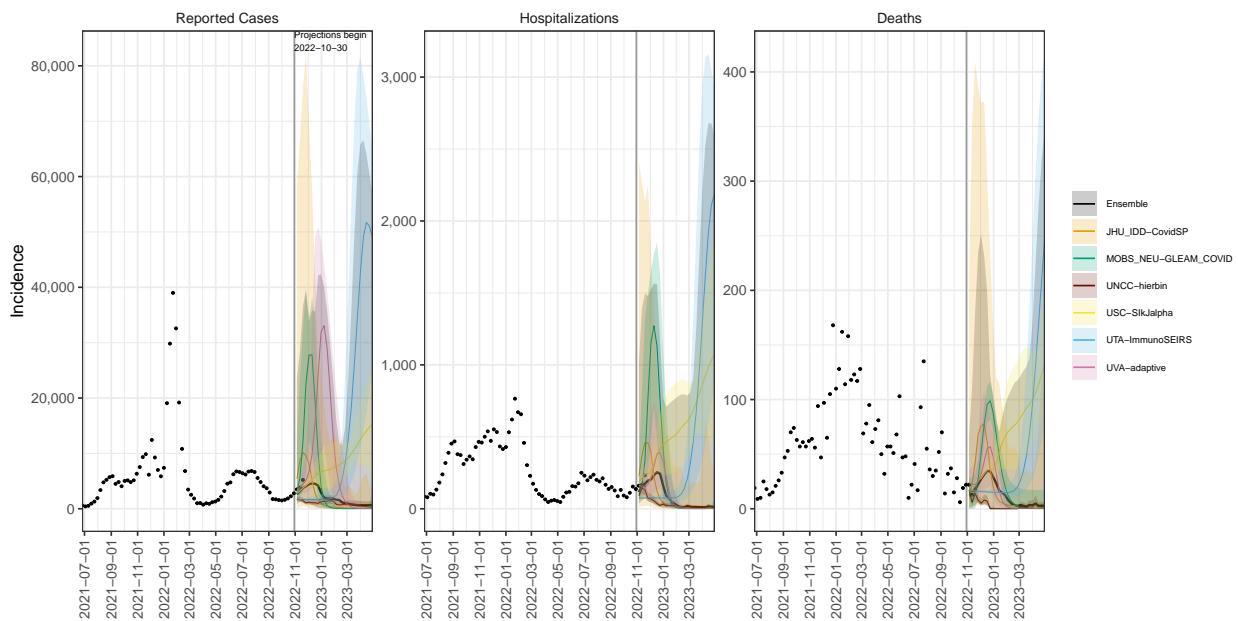
### NH model variance & 95% projection intervals – High booster, High immune escape variant



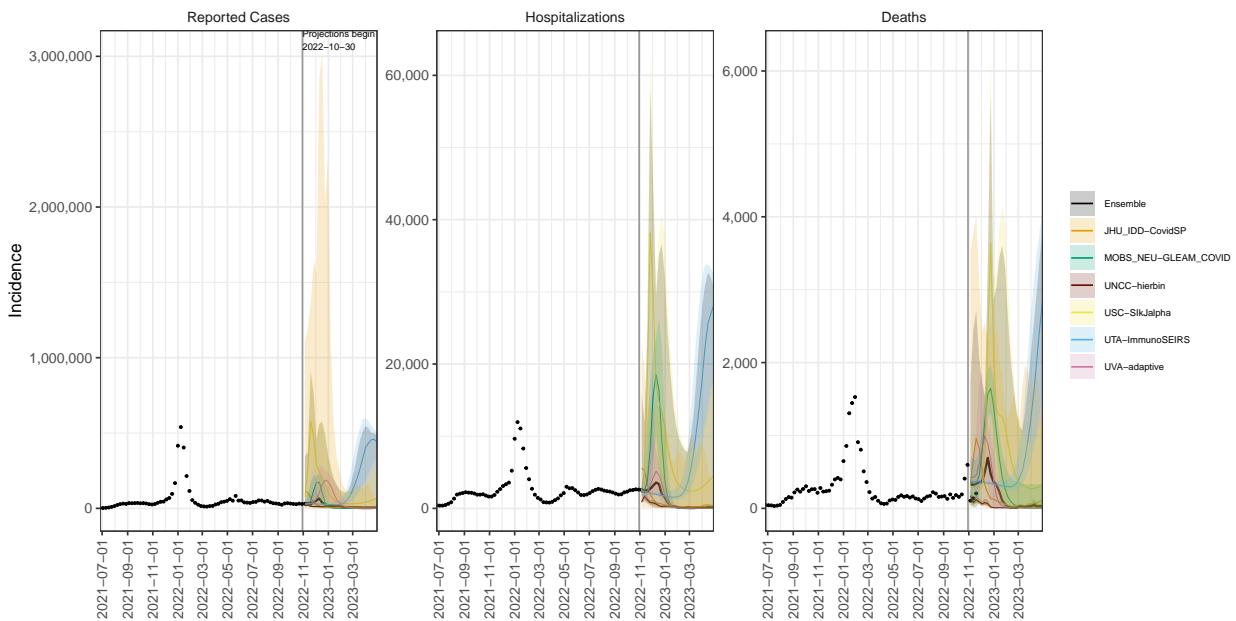
### NJ model variance & 95% projection intervals – High booster, High immune escape variant



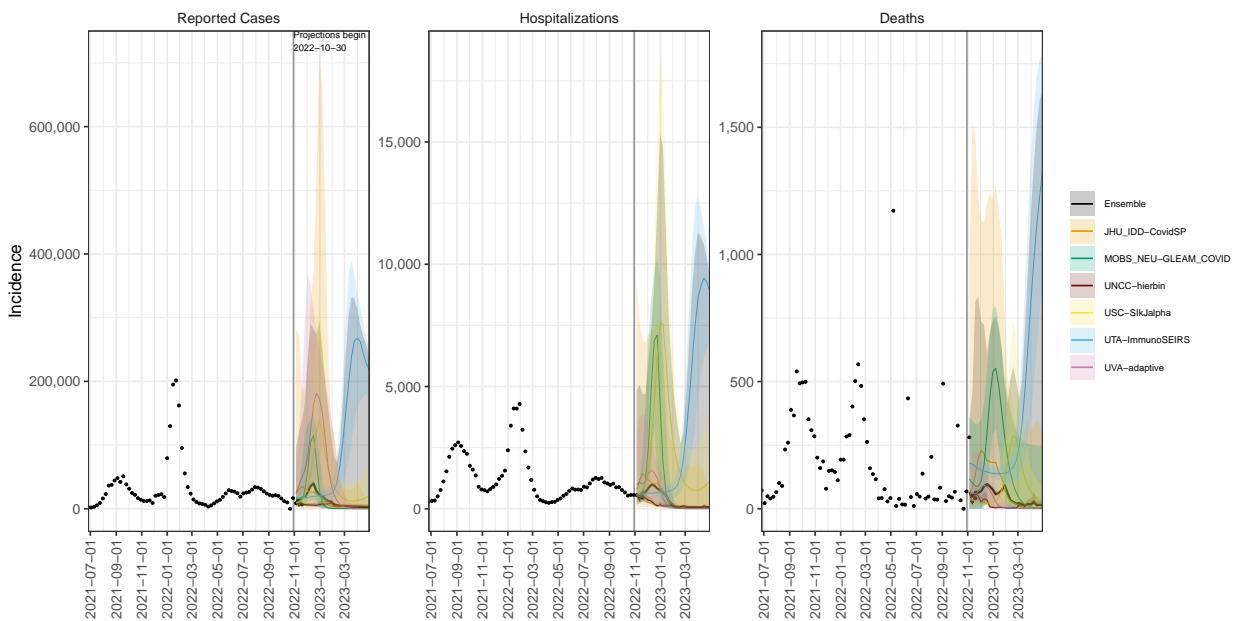
### NM model variance & 95% projection intervals – High booster, High immune escape variant



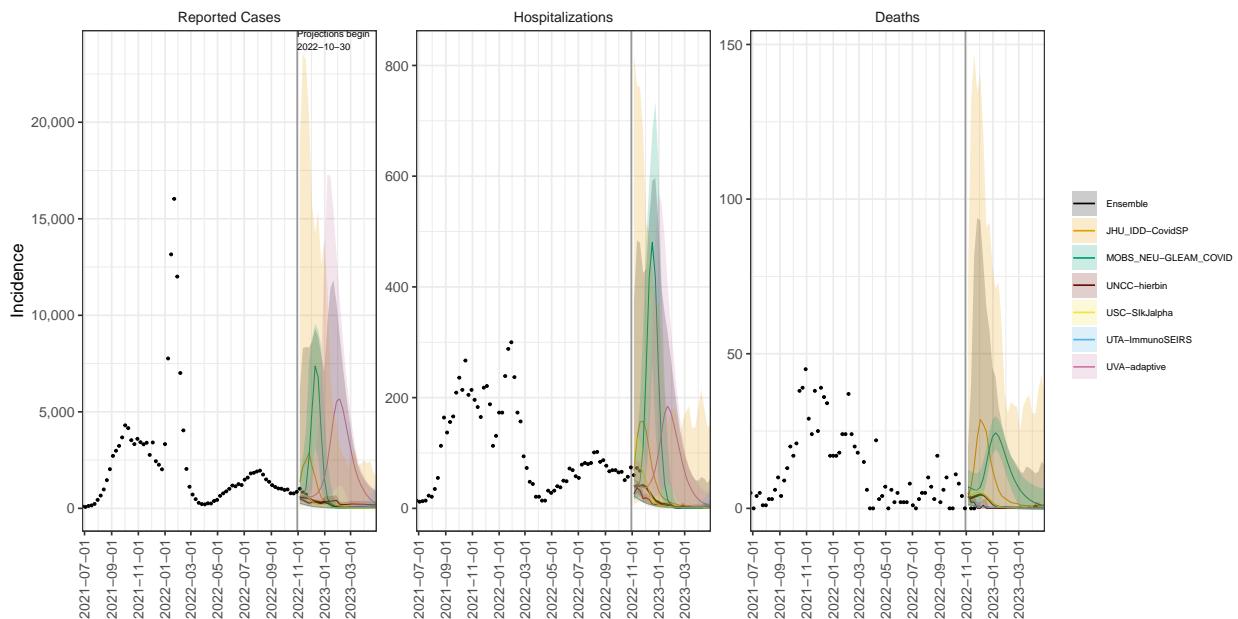
NY model variance & 95% projection intervals – High booster, High immune escape variant



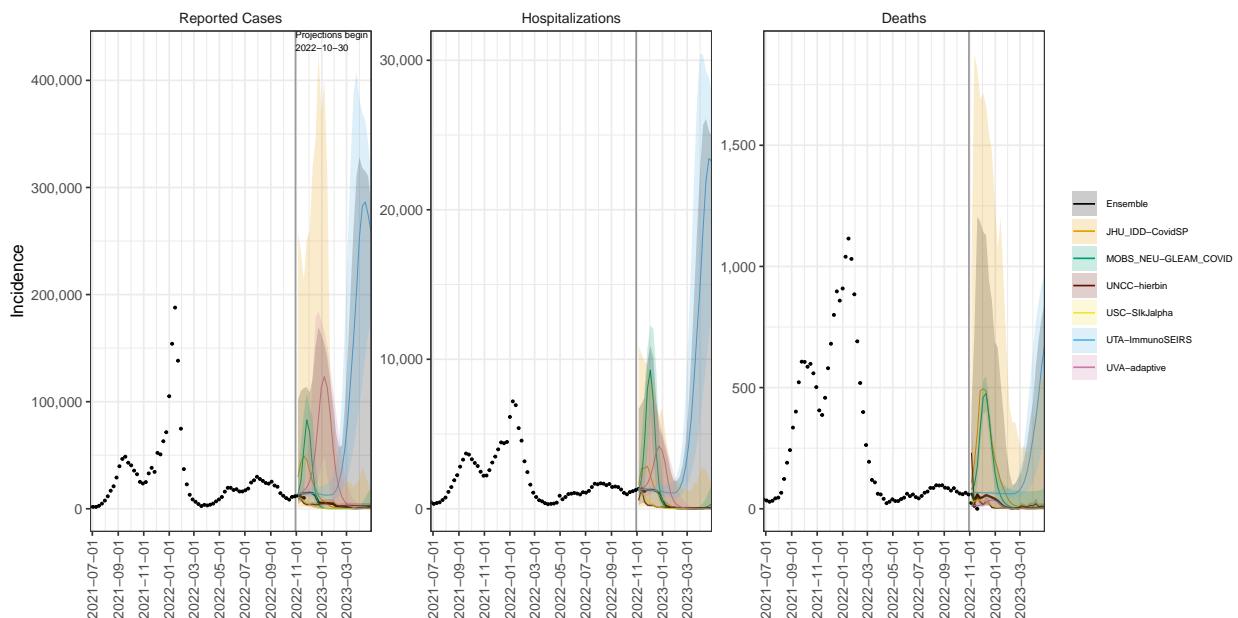
NC model variance & 95% projection intervals – High booster, High immune escape variant



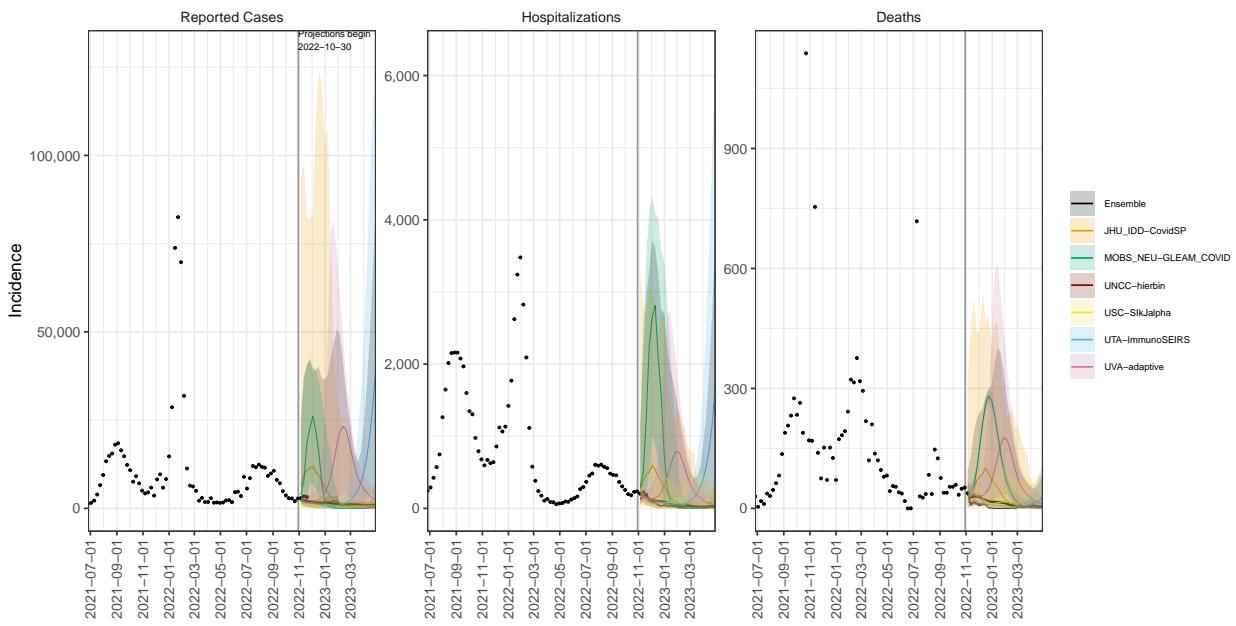
ND model variance & 95% projection intervals – High booster, High immune escape variant



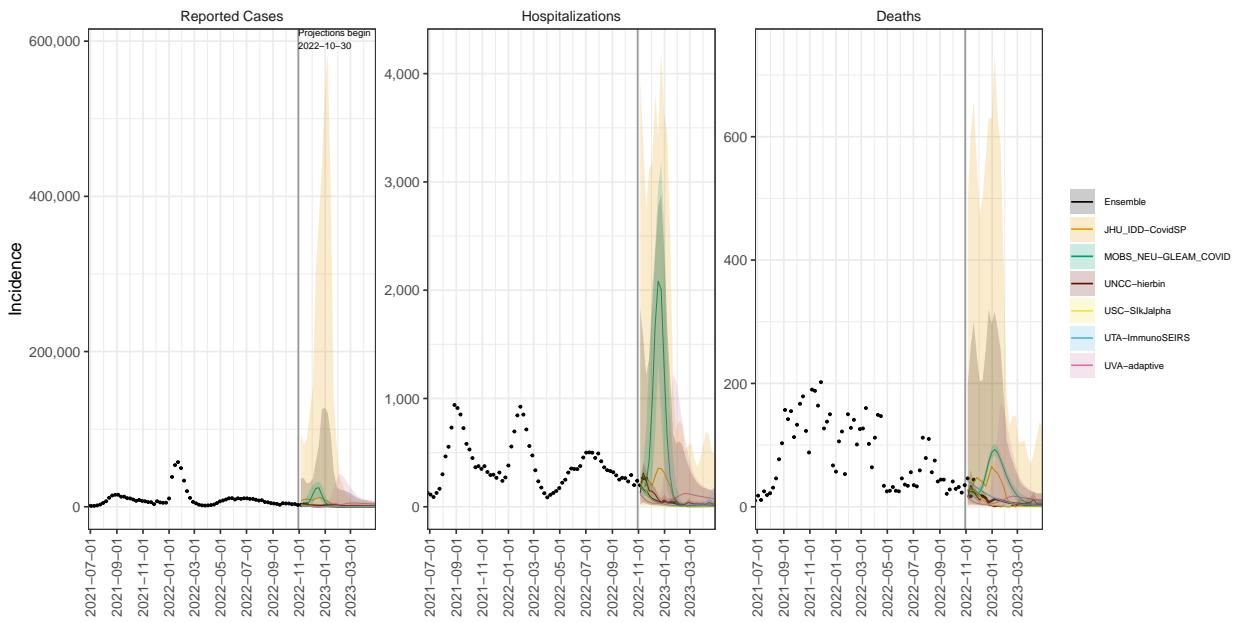
OH model variance & 95% projection intervals – High booster, High immune escape variant



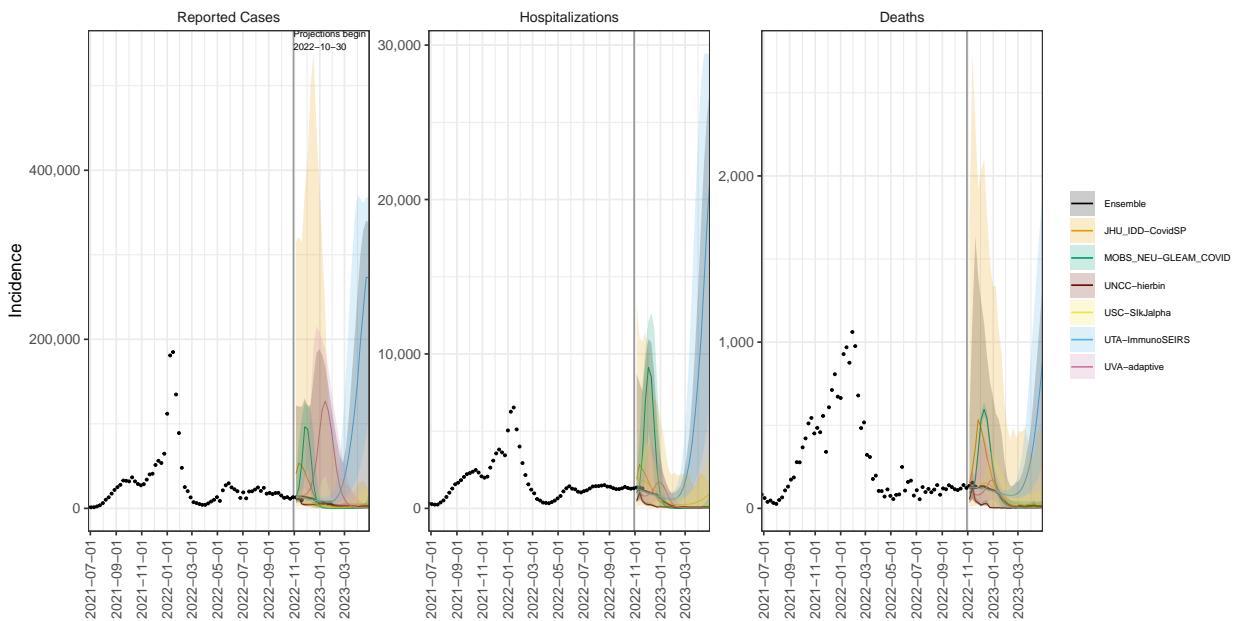
OK model variance & 95% projection intervals – High booster, High immune escape variant



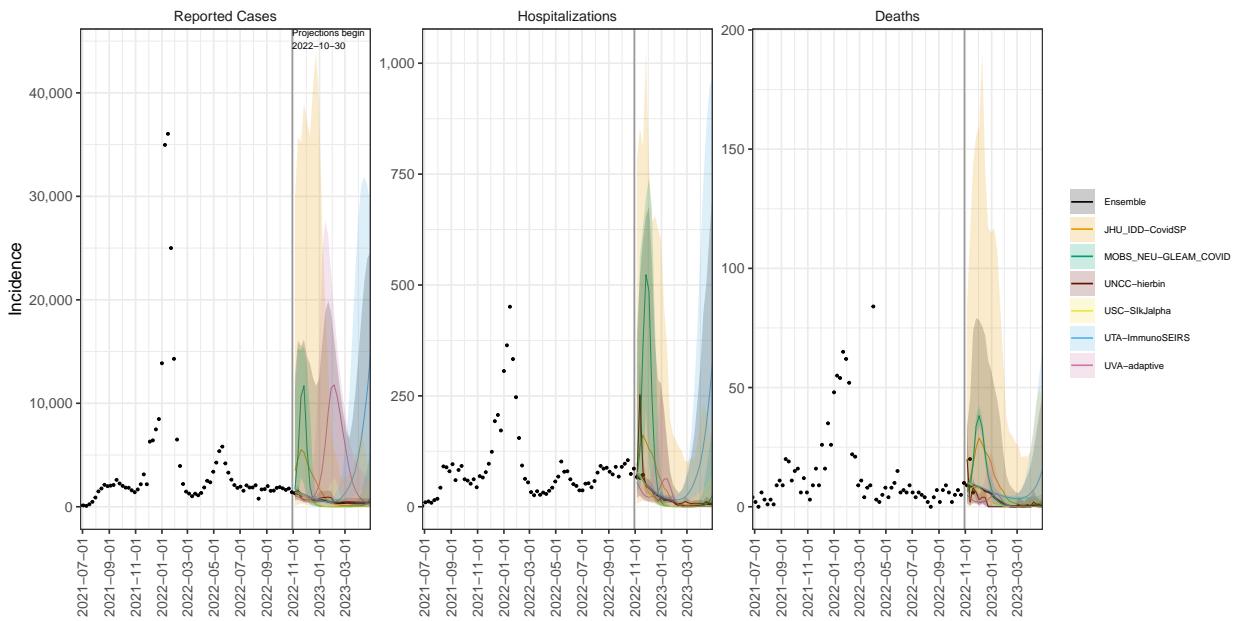
OR model variance & 95% projection intervals – High booster, High immune escape variant



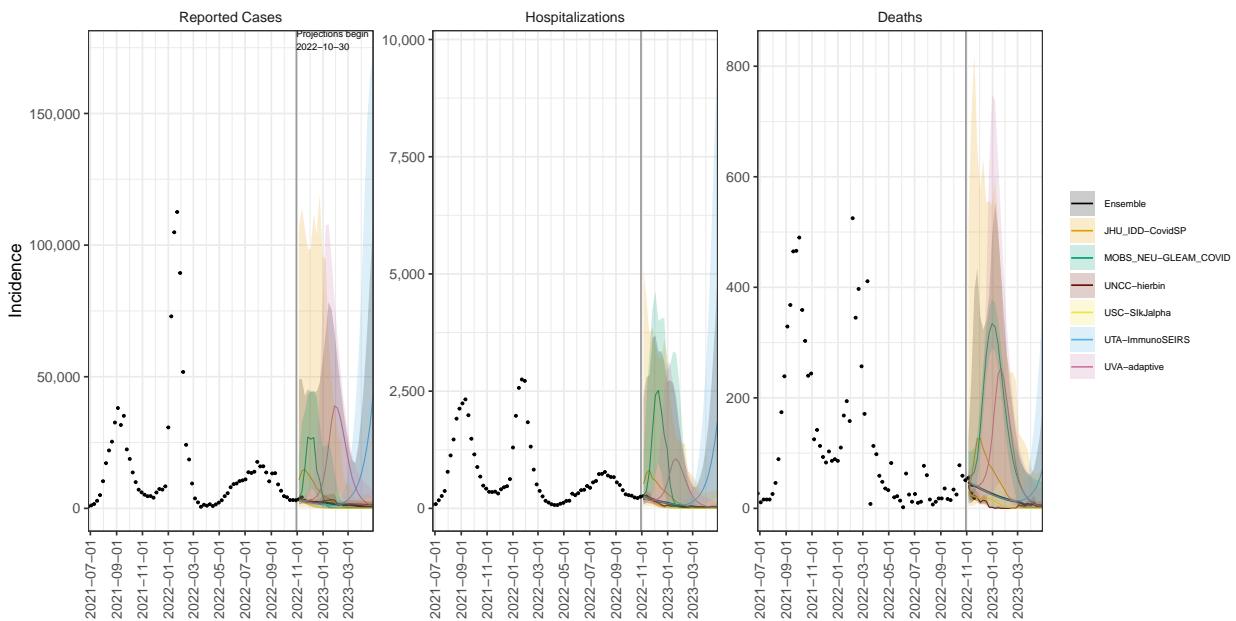
PA model variance & 95% projection intervals – High booster, High immune escape variant



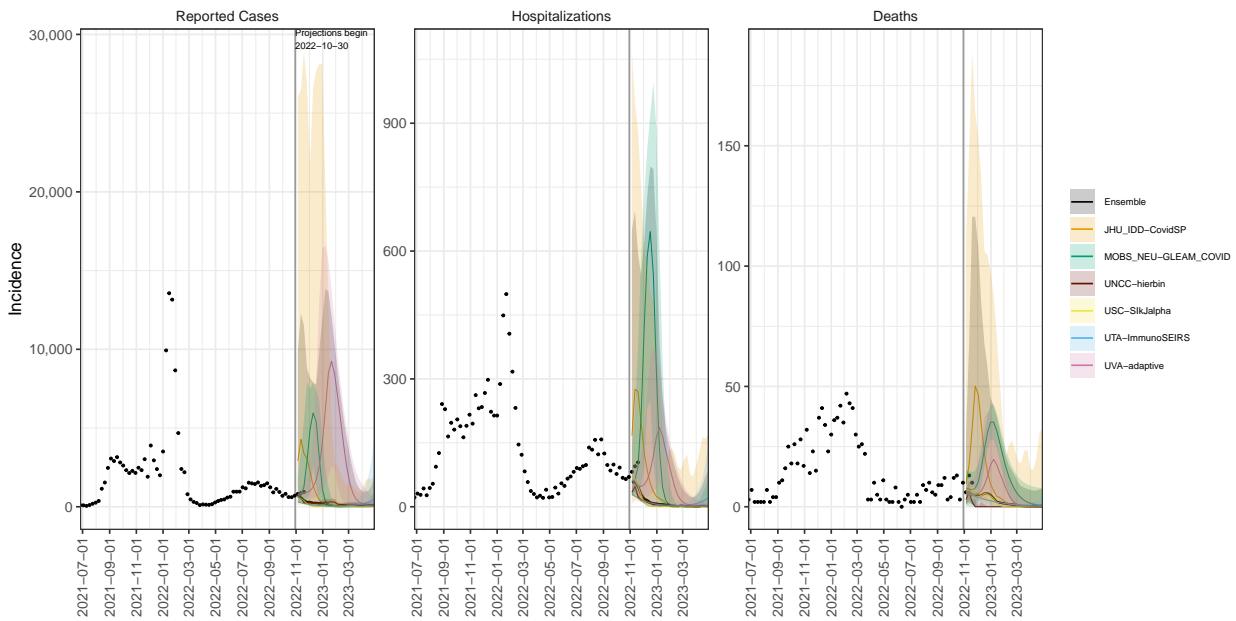
RI model variance & 95% projection intervals – High booster, High immune escape variant



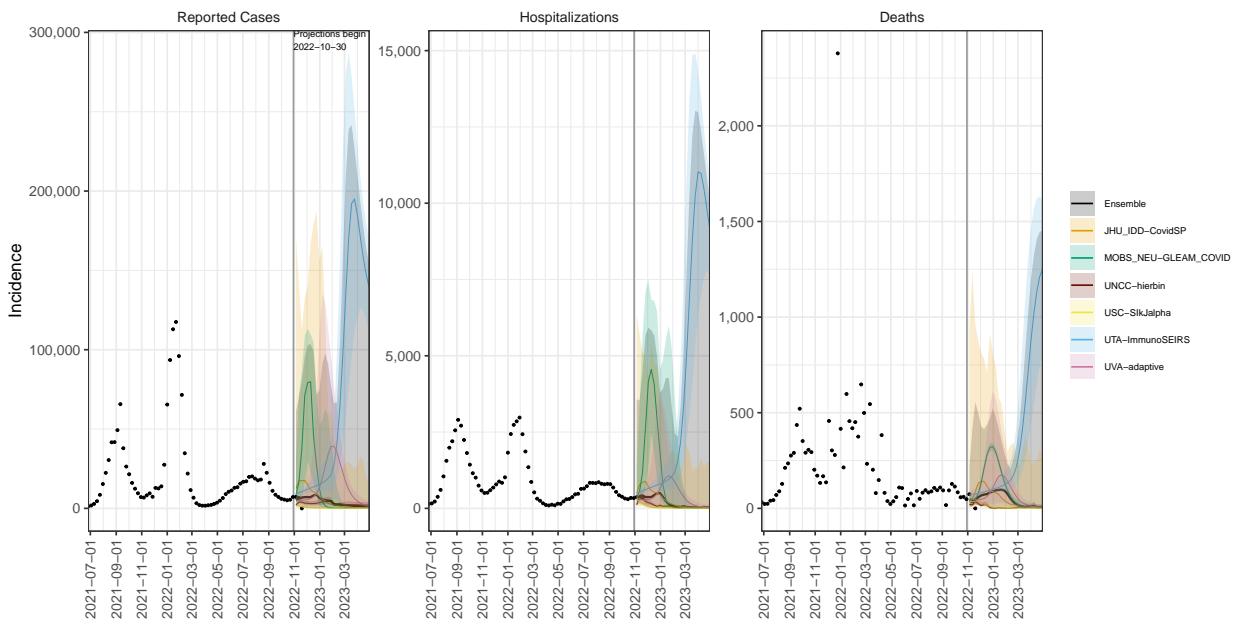
### SC model variance & 95% projection intervals – High booster, High immune escape variant



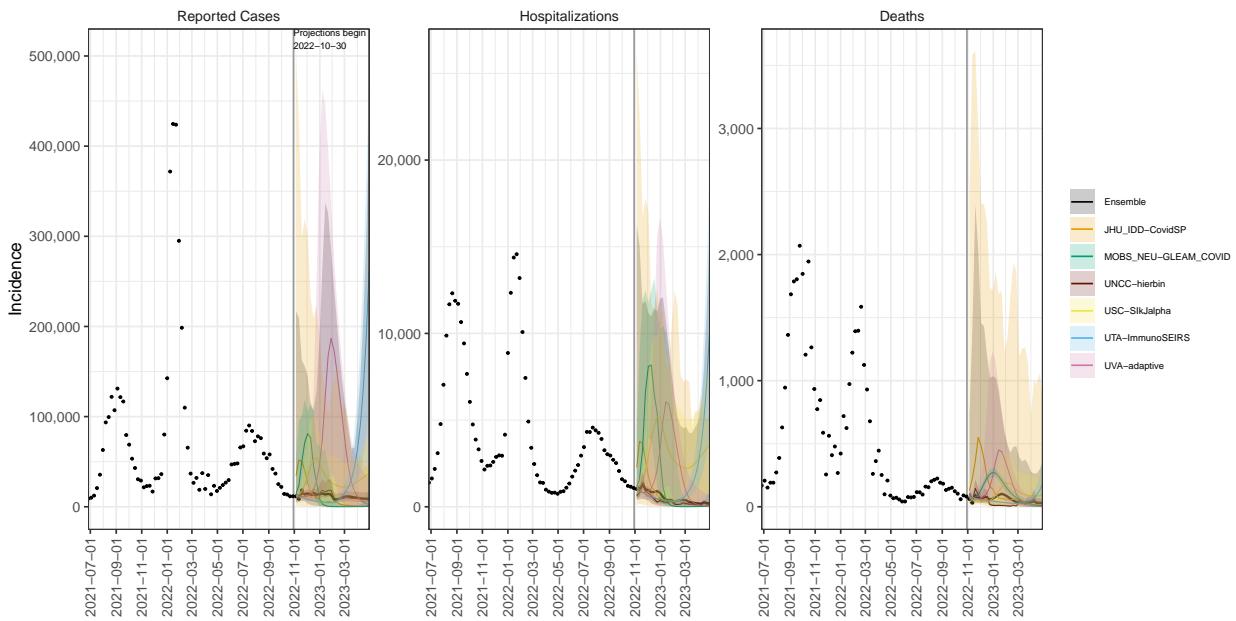
### SD model variance & 95% projection intervals – High booster, High immune escape variant



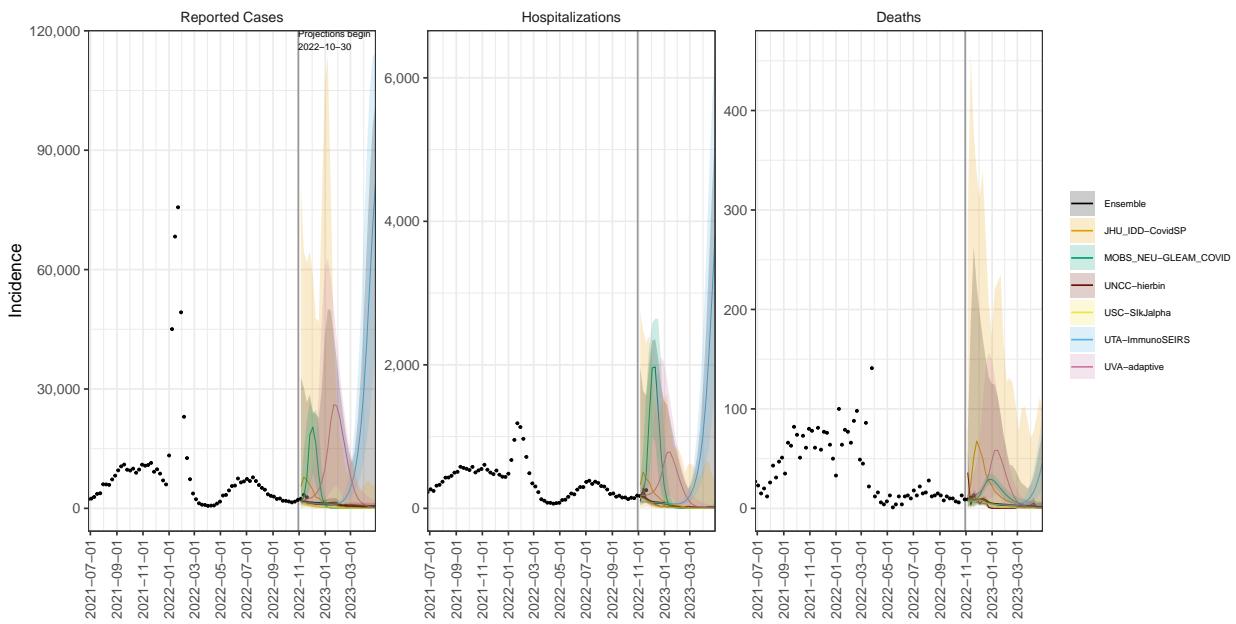
### TN model variance & 95% projection intervals – High booster, High immune escape variant



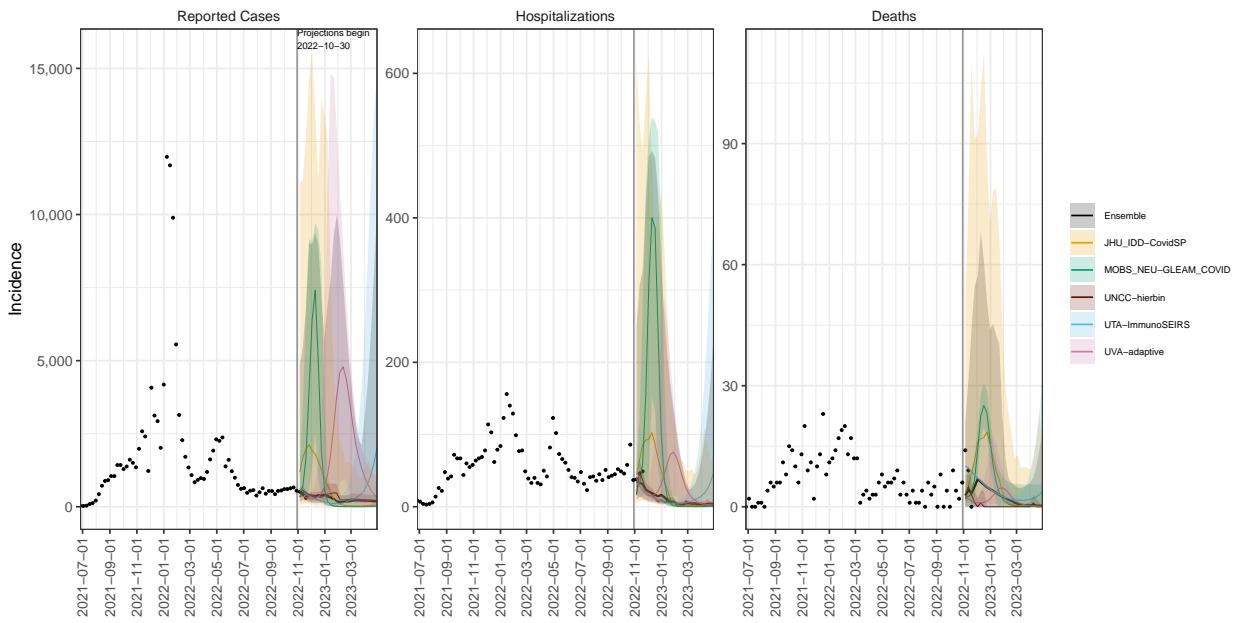
### TX model variance & 95% projection intervals – High booster, High immune escape variant



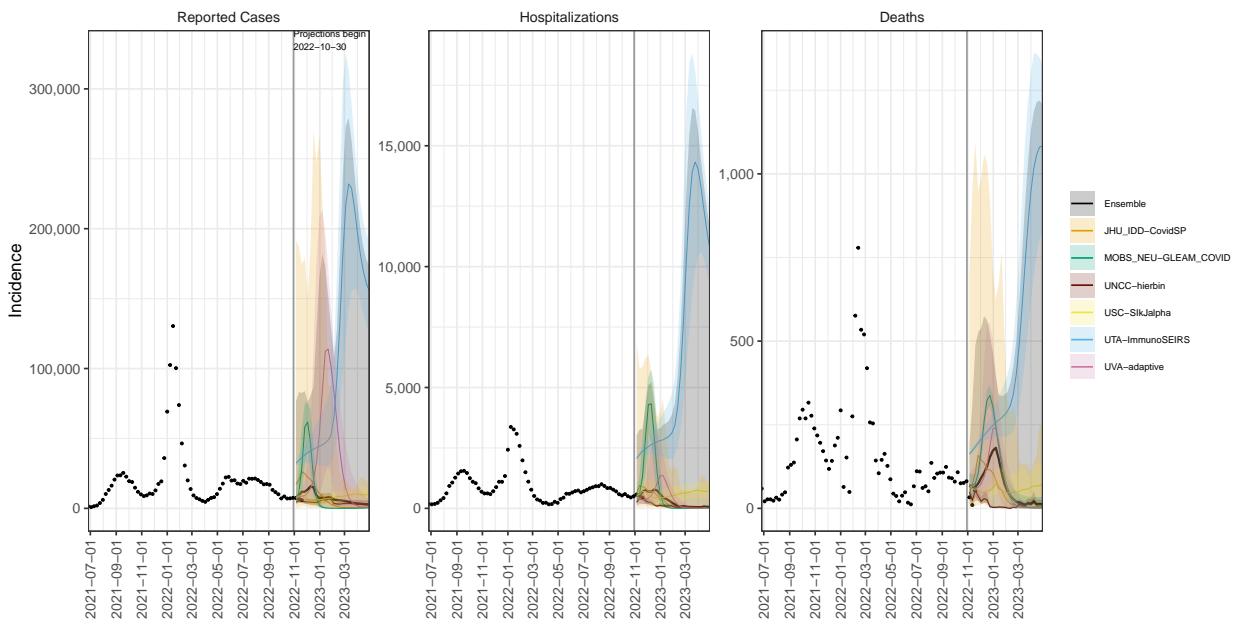
### UT model variance & 95% projection intervals – High booster, High immune escape variant



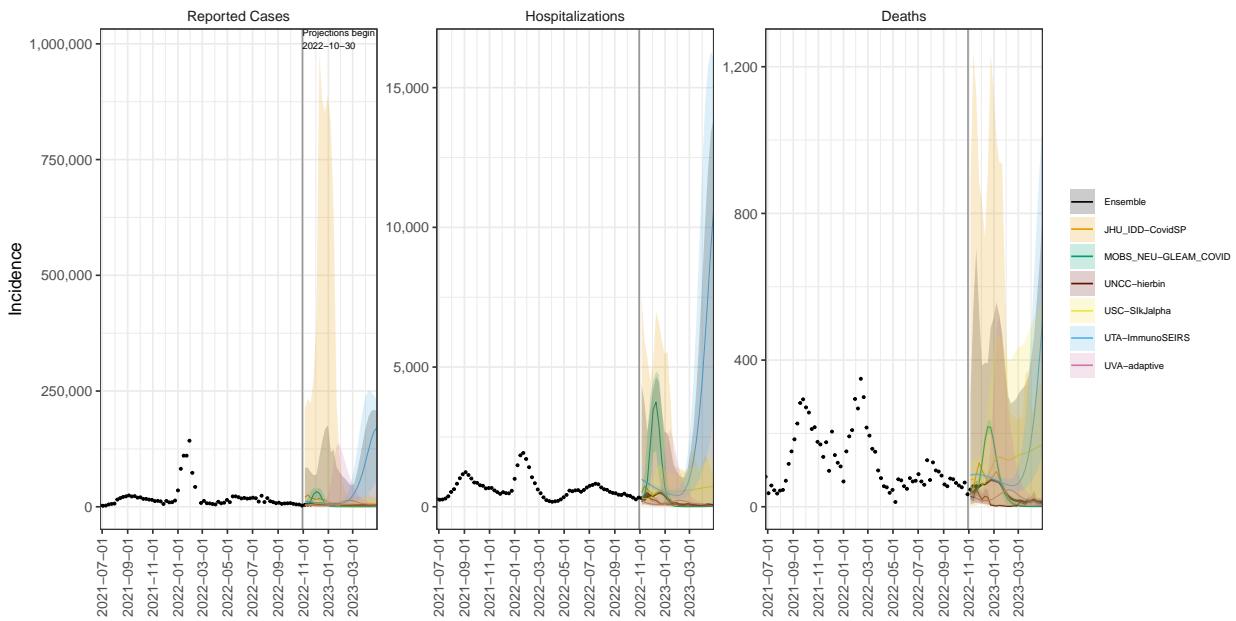
### VT model variance & 95% projection intervals – High booster, High immune escape variant



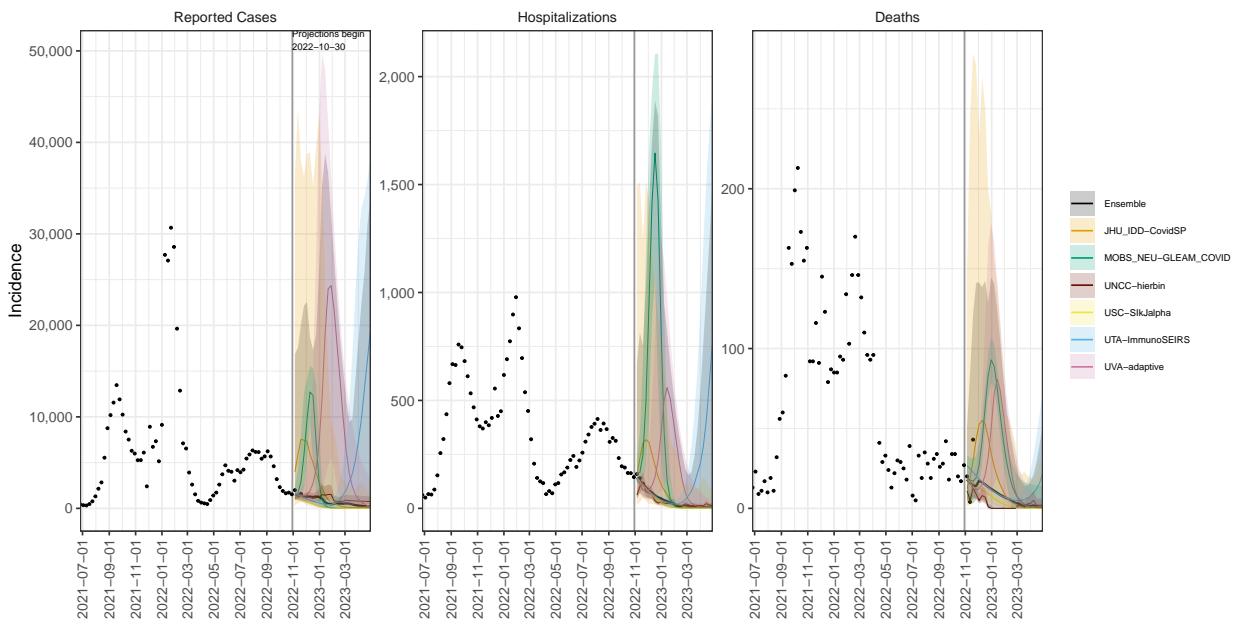
VA model variance & 95% projection intervals – High booster, High immune escape variant



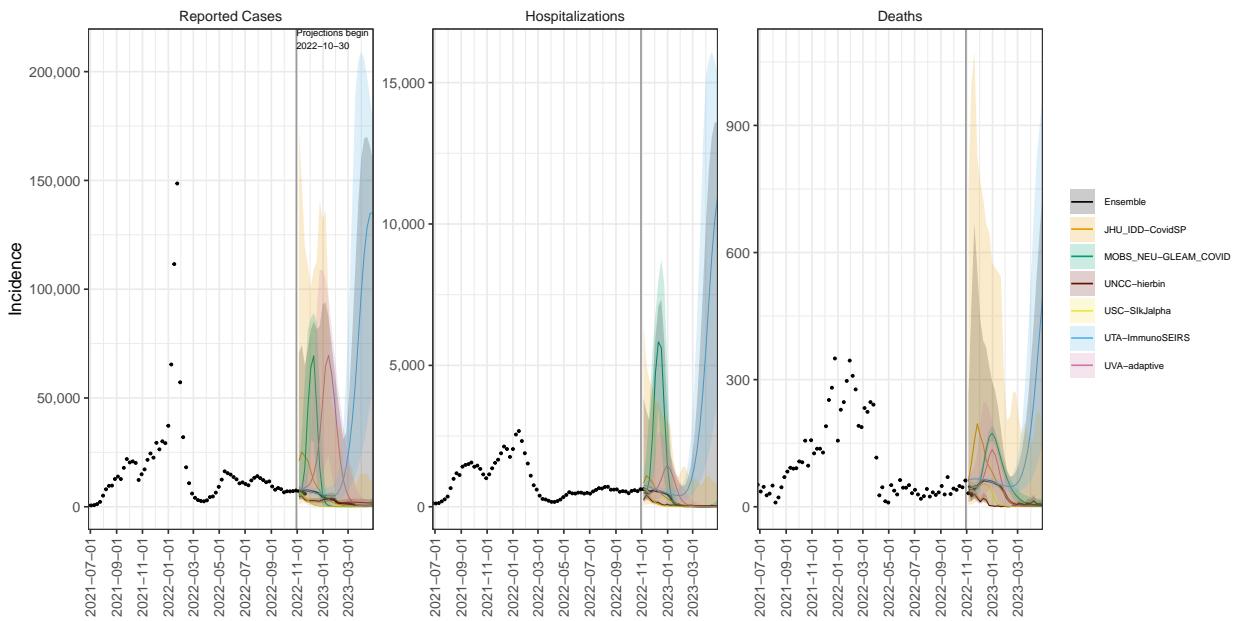
WA model variance & 95% projection intervals – High booster, High immune escape variant



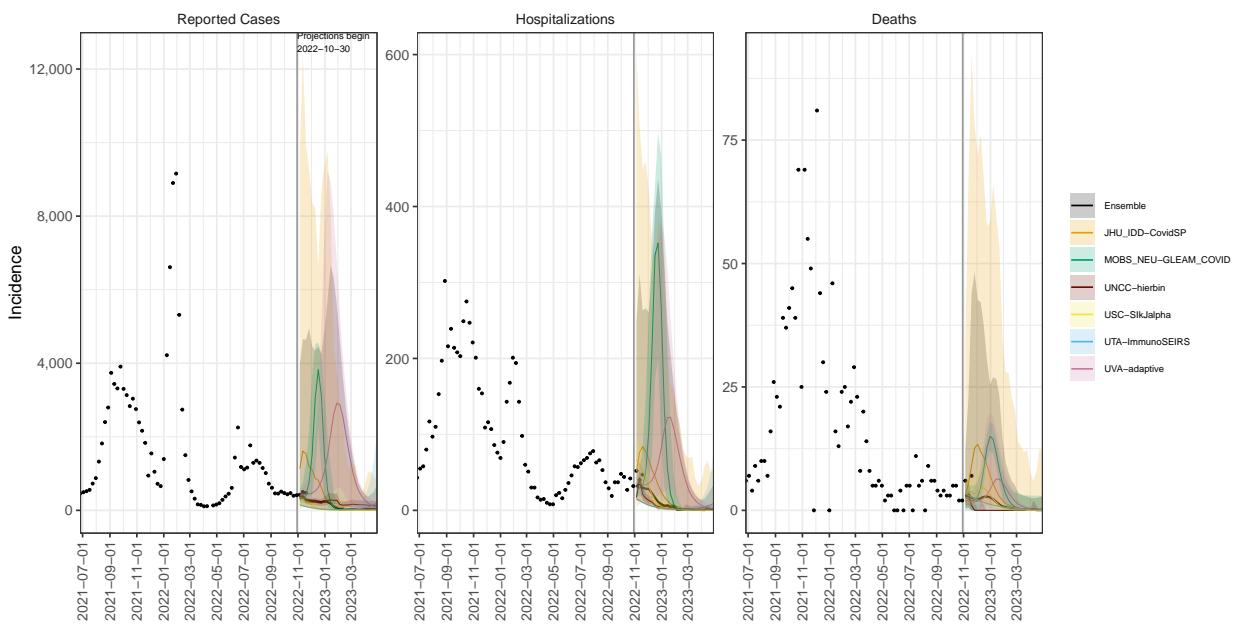
WV model variance & 95% projection intervals – High booster, High immune escape variant



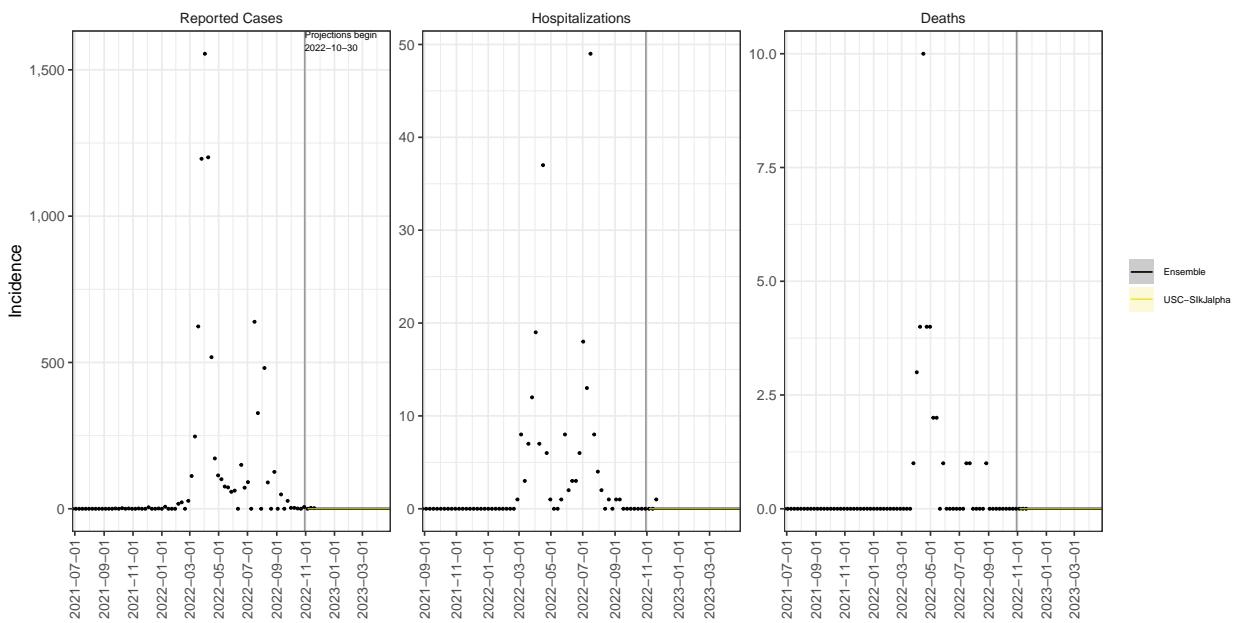
WI model variance & 95% projection intervals – High booster, High immune escape variant



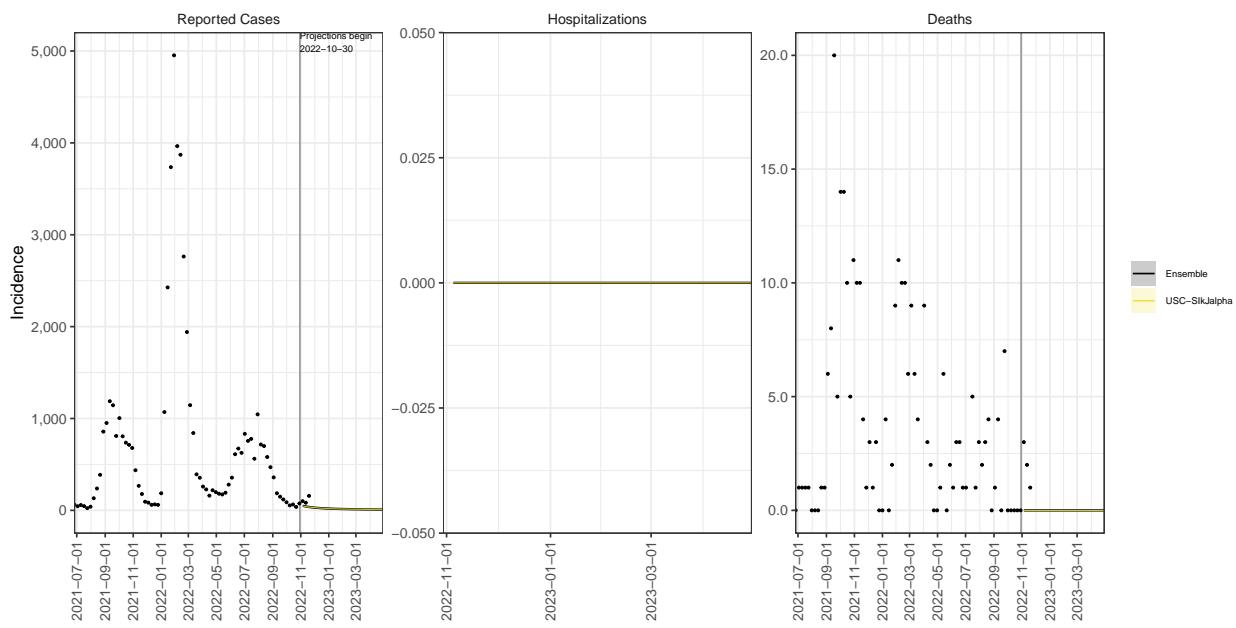
WY model variance & 95% projection intervals – High booster, High immune escape variant



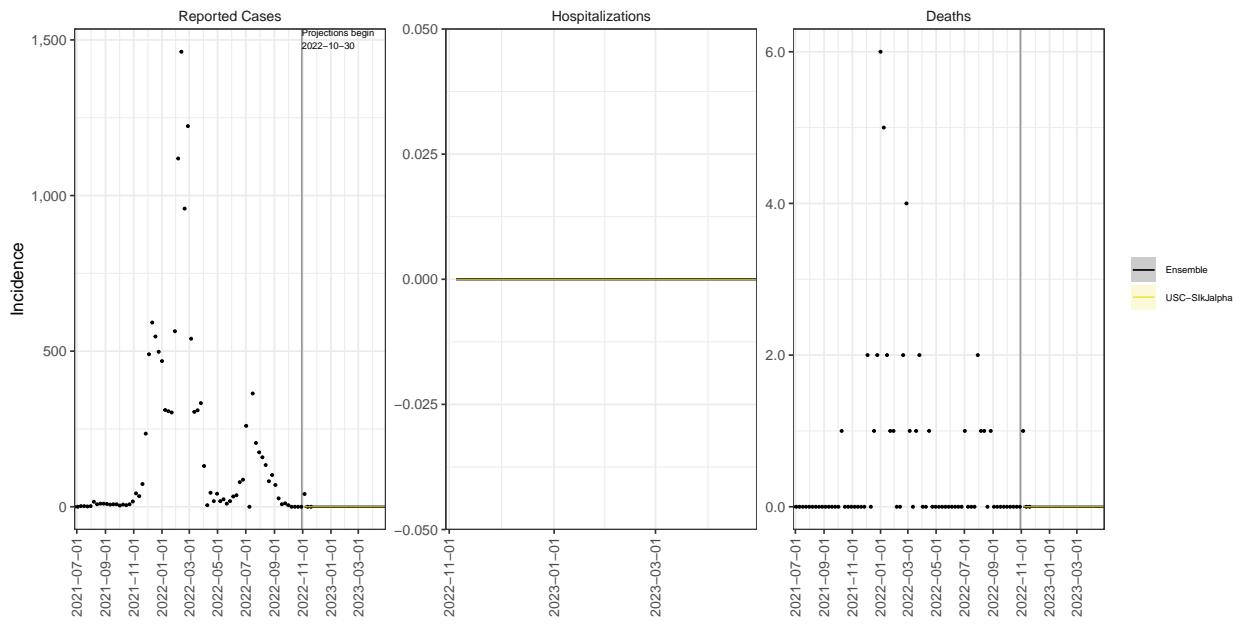
AS model variance & 95% projection intervals – High booster, High immune escape variant



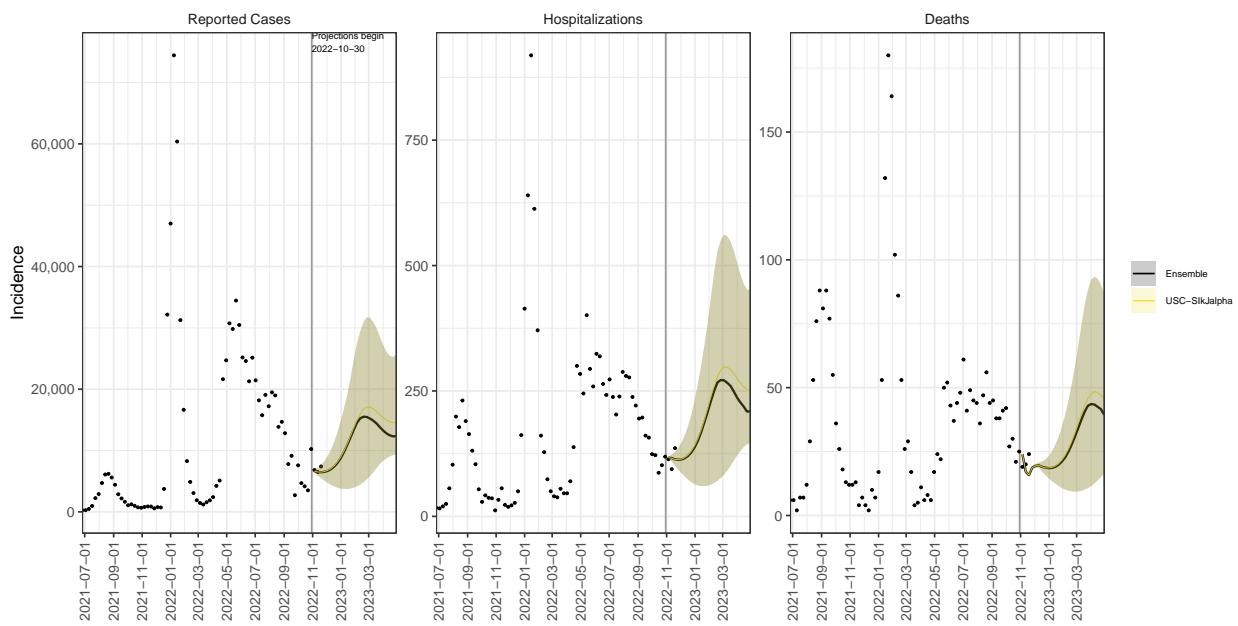
GU model variance & 95% projection intervals – High booster, High immune escape variant



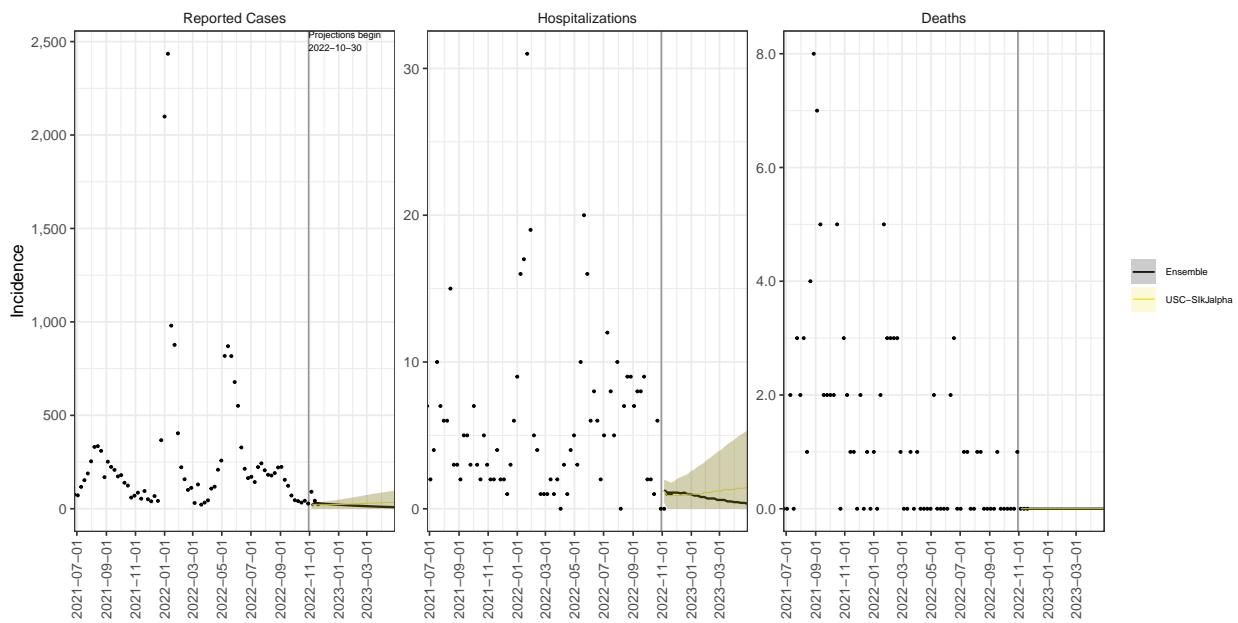
MP model variance & 95% projection intervals – High booster, High immune escape variant



PR model variance & 95% projection intervals – High booster, High immune escape variant

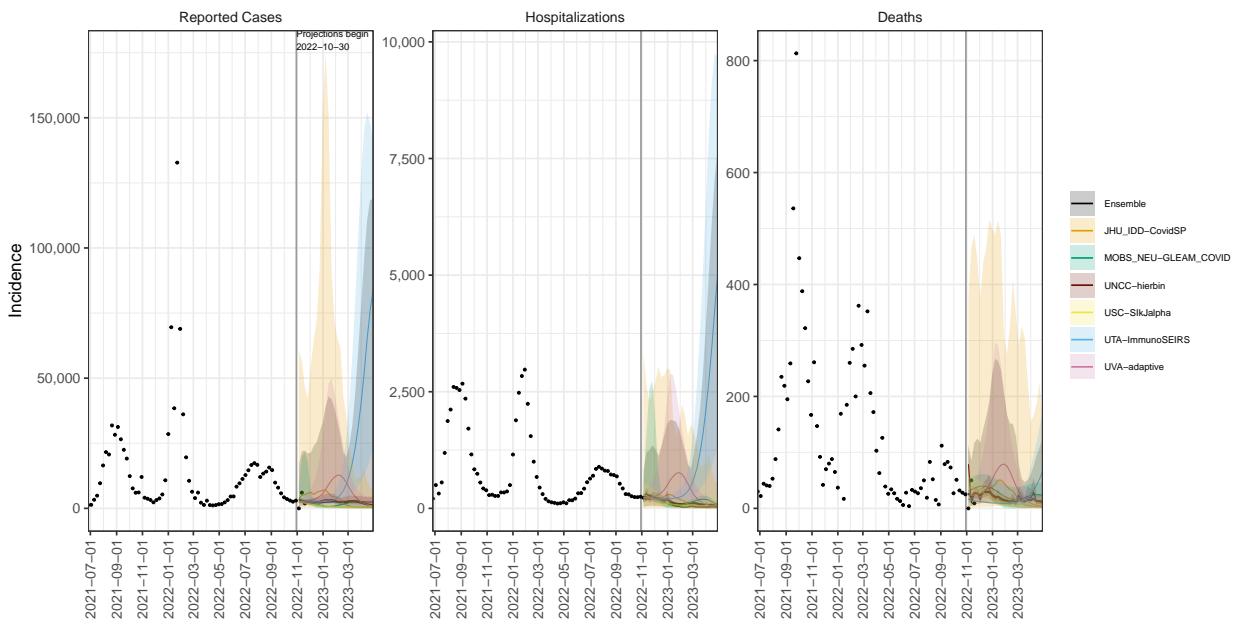


VI model variance & 95% projection intervals – High booster, High immune escape variant

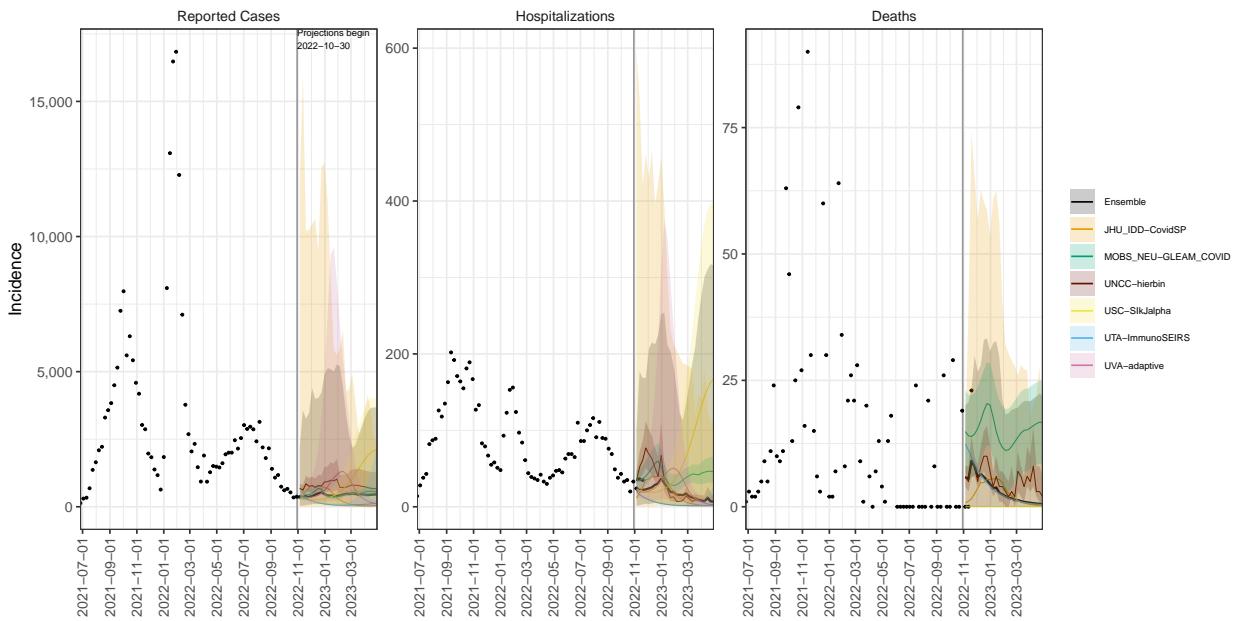


National model variation for the Low booster, Moderate immune escape variant scenario

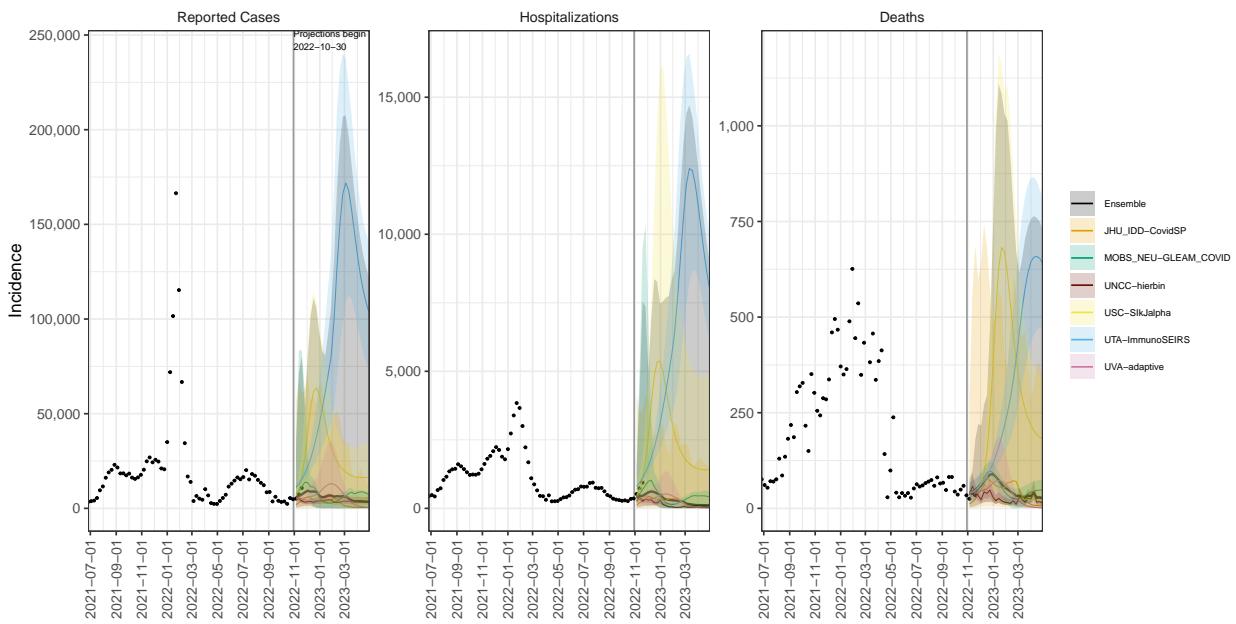
AL model variance & 95% projection intervals – Low booster, Moderate immune escape variant



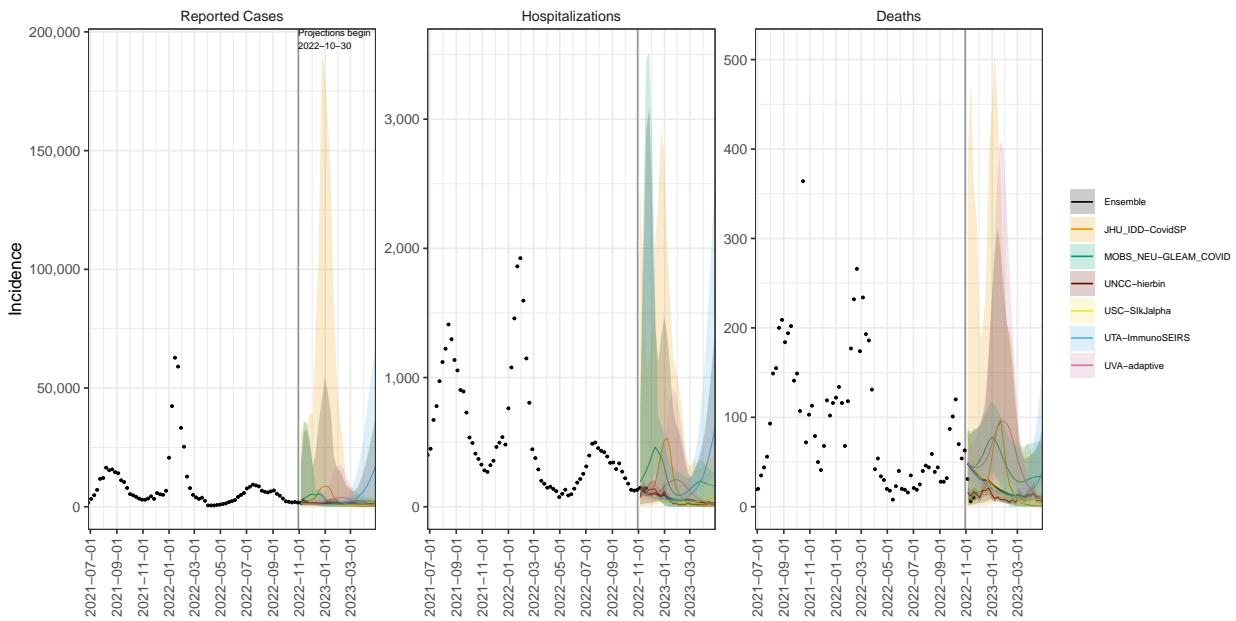
AK model variance & 95% projection intervals – Low booster, Moderate immune escape variant



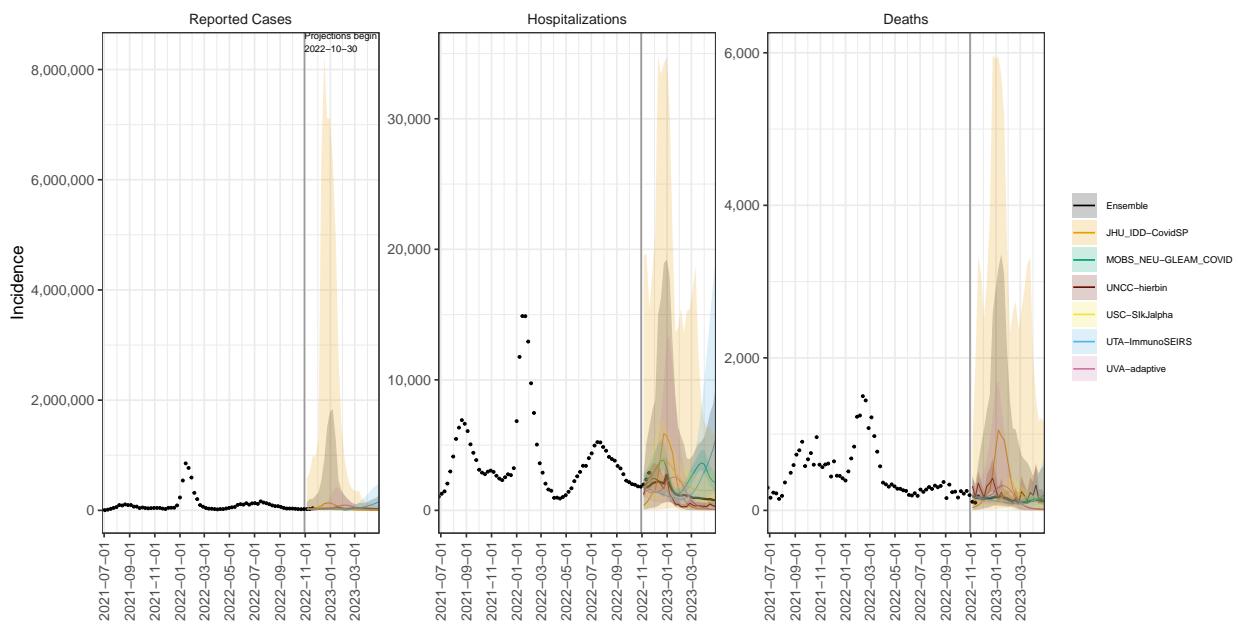
### AZ model variance & 95% projection intervals – Low booster, Moderate immune escape variant



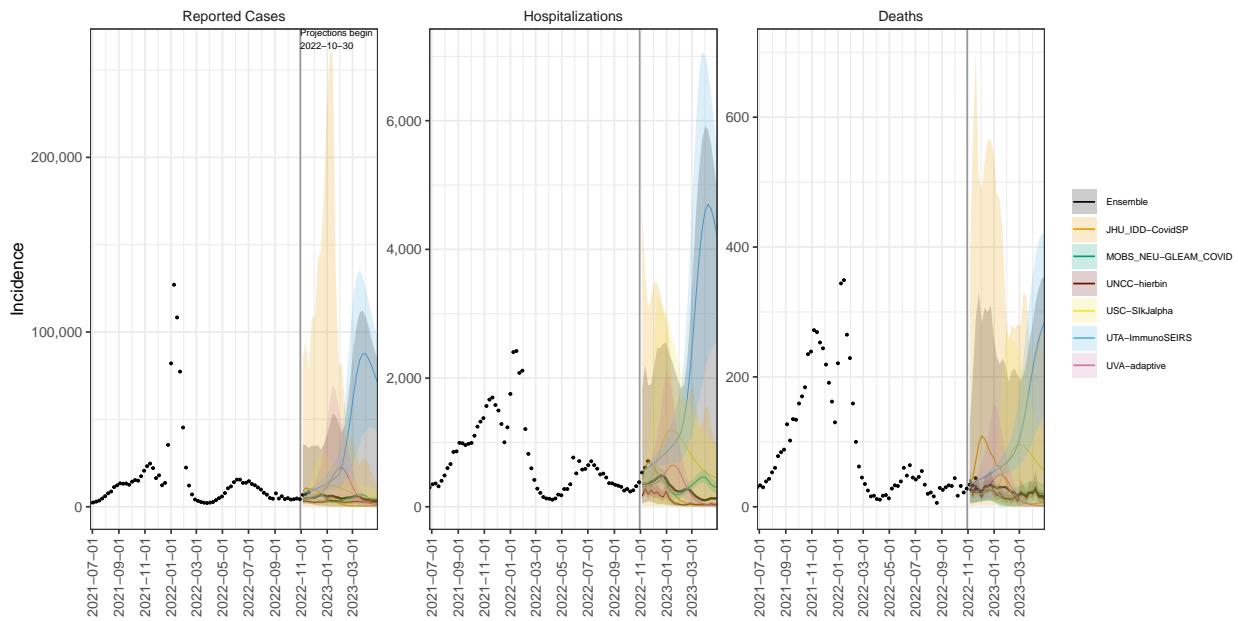
### AR model variance & 95% projection intervals – Low booster, Moderate immune escape variant



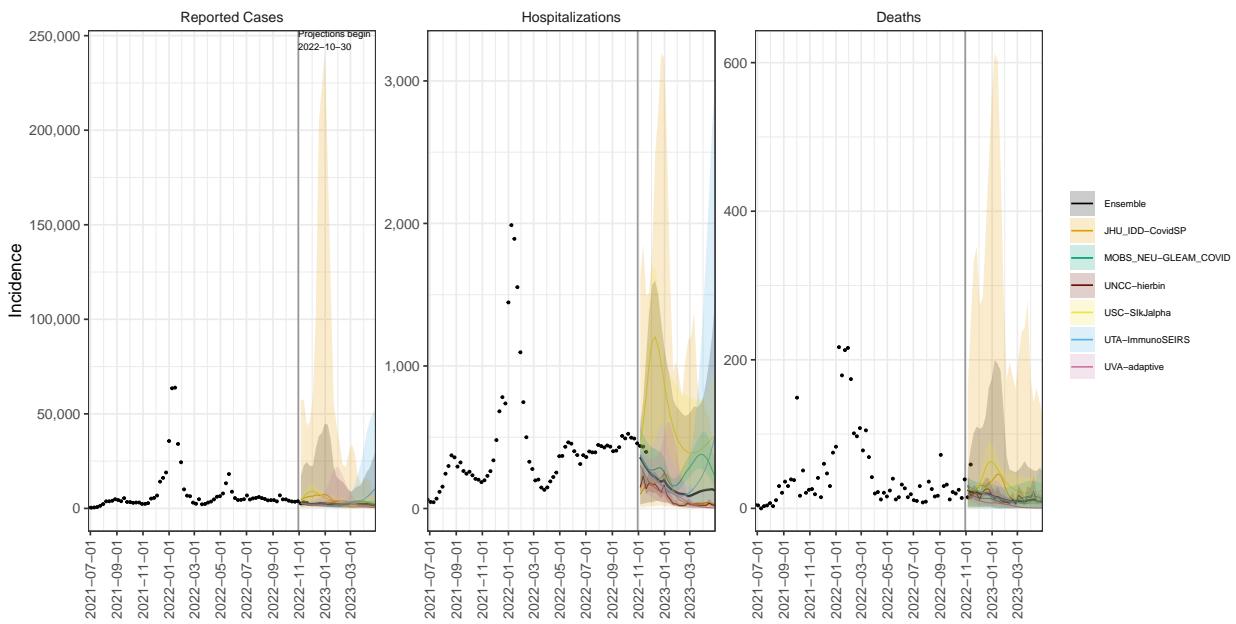
CA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



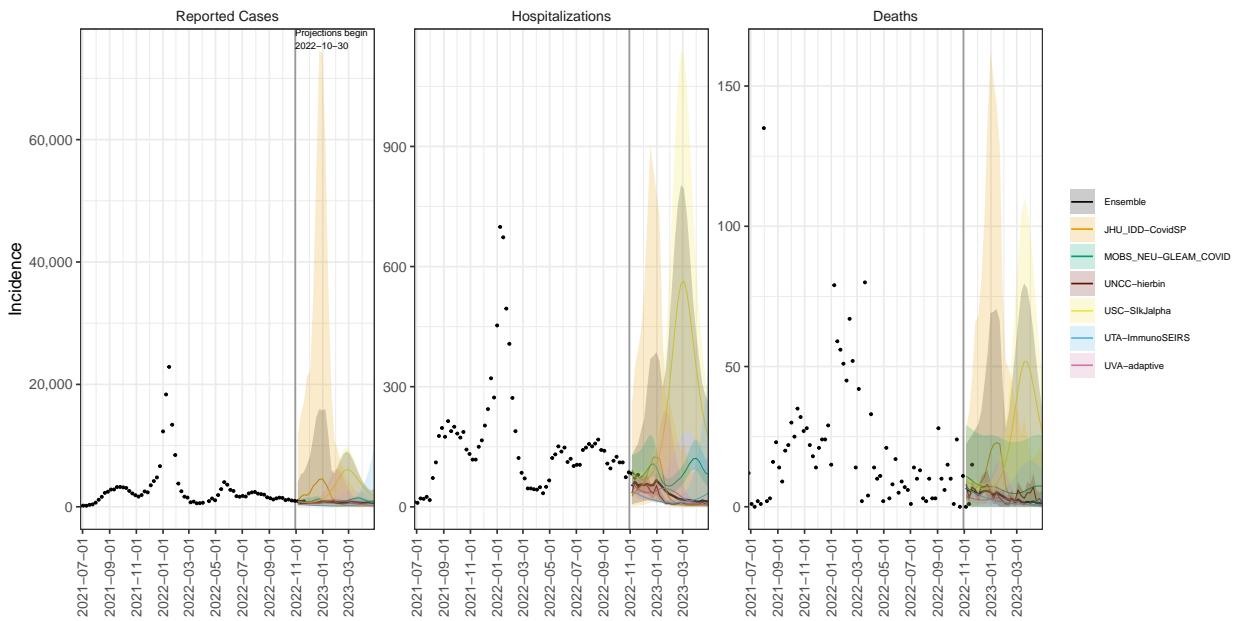
CO model variance & 95% projection intervals – Low booster, Moderate immune escape variant



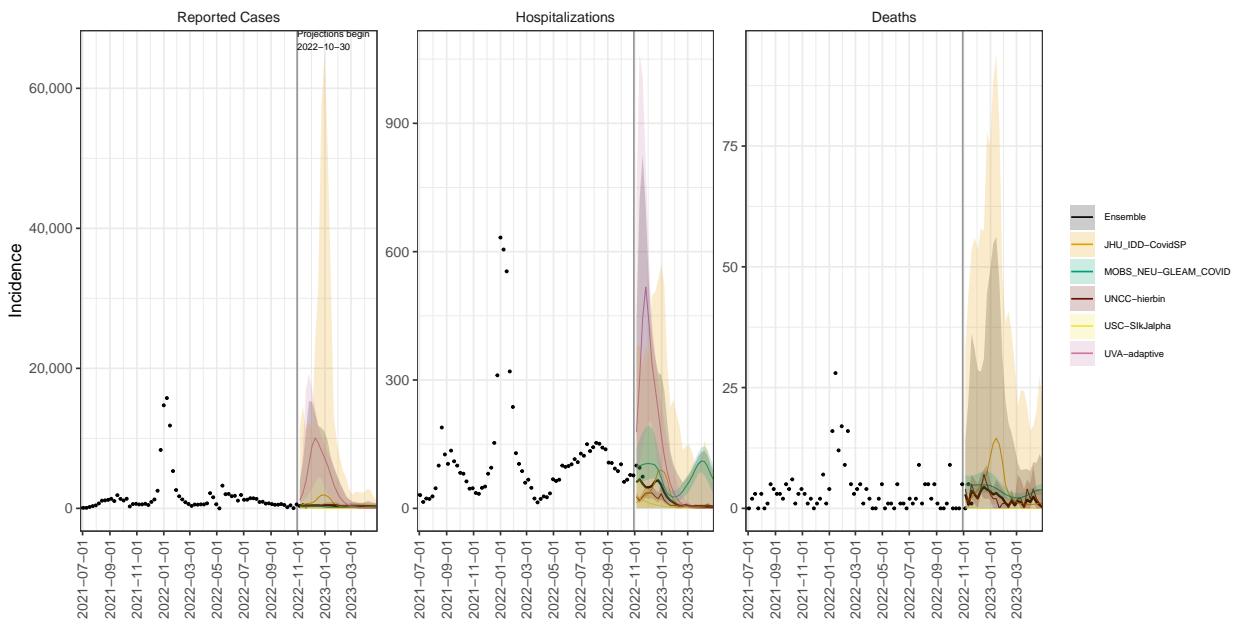
CT model variance & 95% projection intervals – Low booster, Moderate immune escape variant



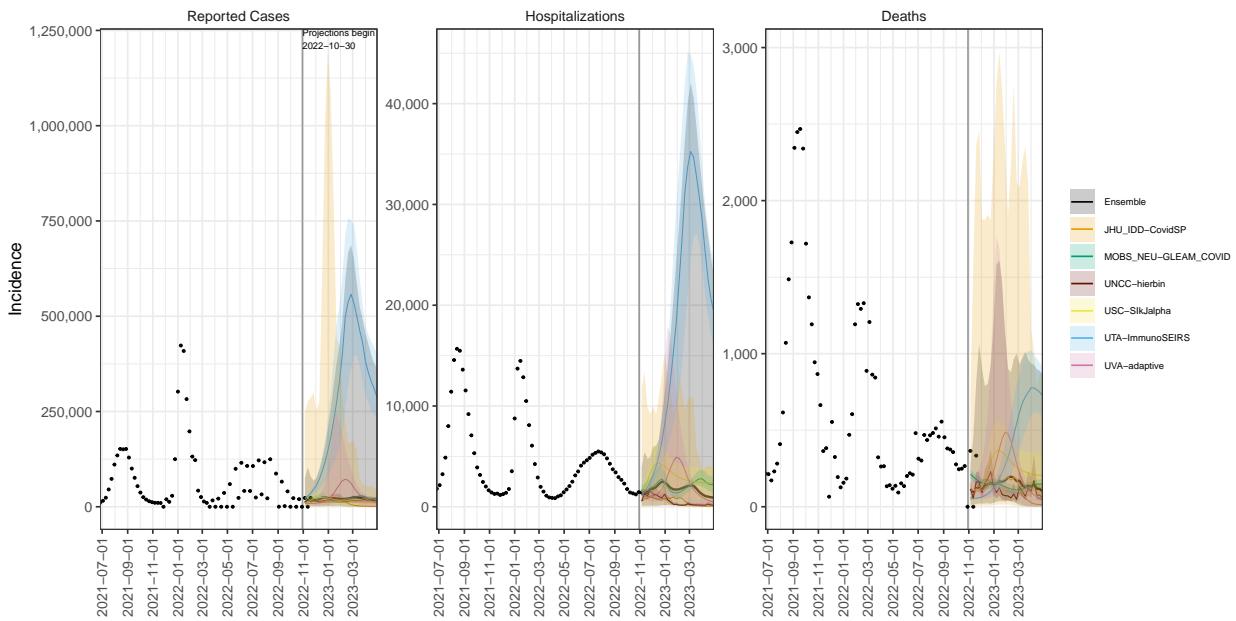
DE model variance & 95% projection intervals – Low booster, Moderate immune escape variant



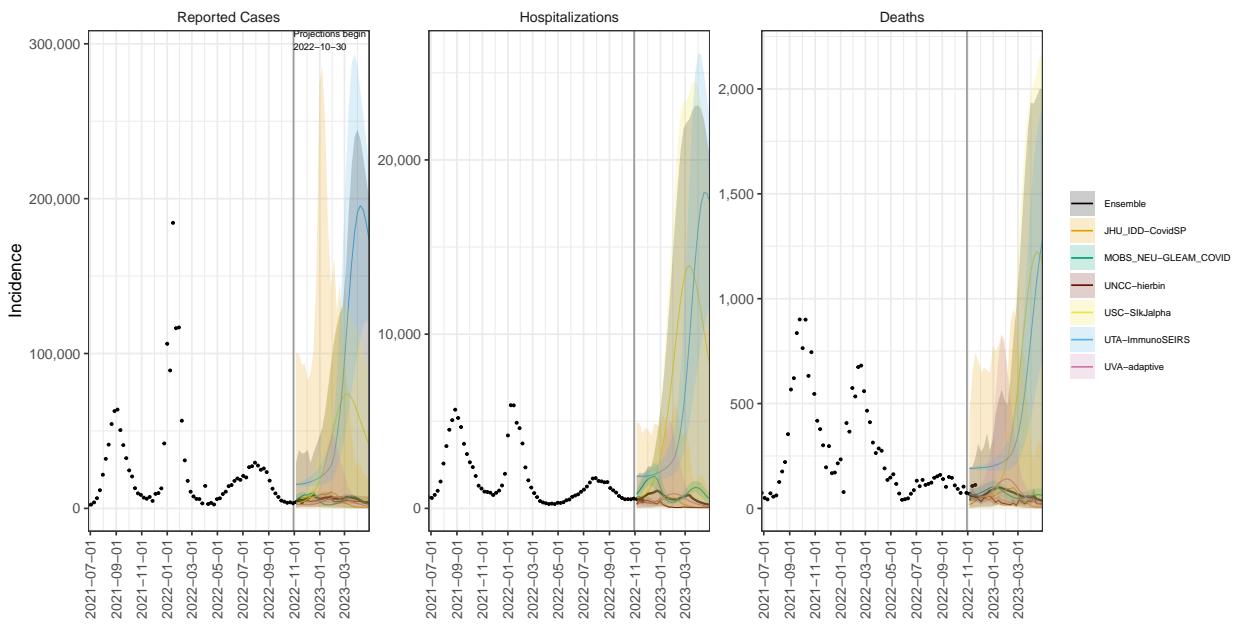
DC model variance & 95% projection intervals – Low booster, Moderate immune escape variant



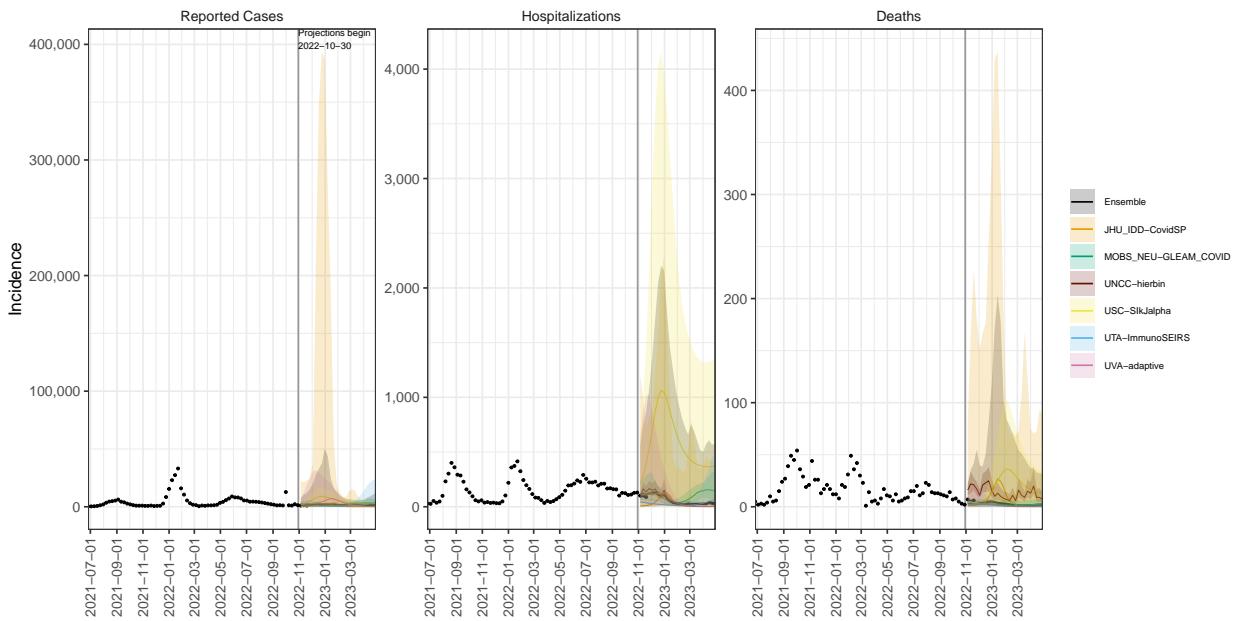
FL model variance & 95% projection intervals – Low booster, Moderate immune escape variant



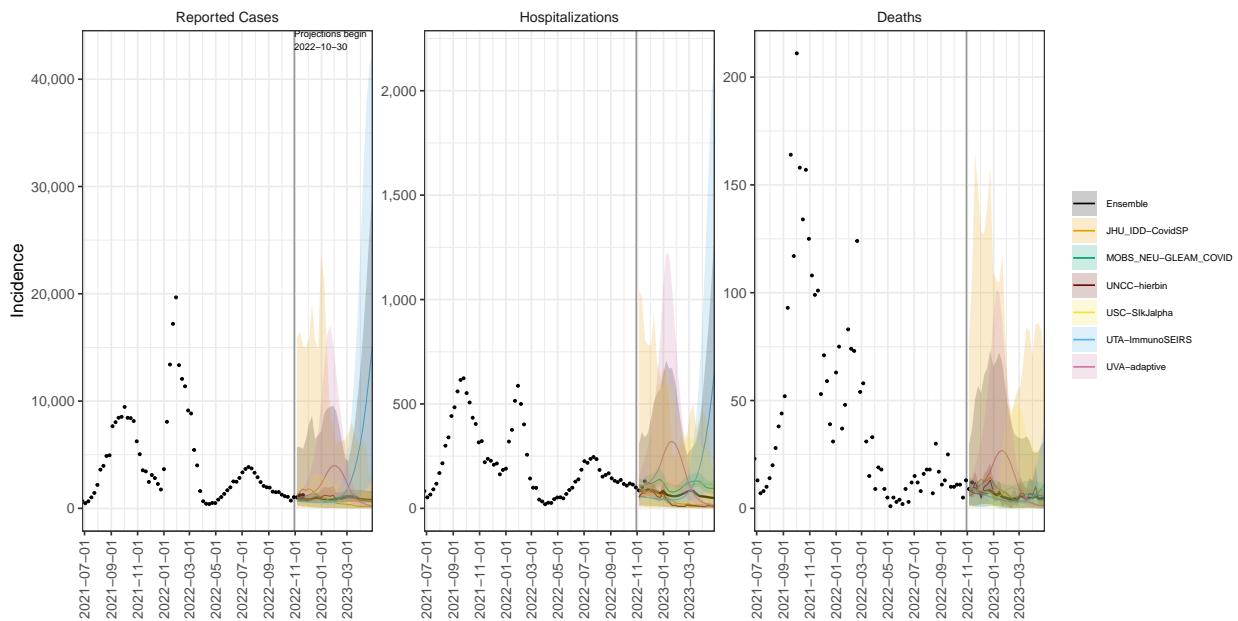
GA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



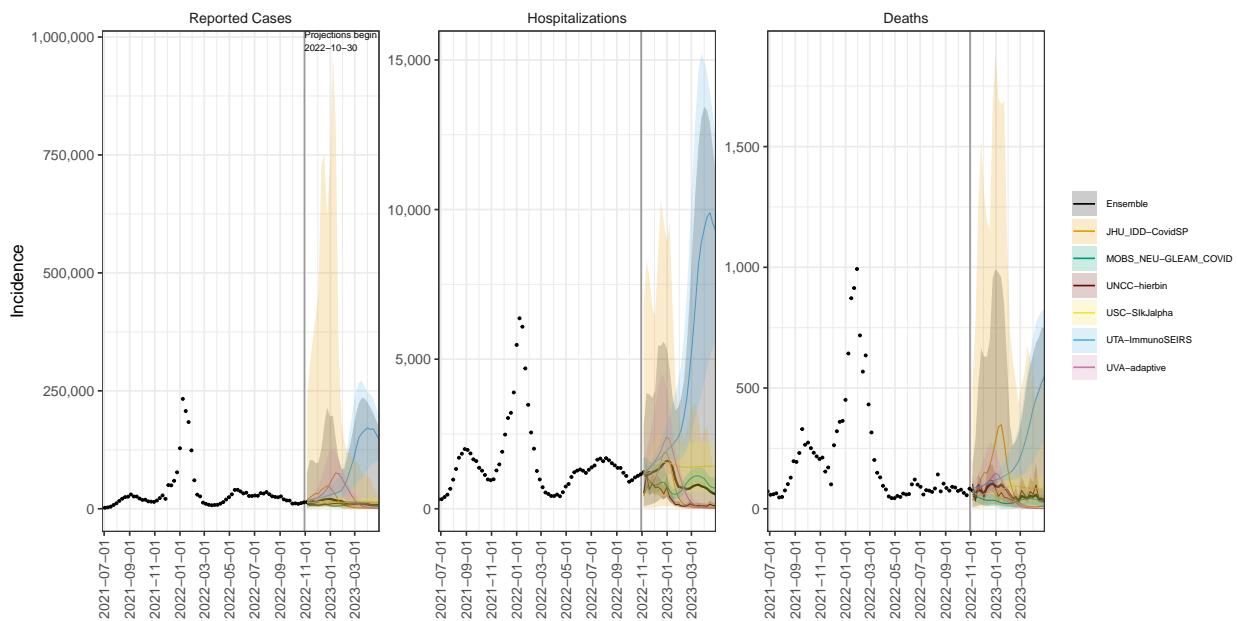
HI model variance & 95% projection intervals – Low booster, Moderate immune escape variant



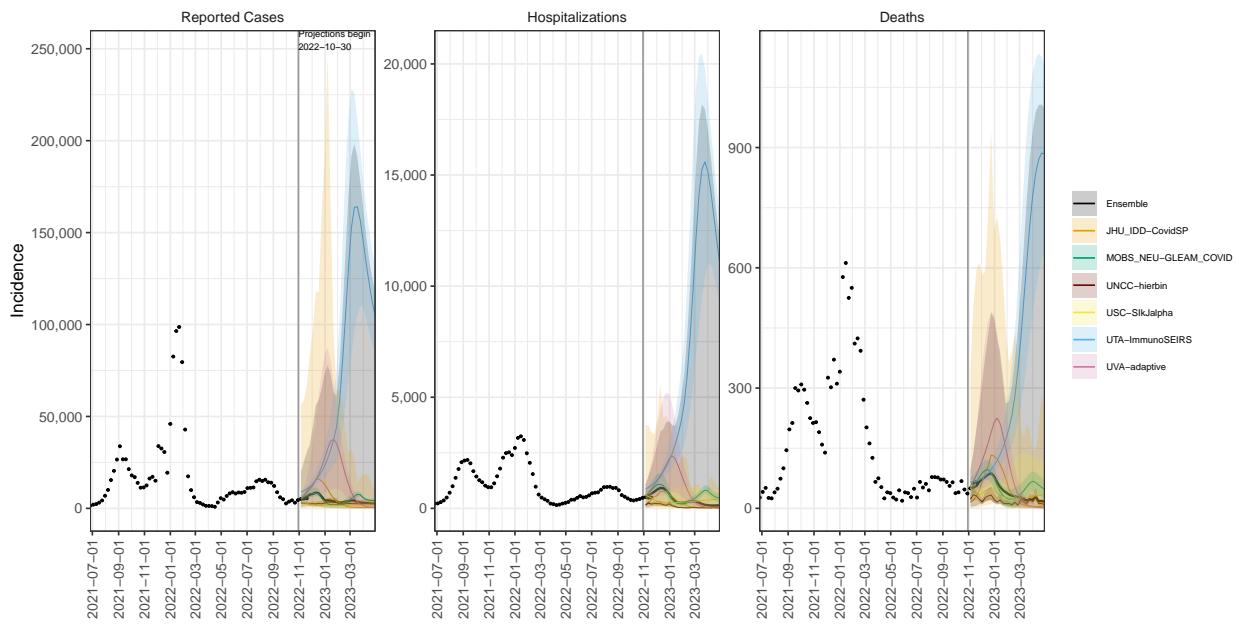
ID model variance & 95% projection intervals – Low booster, Moderate immune escape variant



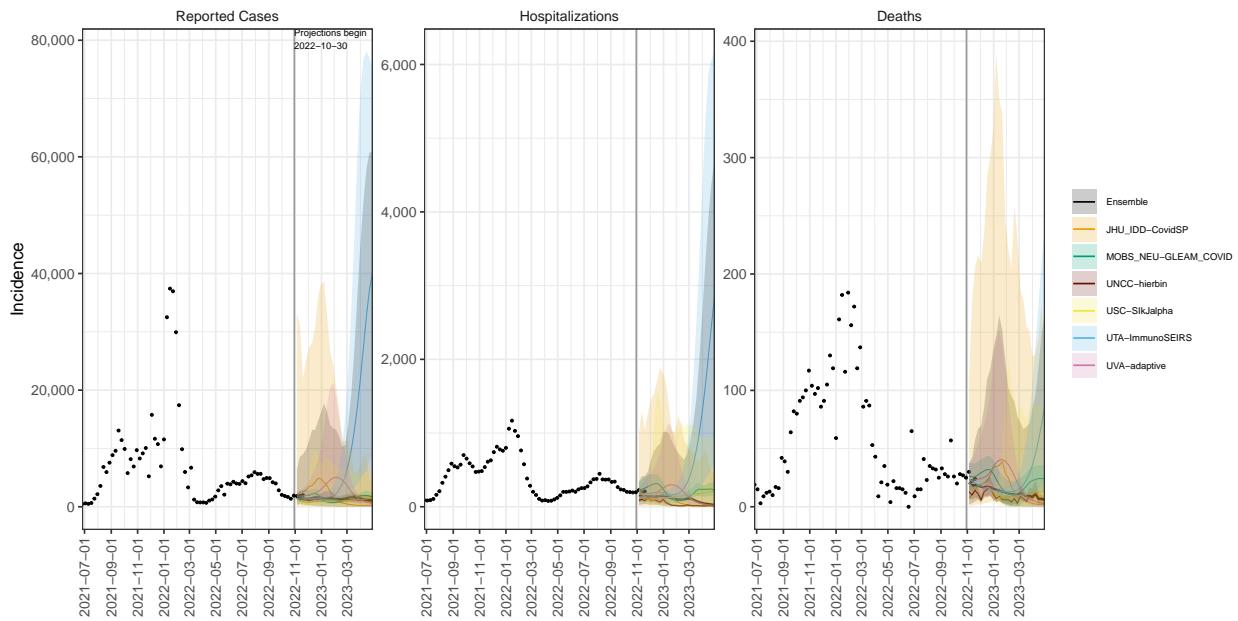
IL model variance & 95% projection intervals – Low booster, Moderate immune escape variant



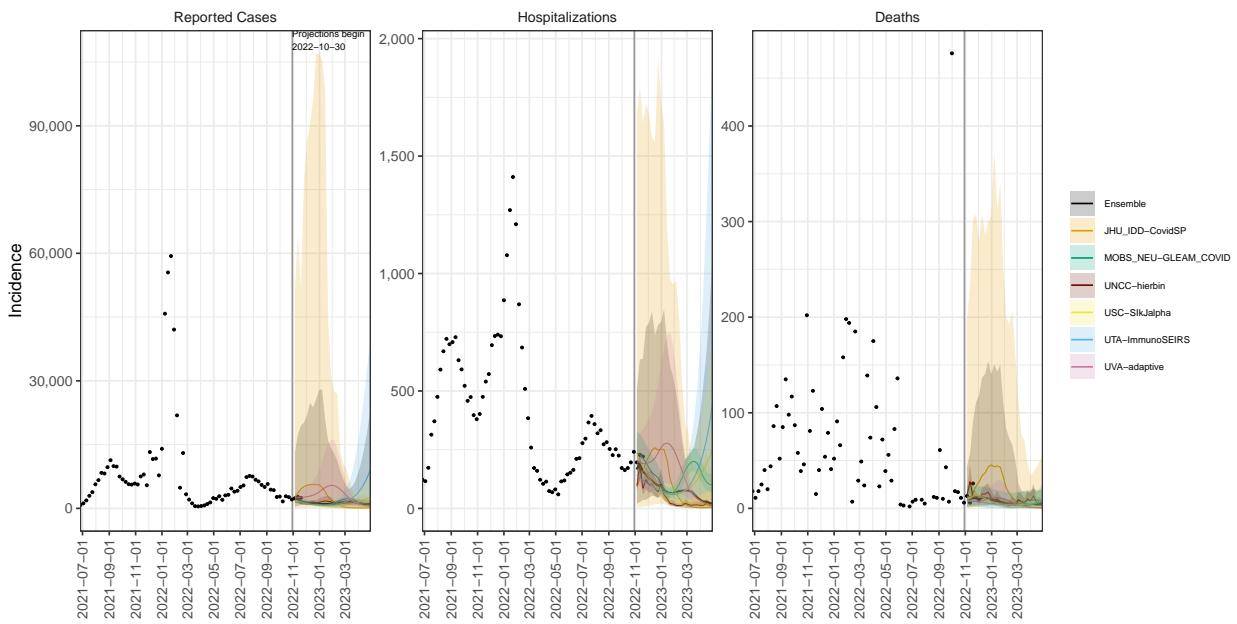
IN model variance & 95% projection intervals – Low booster, Moderate immune escape variant



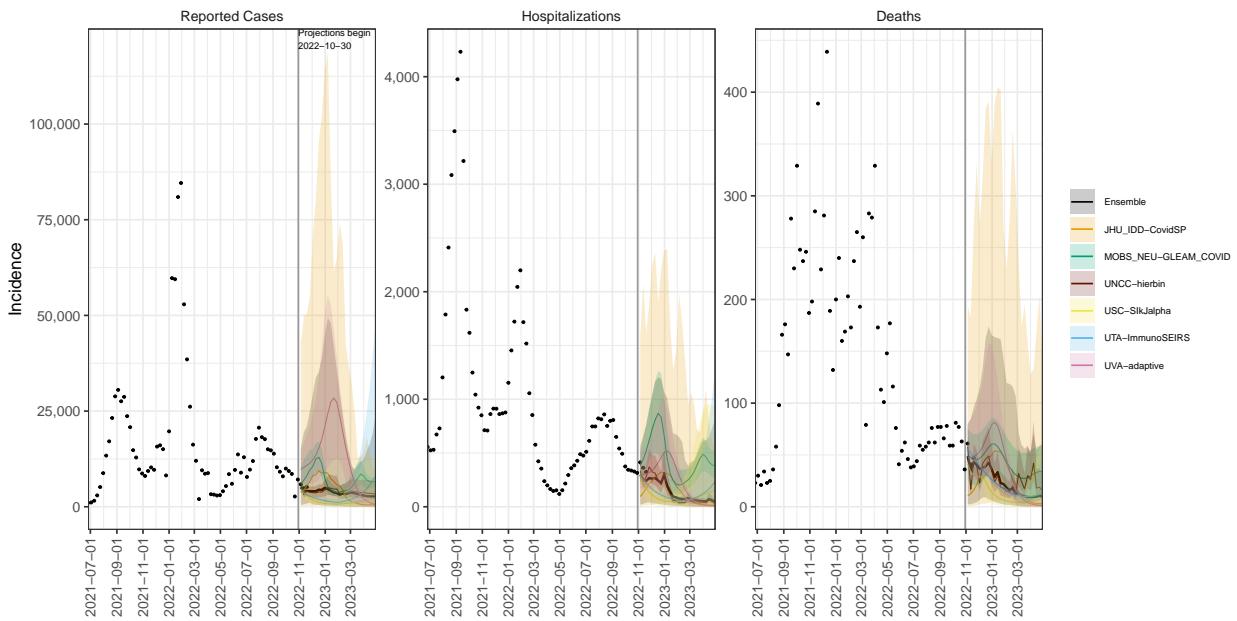
IA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



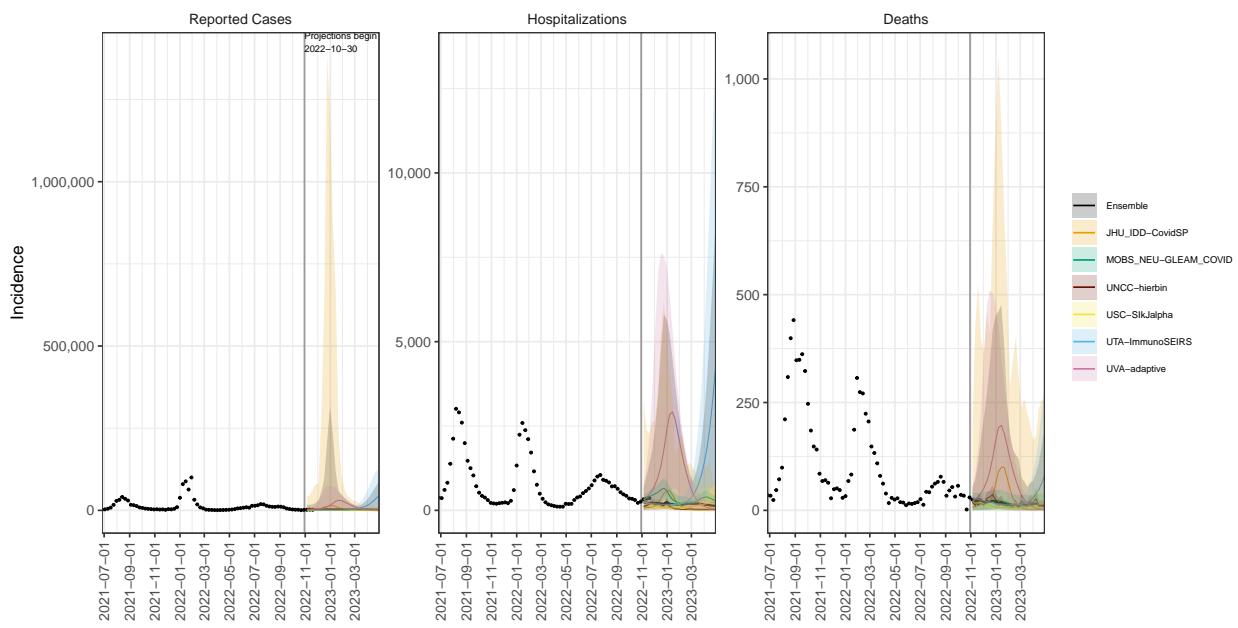
### KS model variance & 95% projection intervals – Low booster, Moderate immune escape variant



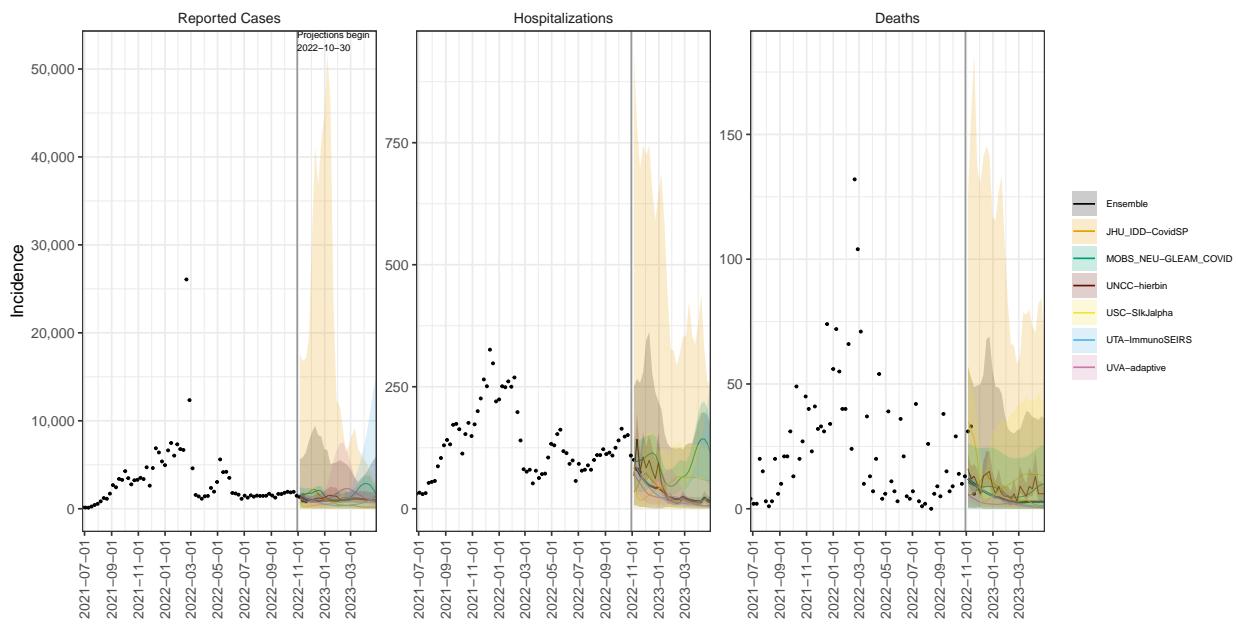
### KY model variance & 95% projection intervals – Low booster, Moderate immune escape variant



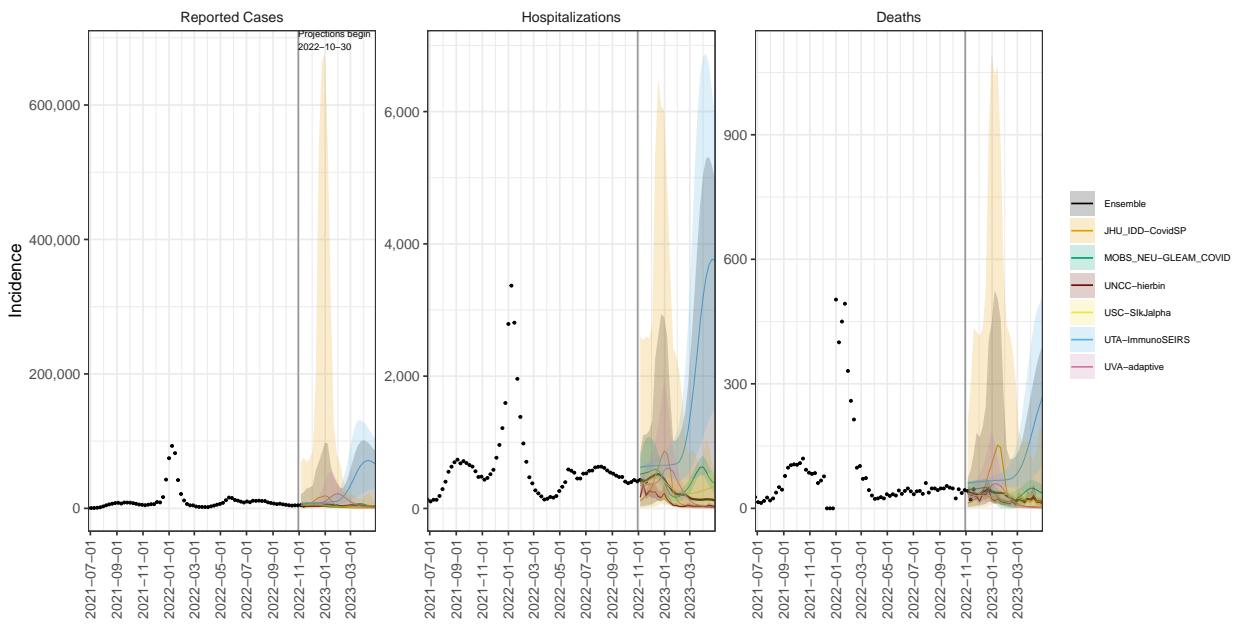
LA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



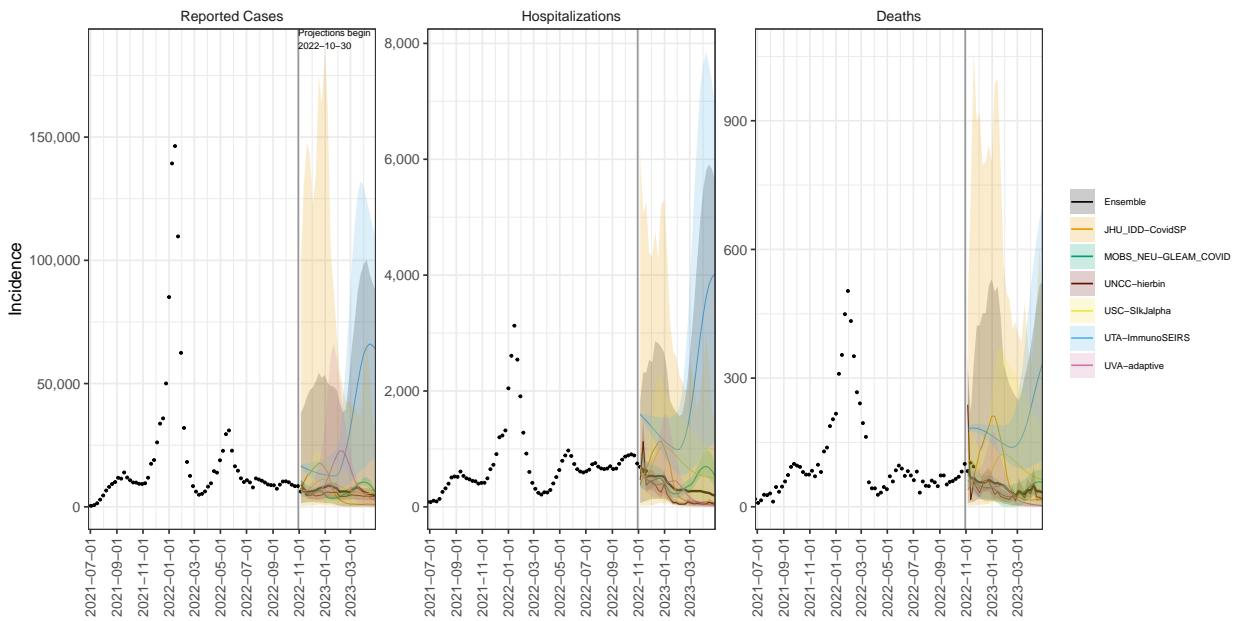
ME model variance & 95% projection intervals – Low booster, Moderate immune escape variant



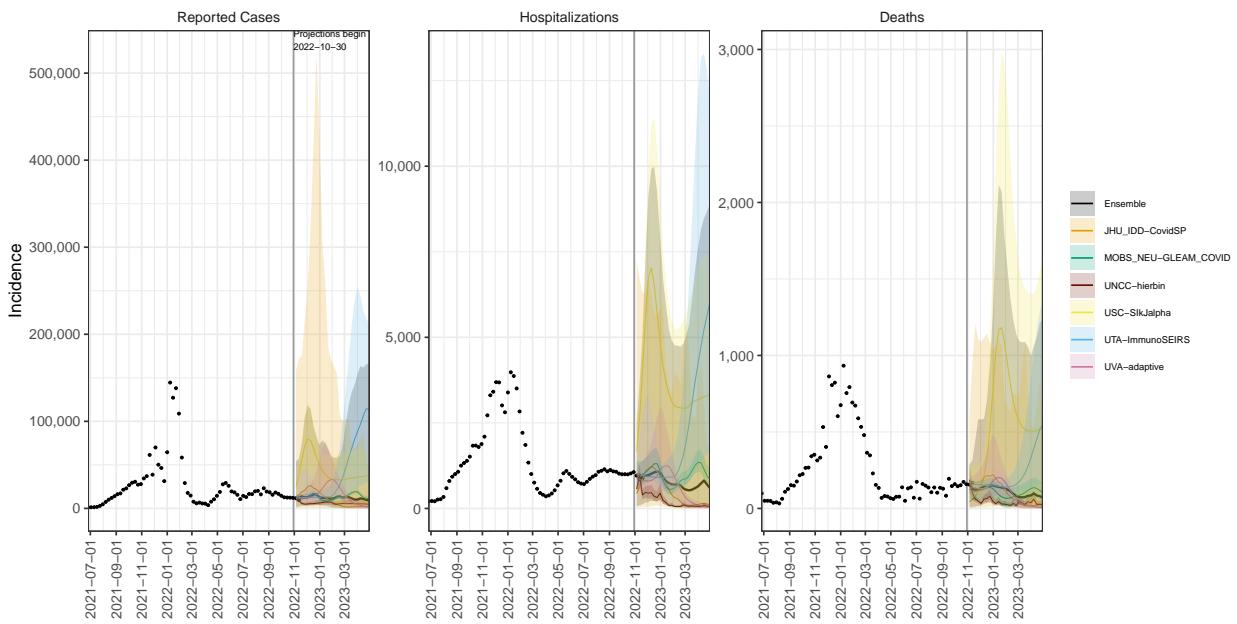
MD model variance & 95% projection intervals – Low booster, Moderate immune escape variant



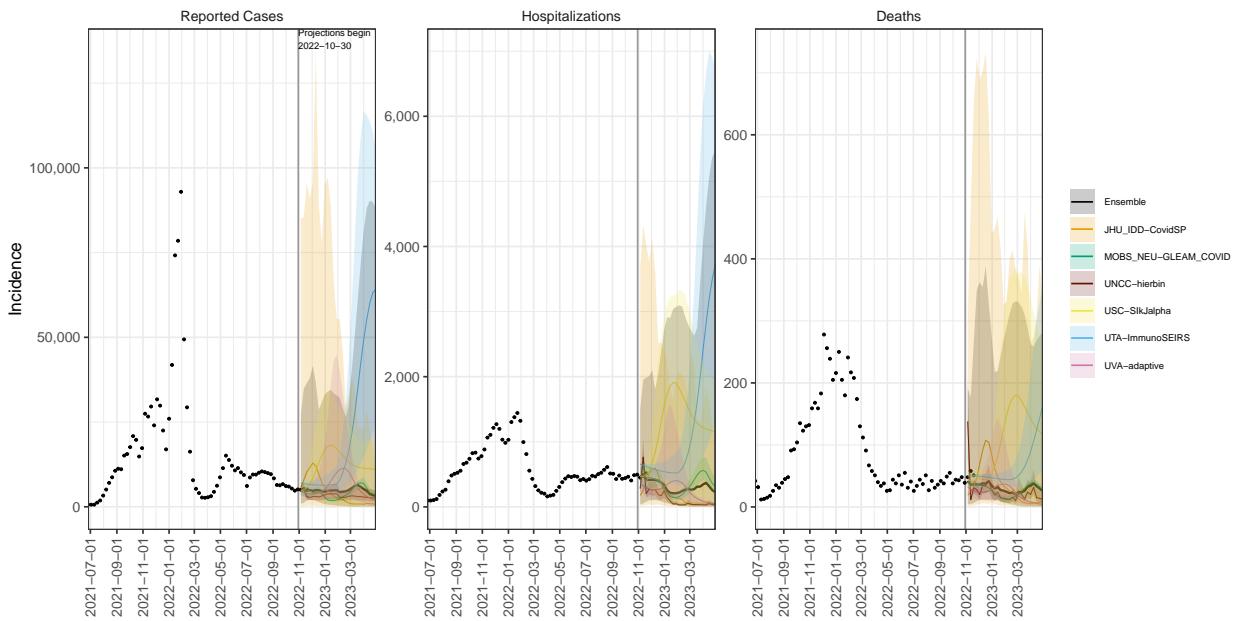
MA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



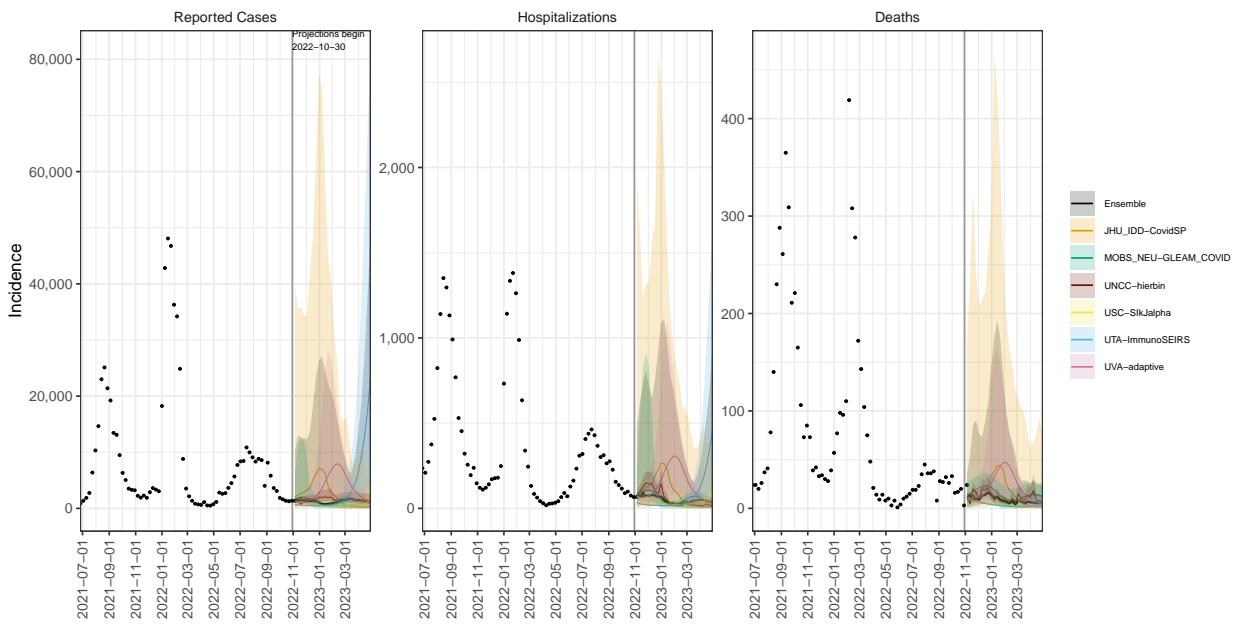
MI model variance & 95% projection intervals – Low booster, Moderate immune escape variant



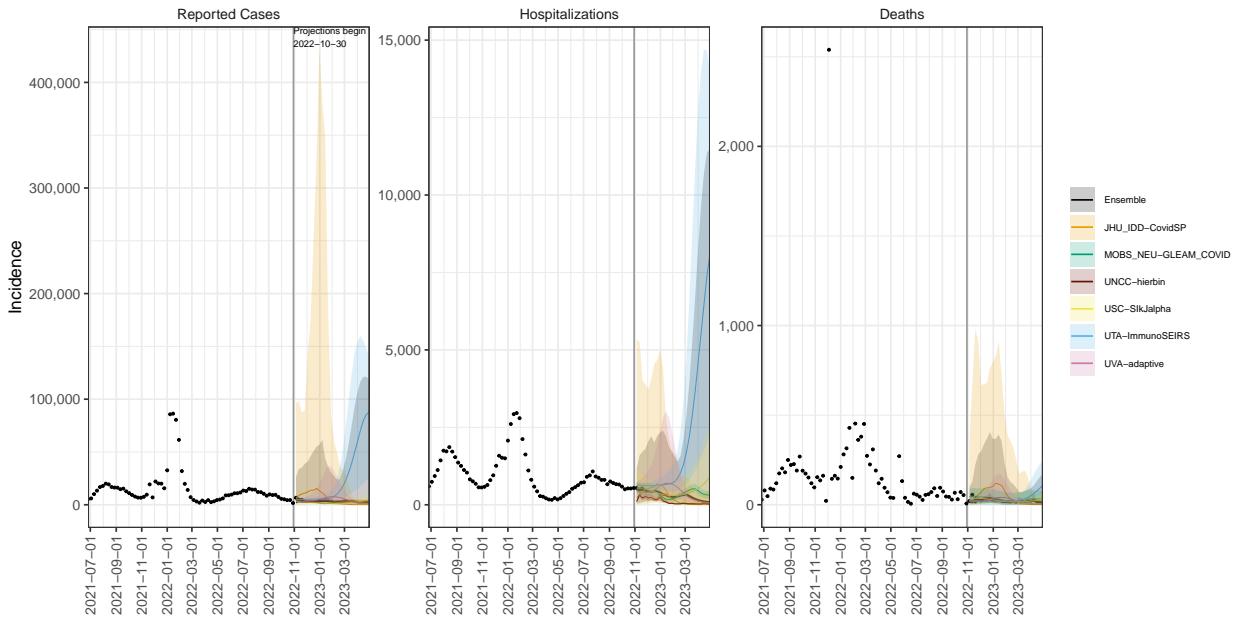
MN model variance & 95% projection intervals – Low booster, Moderate immune escape variant



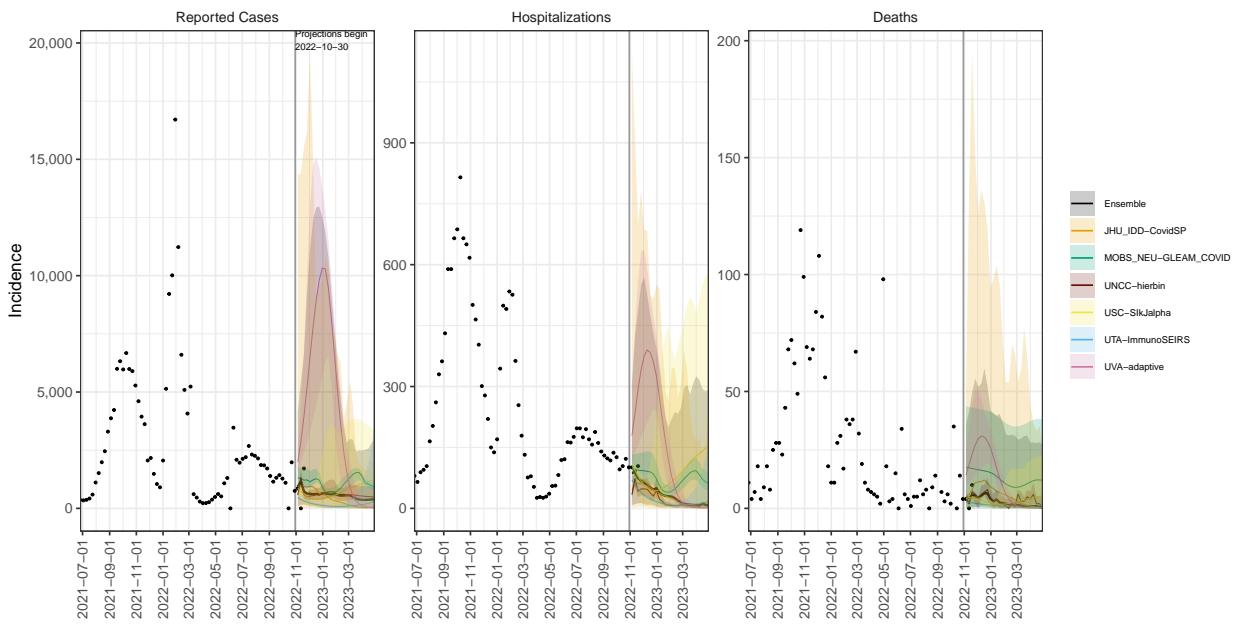
### MS model variance & 95% projection intervals – Low booster, Moderate immune escape variant



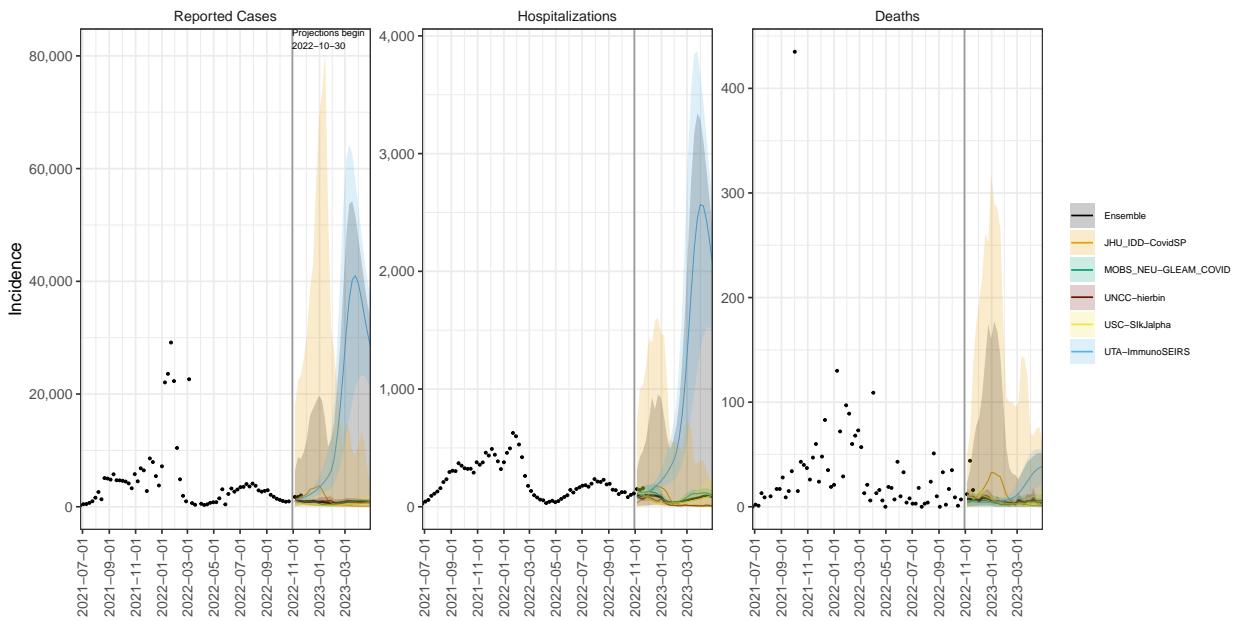
### MO model variance & 95% projection intervals – Low booster, Moderate immune escape variant



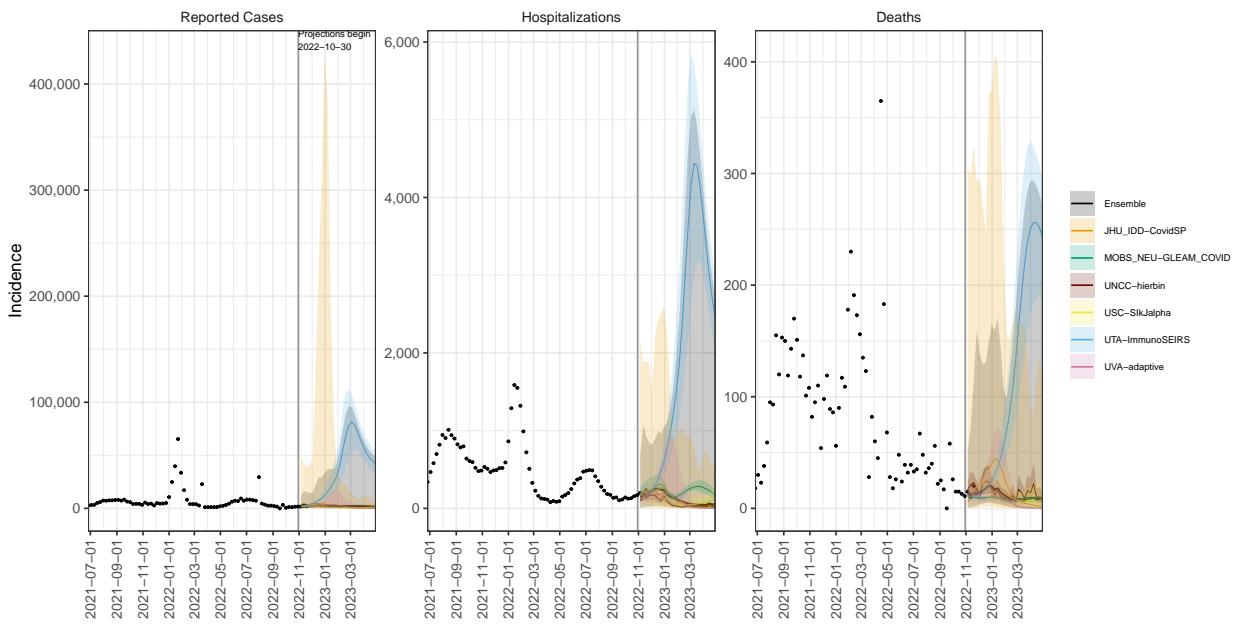
### MT model variance & 95% projection intervals – Low booster, Moderate immune escape variant



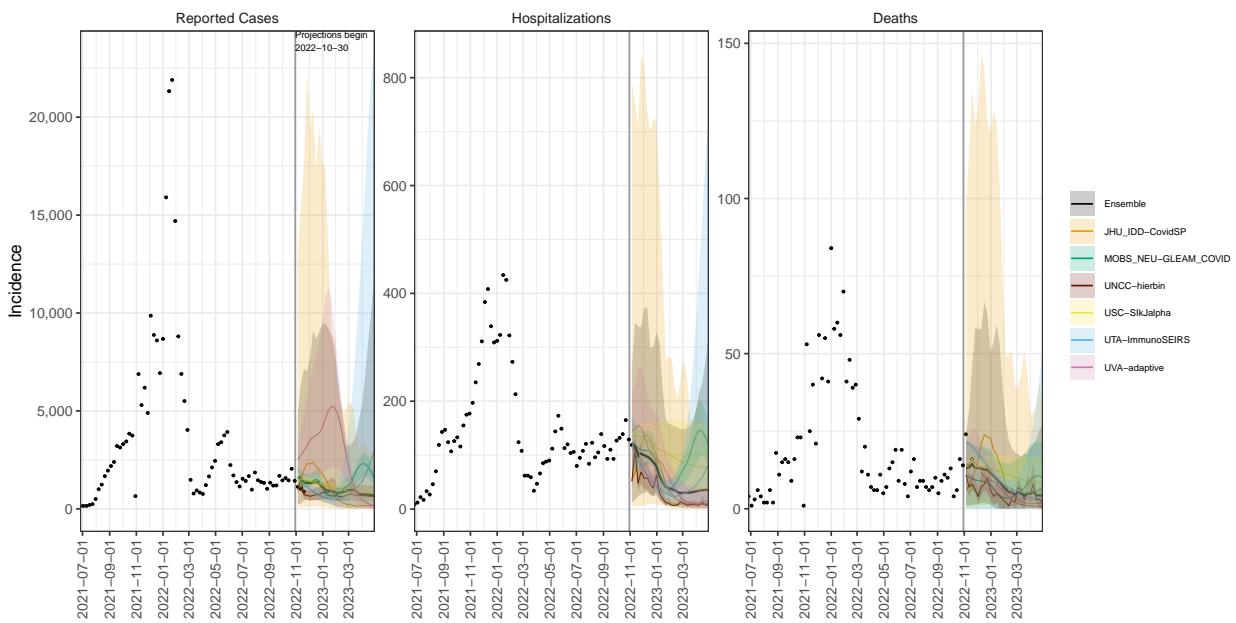
### NE model variance & 95% projection intervals – Low booster, Moderate immune escape variant



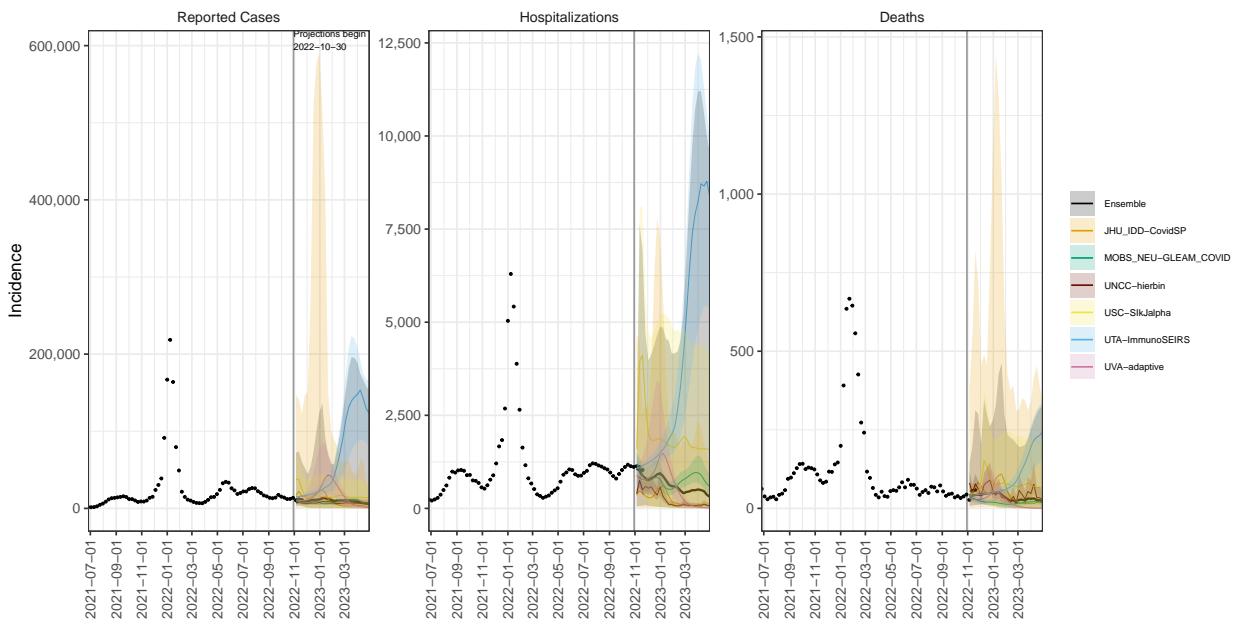
### NV model variance & 95% projection intervals – Low booster, Moderate immune escape variant



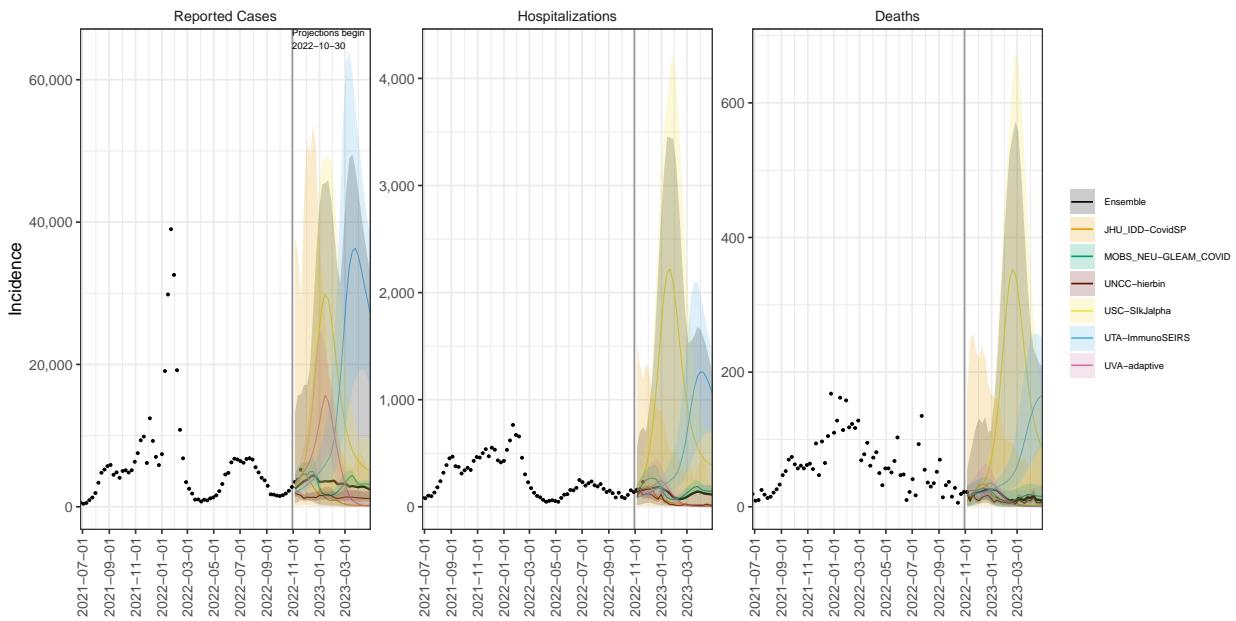
### NH model variance & 95% projection intervals – Low booster, Moderate immune escape variant



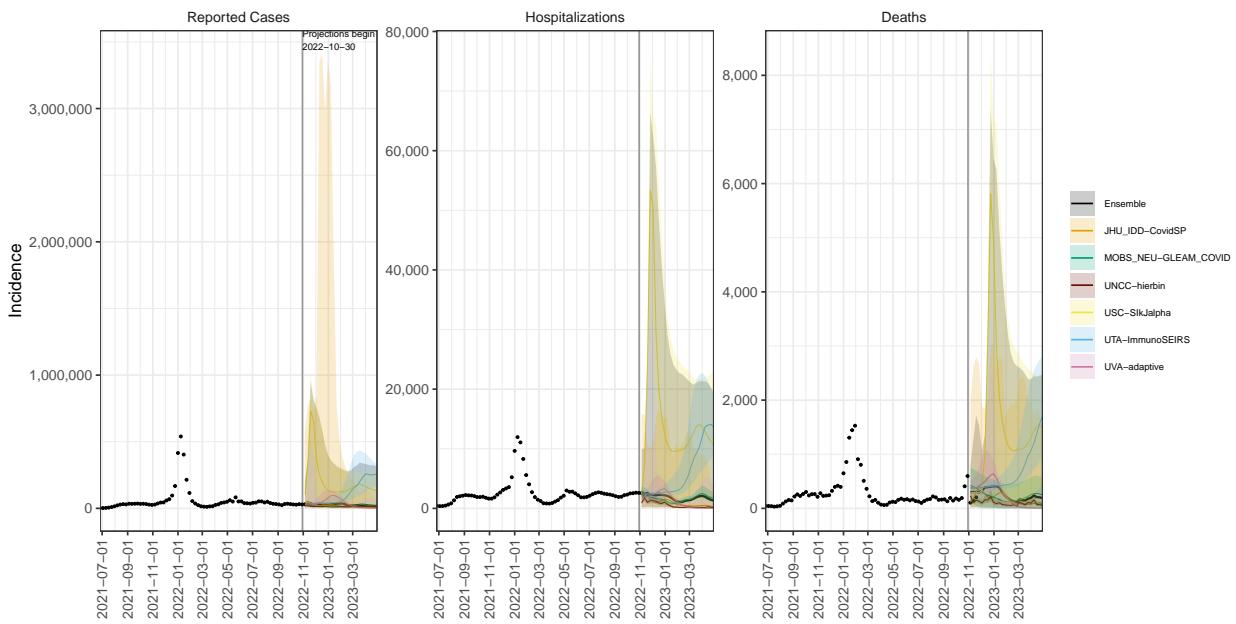
### NJ model variance & 95% projection intervals – Low booster, Moderate immune escape variant



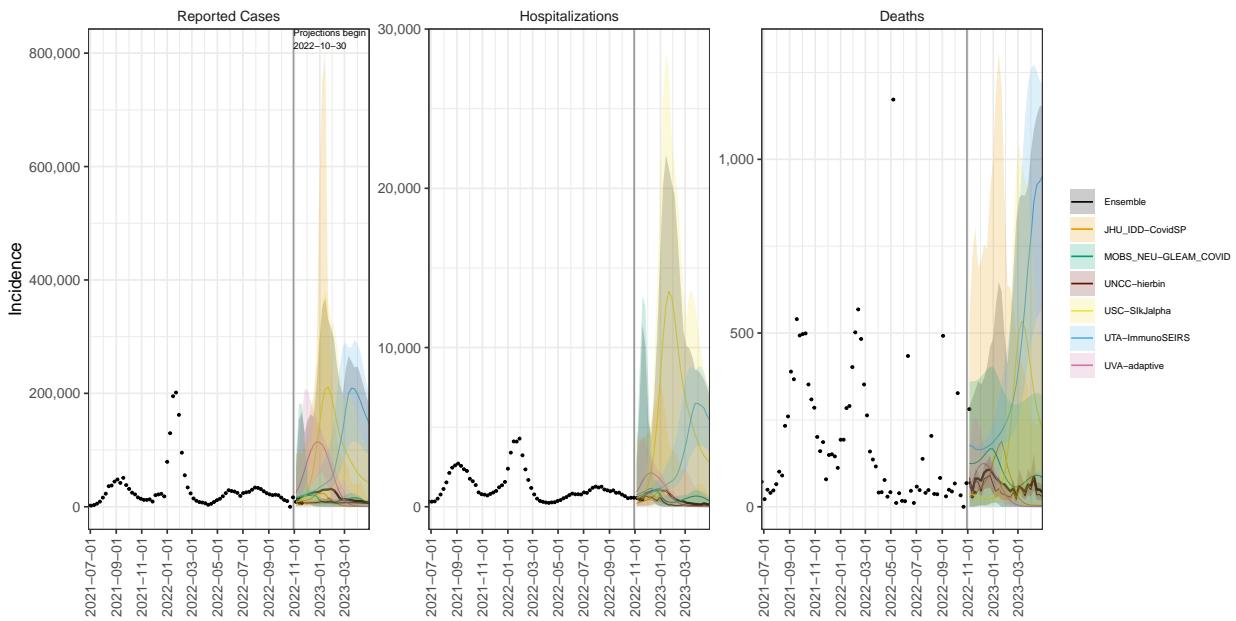
### NM model variance & 95% projection intervals – Low booster, Moderate immune escape variant



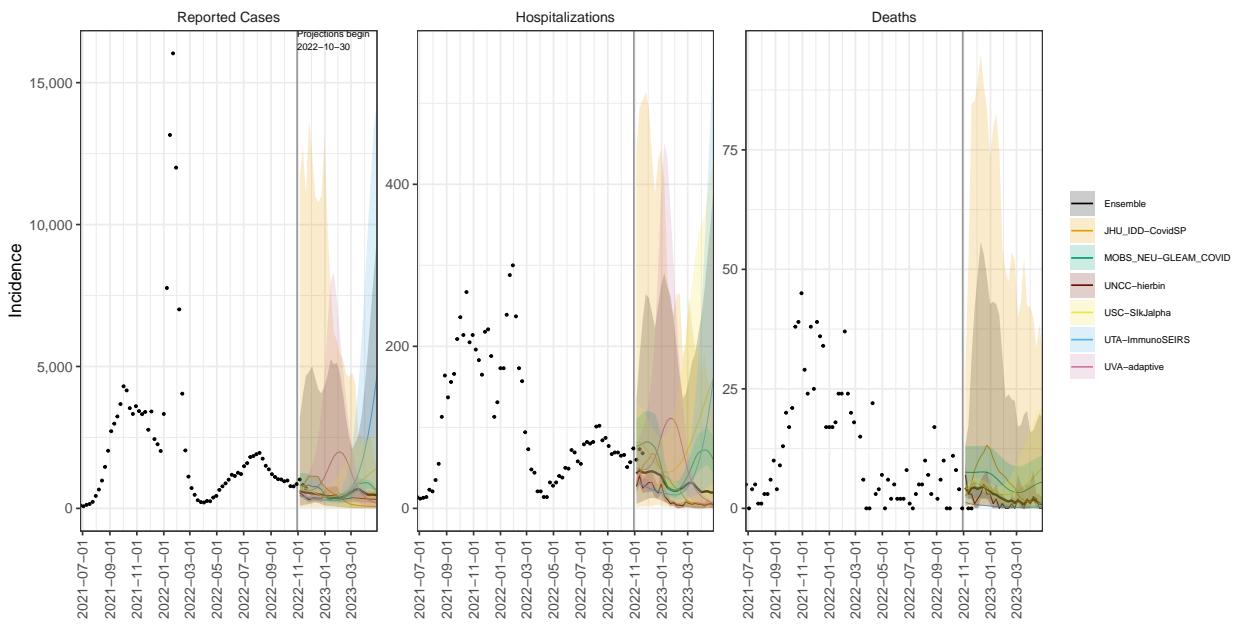
NY model variance & 95% projection intervals – Low booster, Moderate immune escape variant



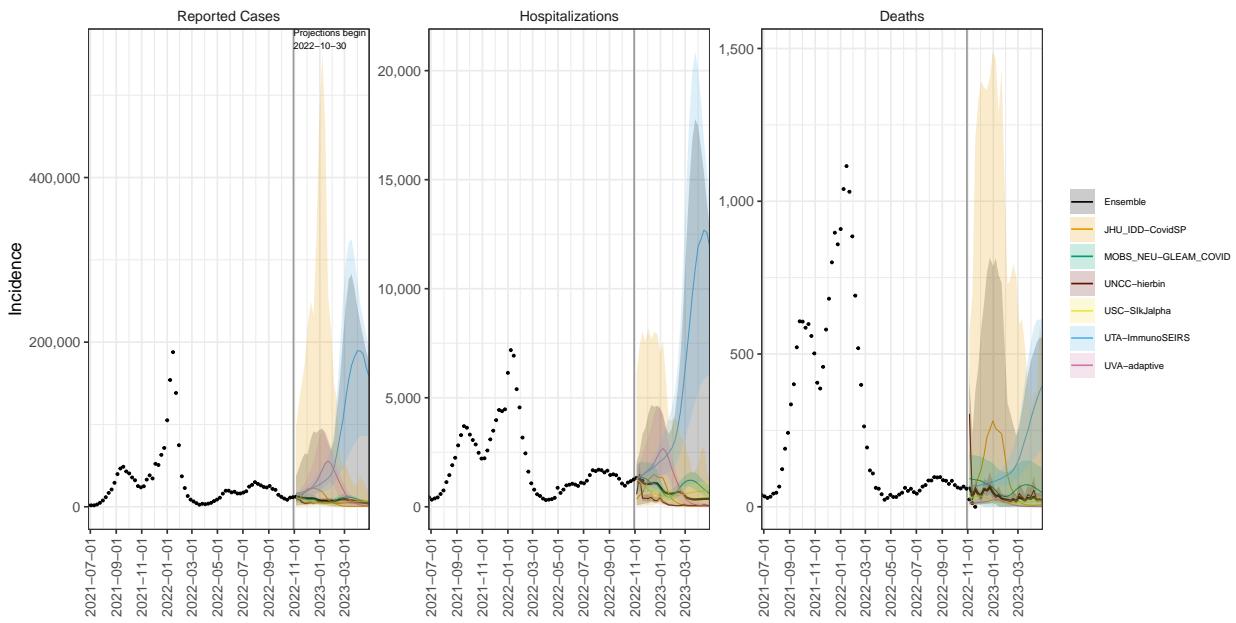
NC model variance & 95% projection intervals – Low booster, Moderate immune escape variant



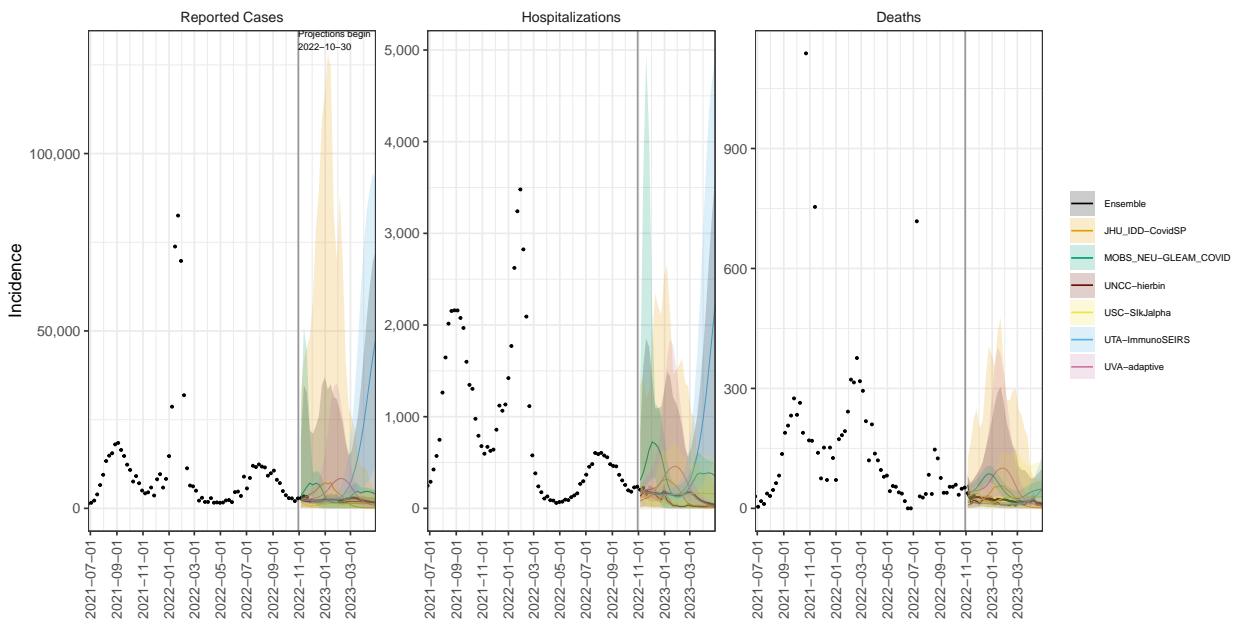
ND model variance & 95% projection intervals – Low booster, Moderate immune escape variant



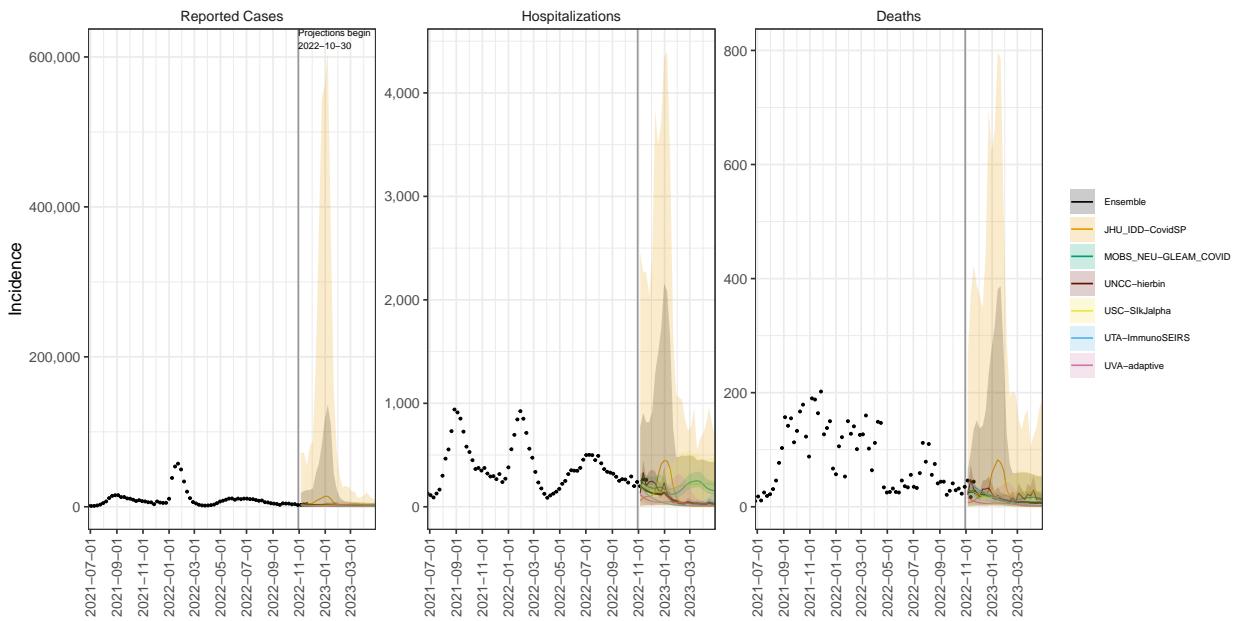
OH model variance & 95% projection intervals – Low booster, Moderate immune escape variant



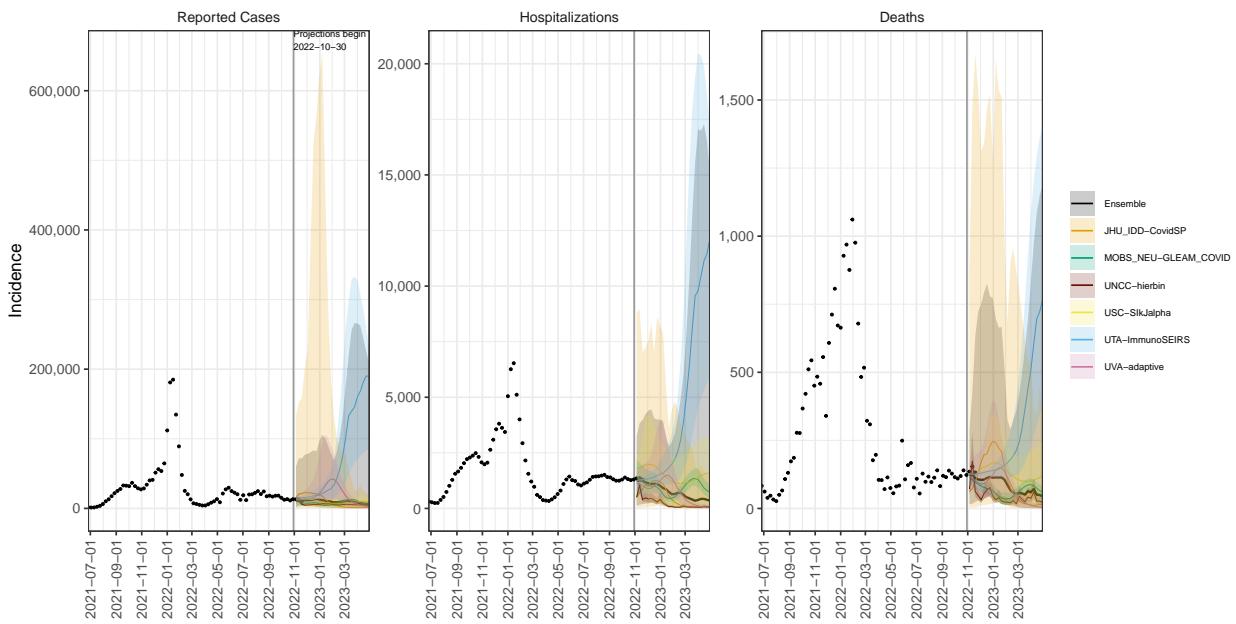
OK model variance & 95% projection intervals – Low booster, Moderate immune escape variant



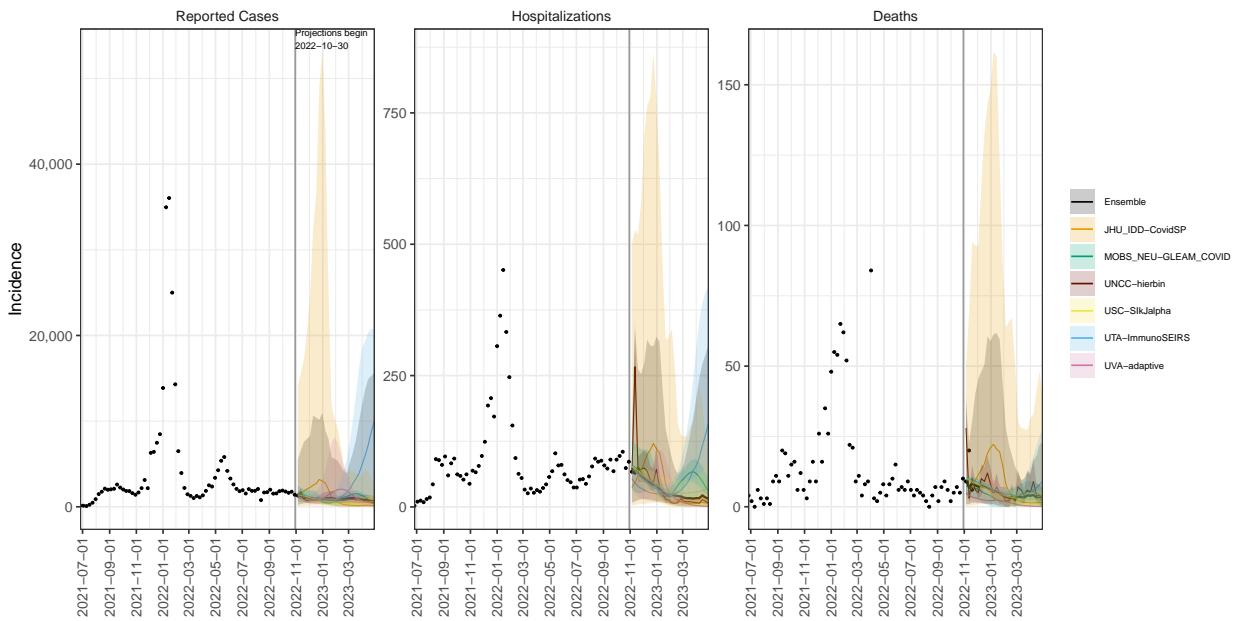
OR model variance & 95% projection intervals – Low booster, Moderate immune escape variant



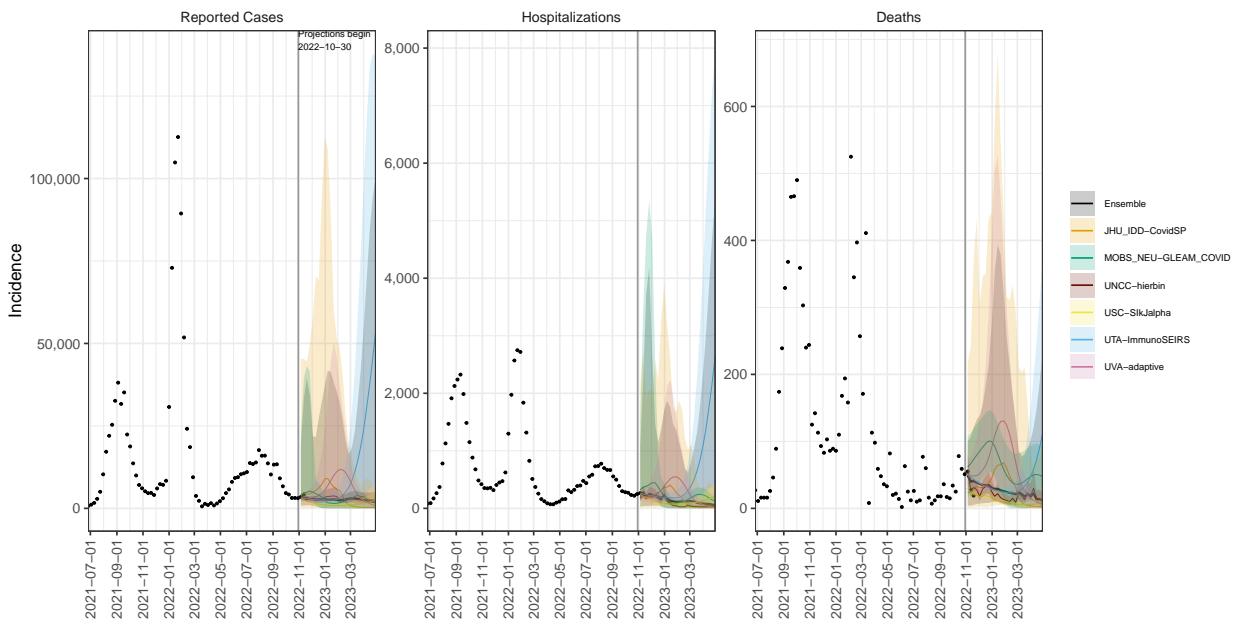
PA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



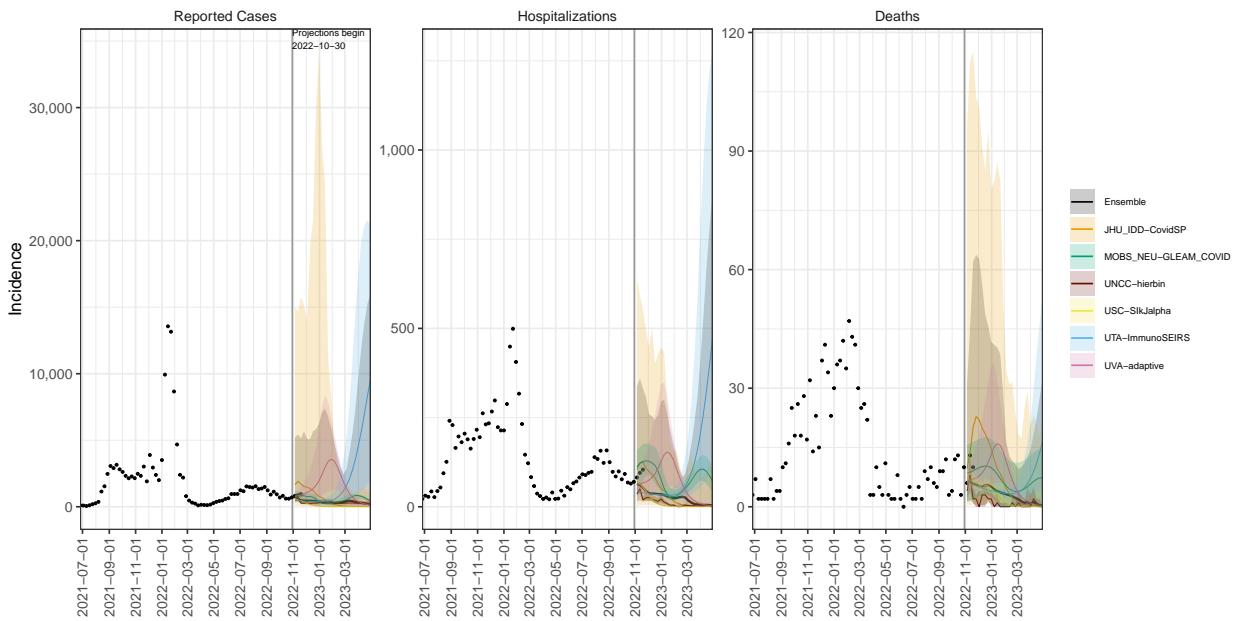
RI model variance & 95% projection intervals – Low booster, Moderate immune escape variant



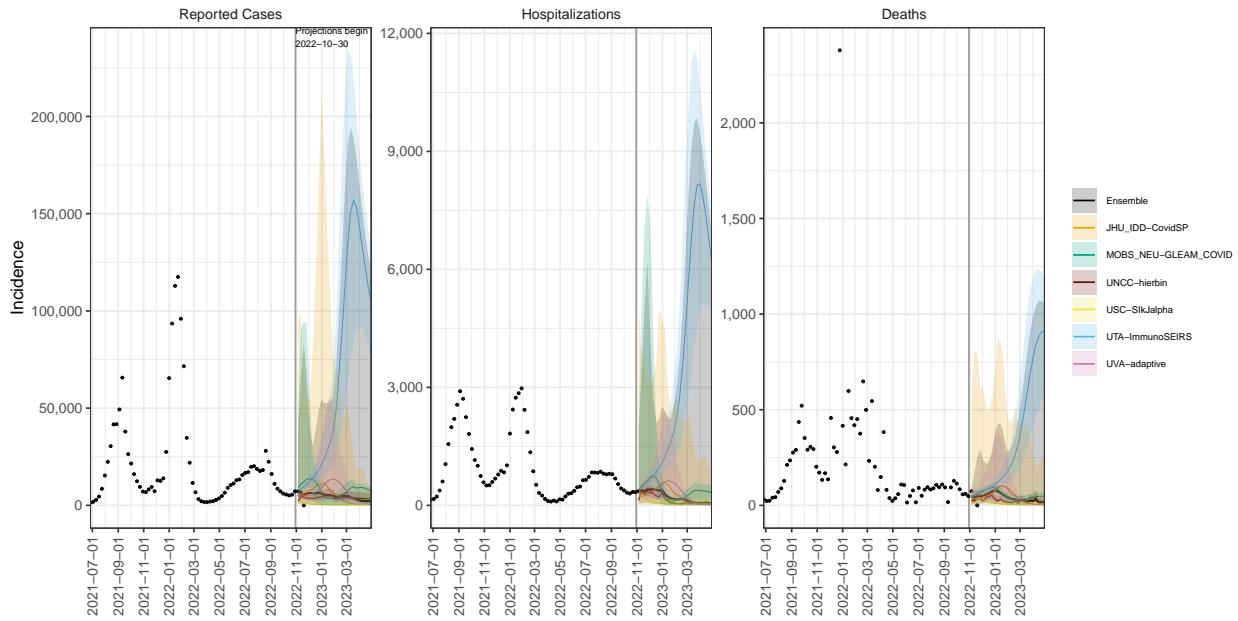
### SC model variance & 95% projection intervals – Low booster, Moderate immune escape variant



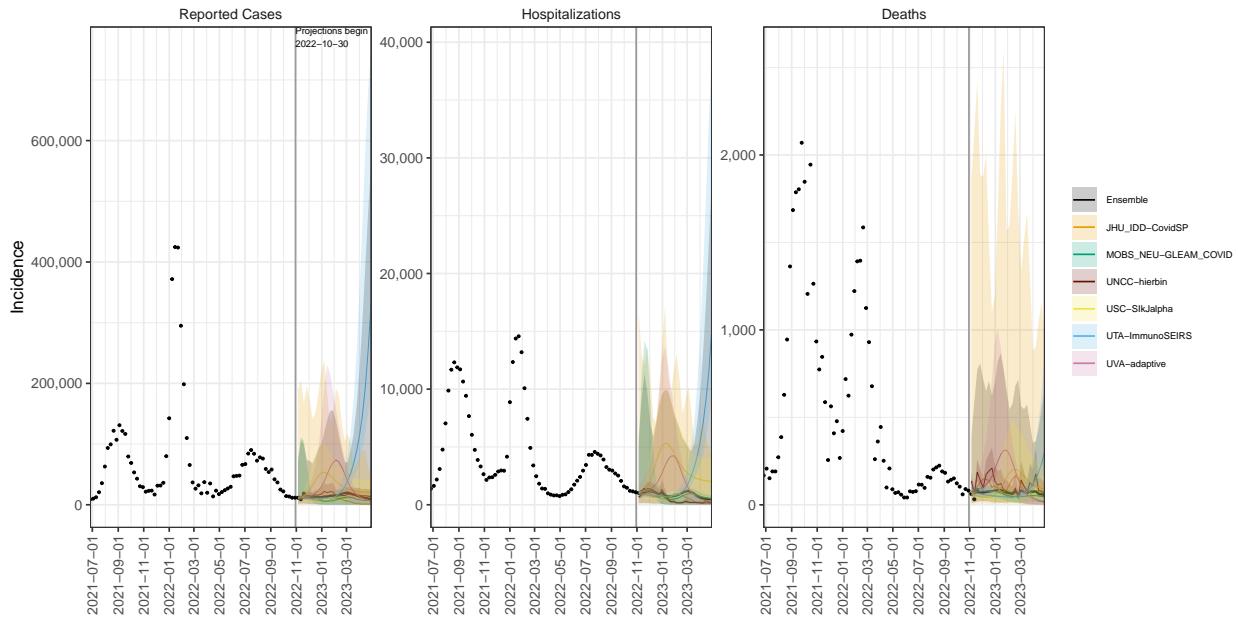
### SD model variance & 95% projection intervals – Low booster, Moderate immune escape variant



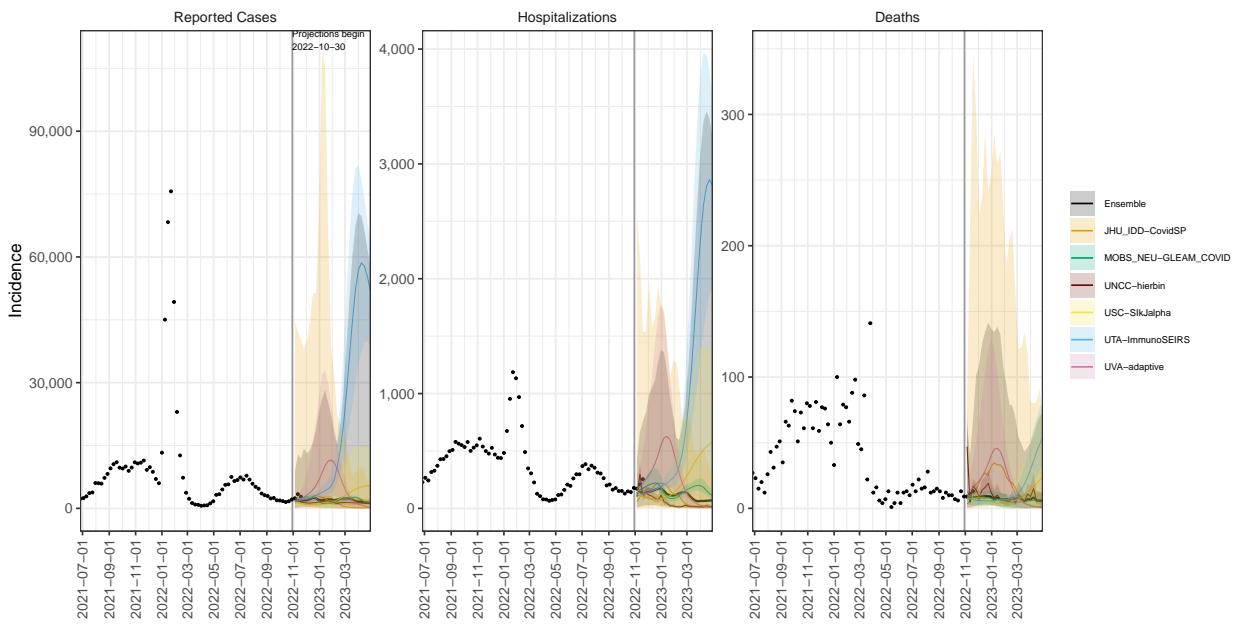
### TN model variance & 95% projection intervals – Low booster, Moderate immune escape variant



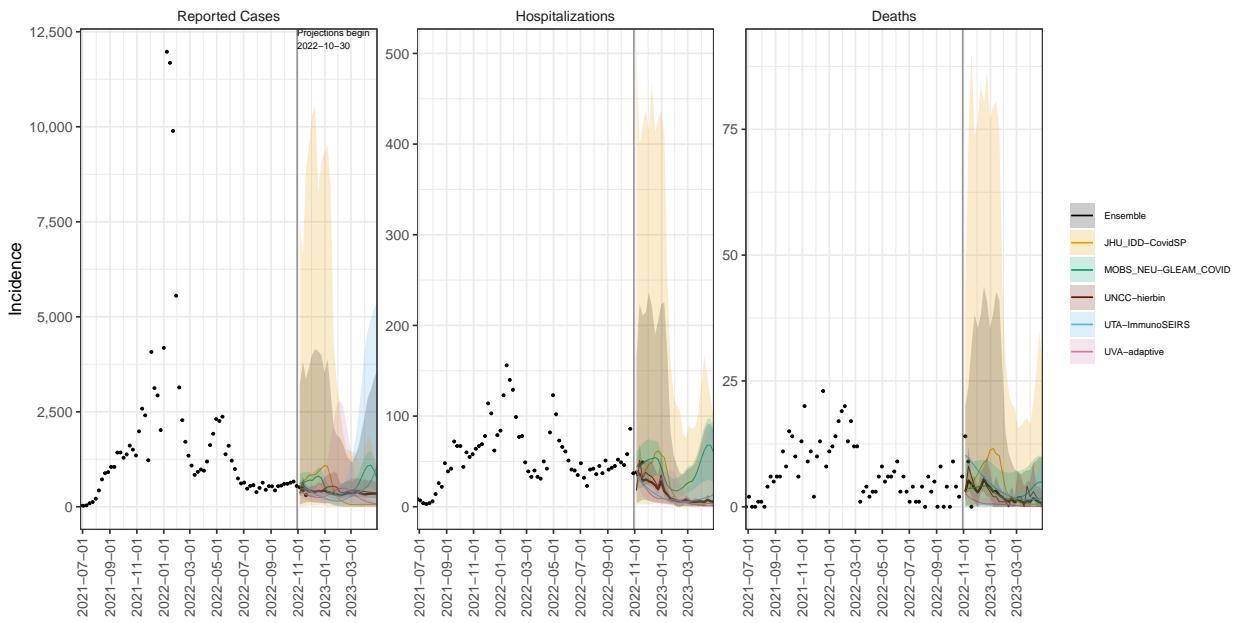
### TX model variance & 95% projection intervals – Low booster, Moderate immune escape variant



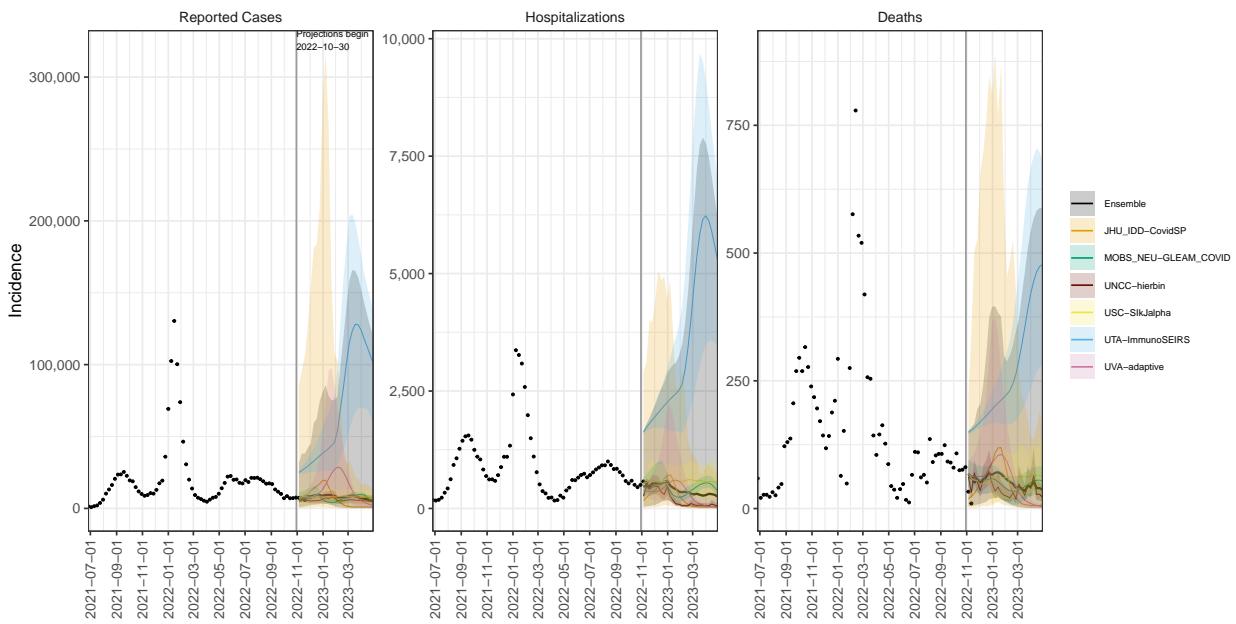
### UT model variance & 95% projection intervals – Low booster, Moderate immune escape variant



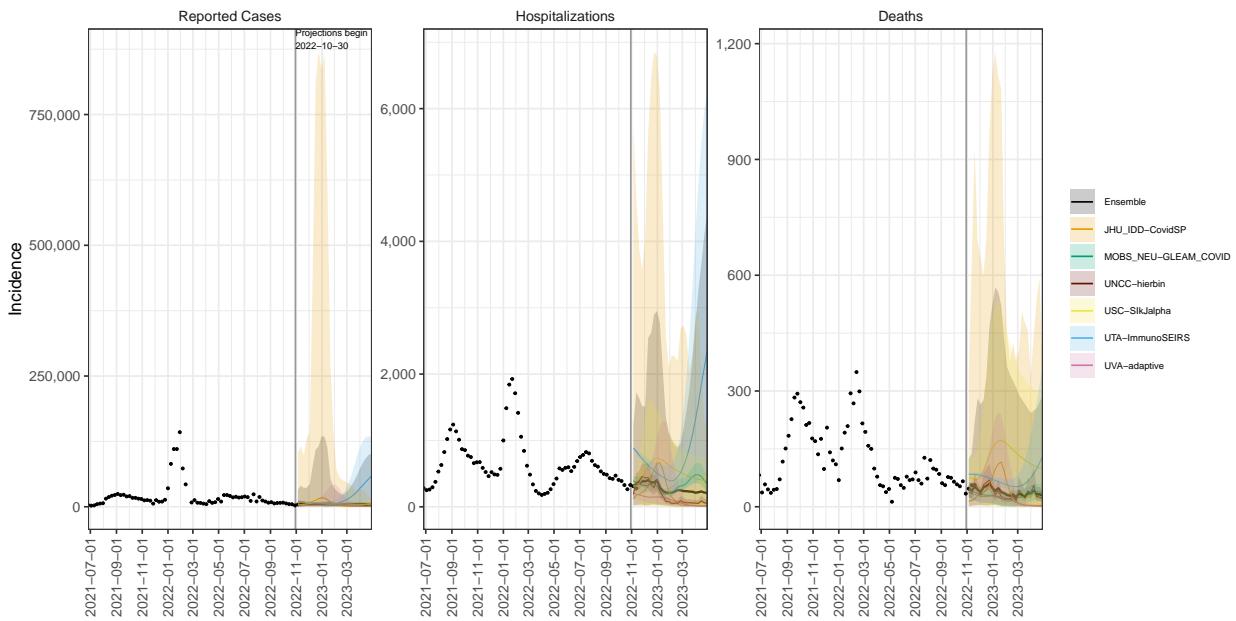
### VT model variance & 95% projection intervals – Low booster, Moderate immune escape variant



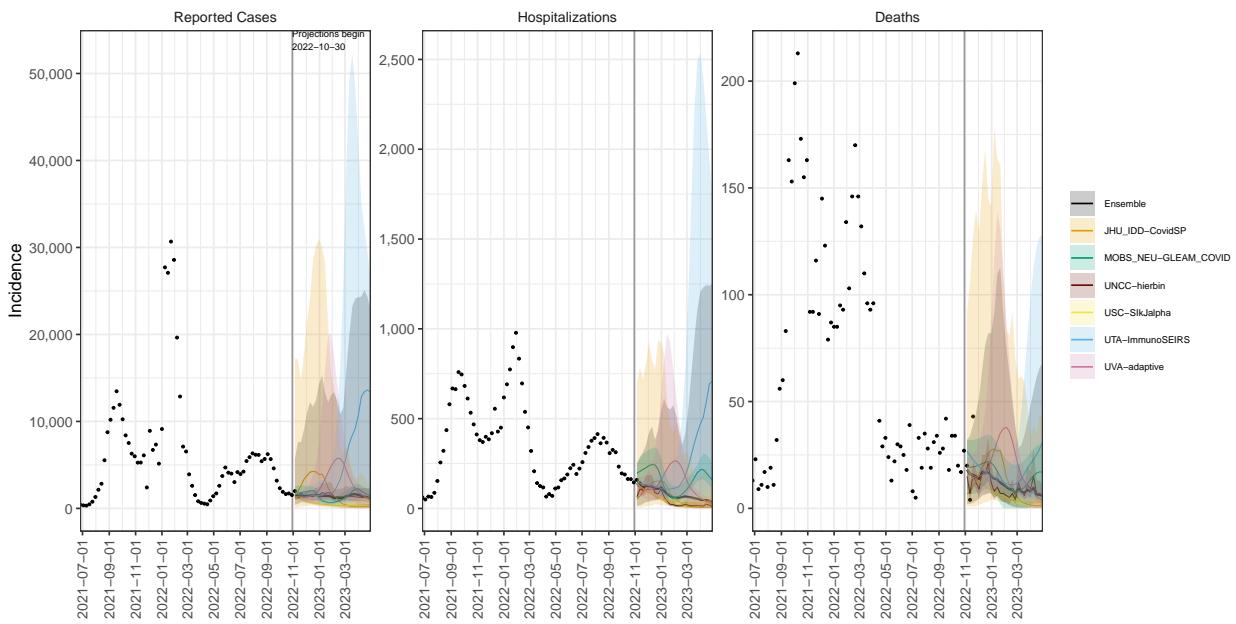
VA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



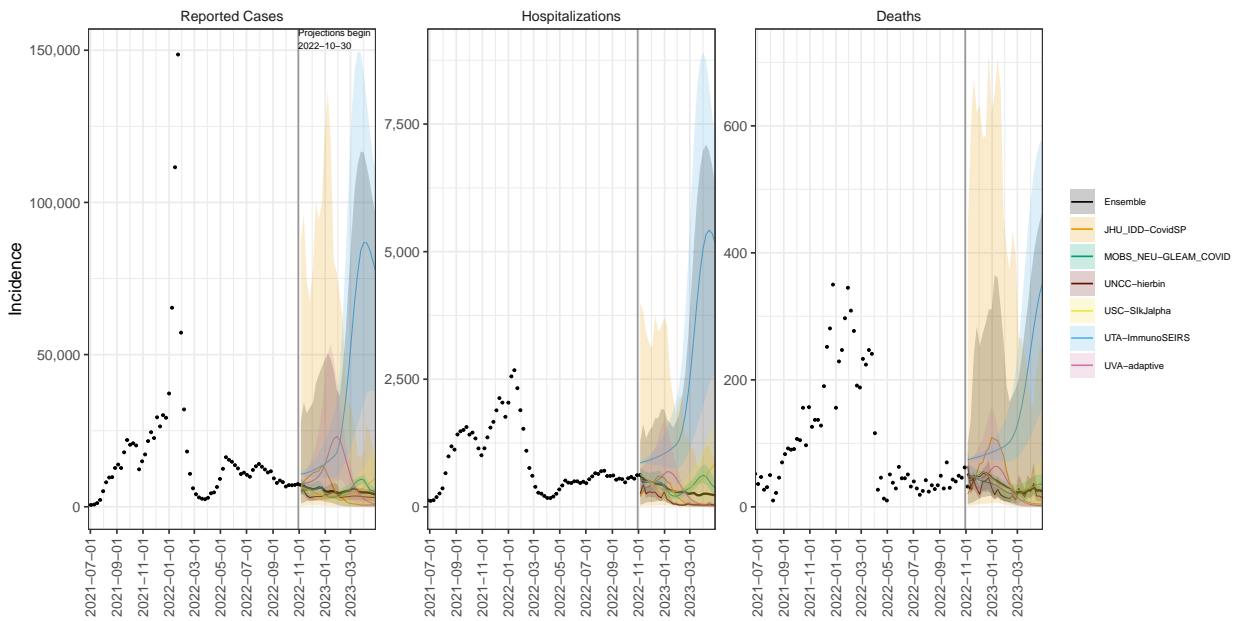
WA model variance & 95% projection intervals – Low booster, Moderate immune escape variant



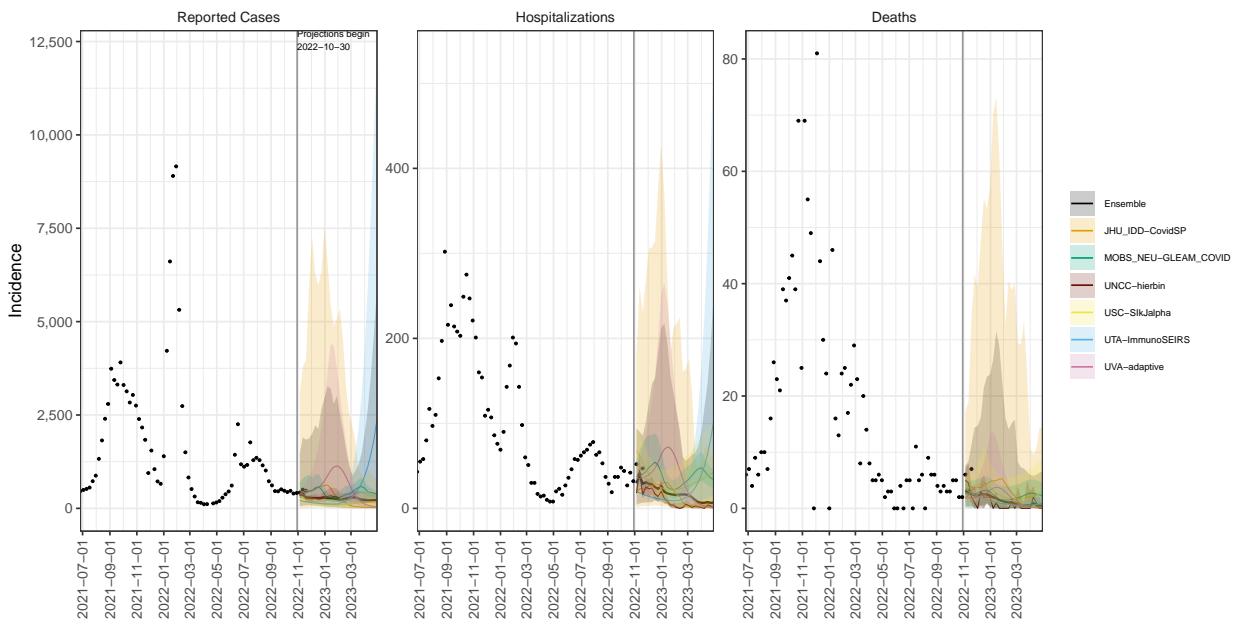
### WV model variance & 95% projection intervals – Low booster, Moderate immune escape variant



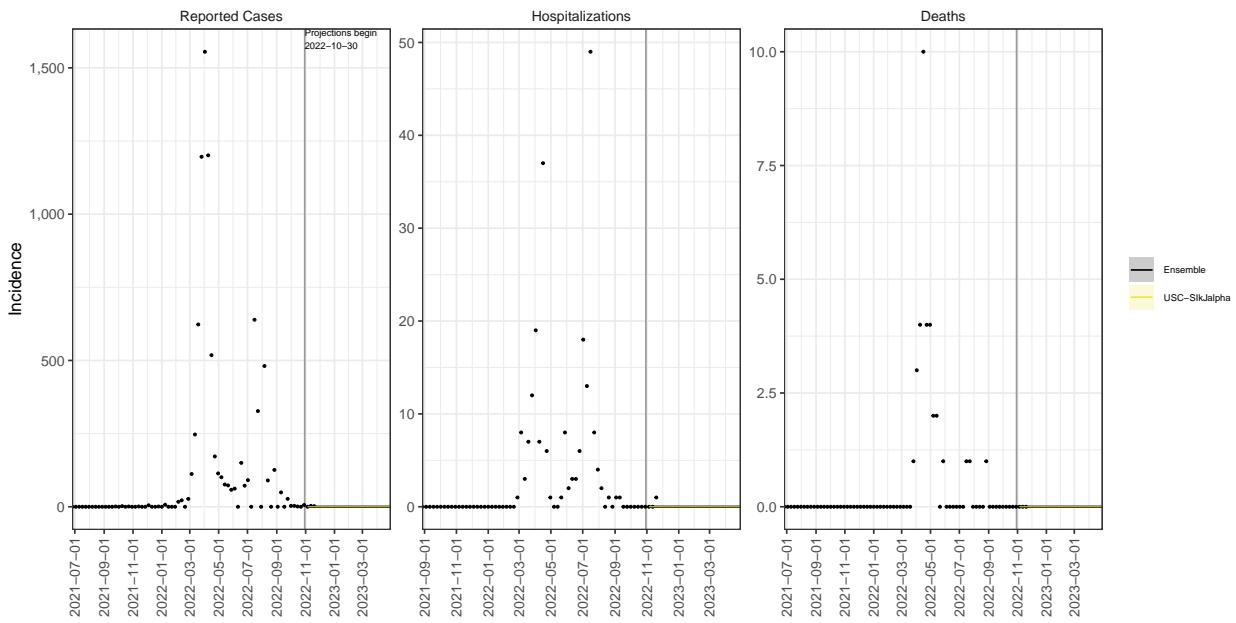
### WI model variance & 95% projection intervals – Low booster, Moderate immune escape variant



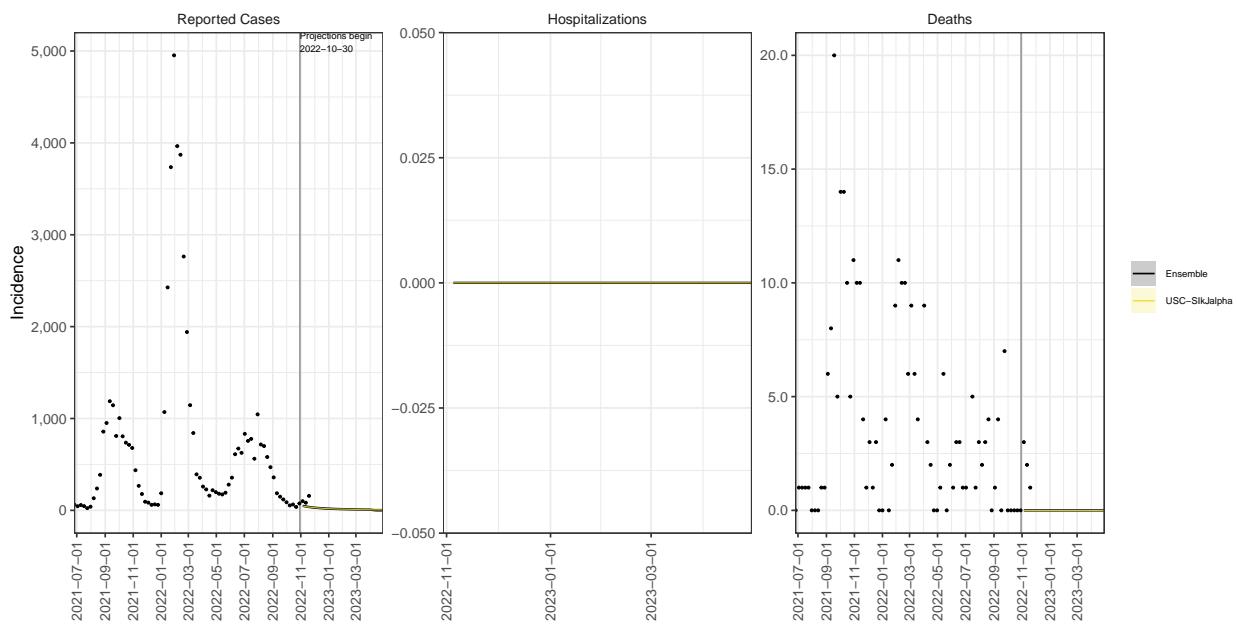
WY model variance & 95% projection intervals – Low booster, Moderate immune escape variant



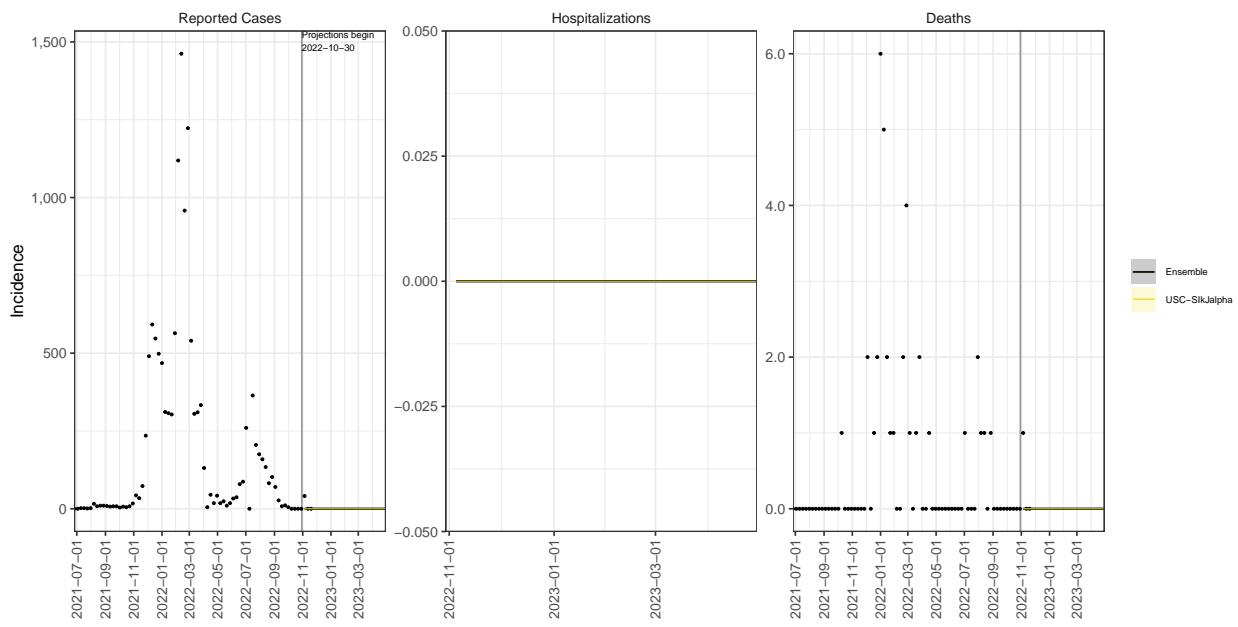
AS model variance & 95% projection intervals – Low booster, Moderate immune escape variant



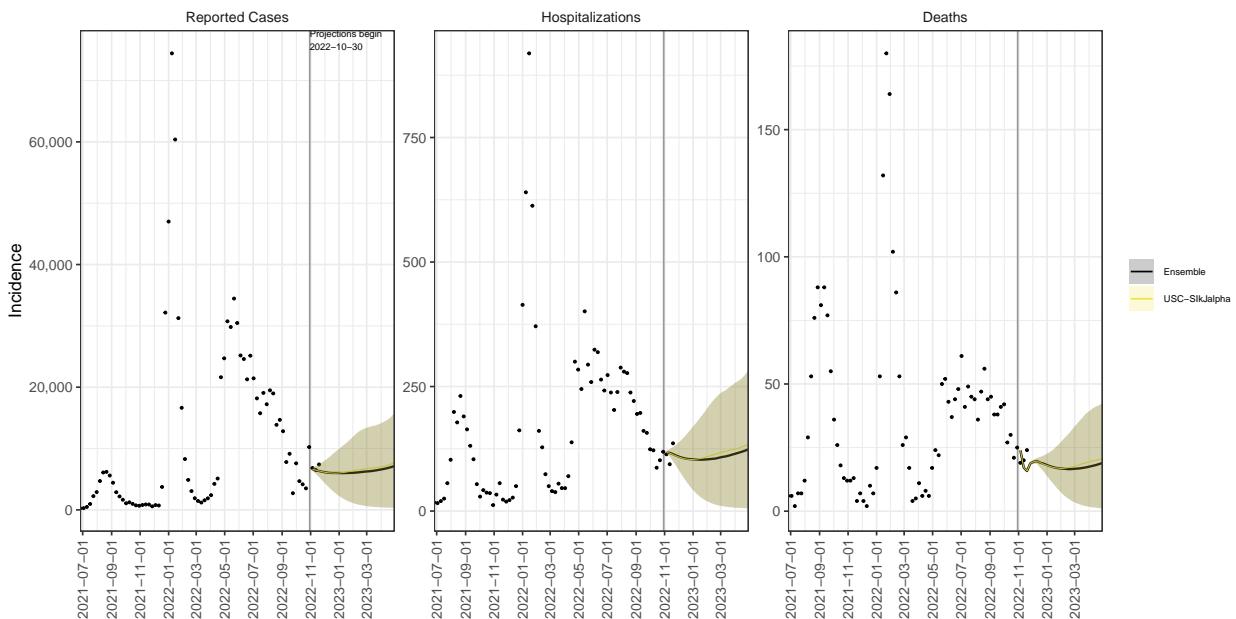
GU model variance & 95% projection intervals – Low booster, Moderate immune escape variant



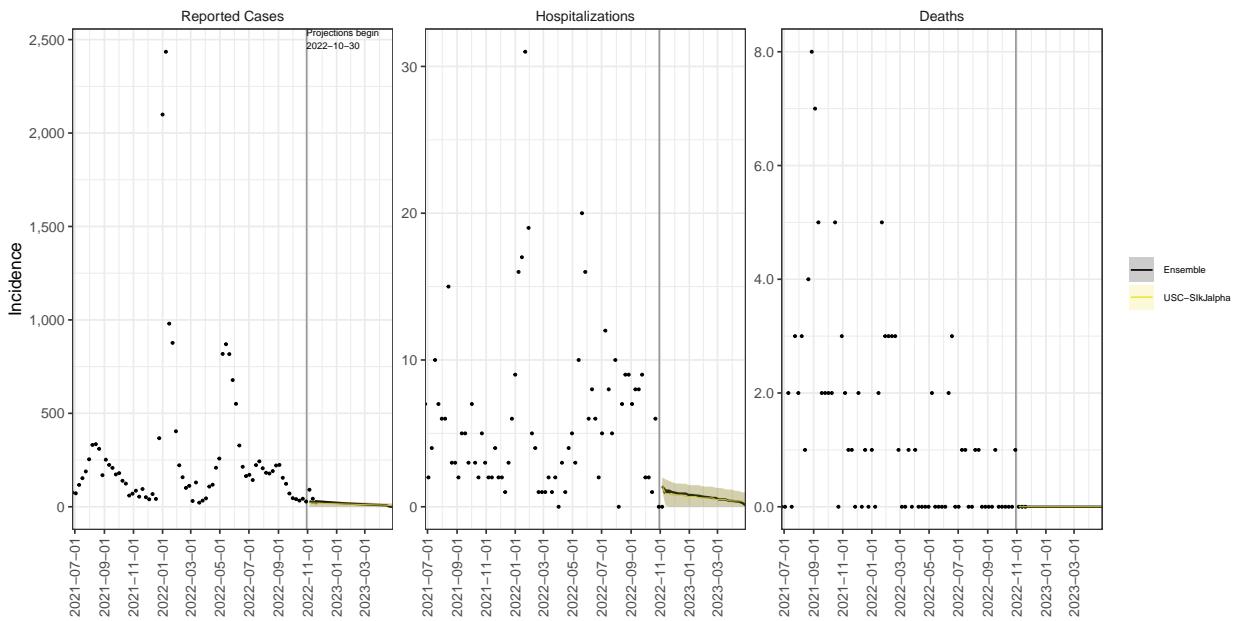
MP model variance & 95% projection intervals – Low booster, Moderate immune escape variant



PR model variance & 95% projection intervals – Low booster, Moderate immune escape variant

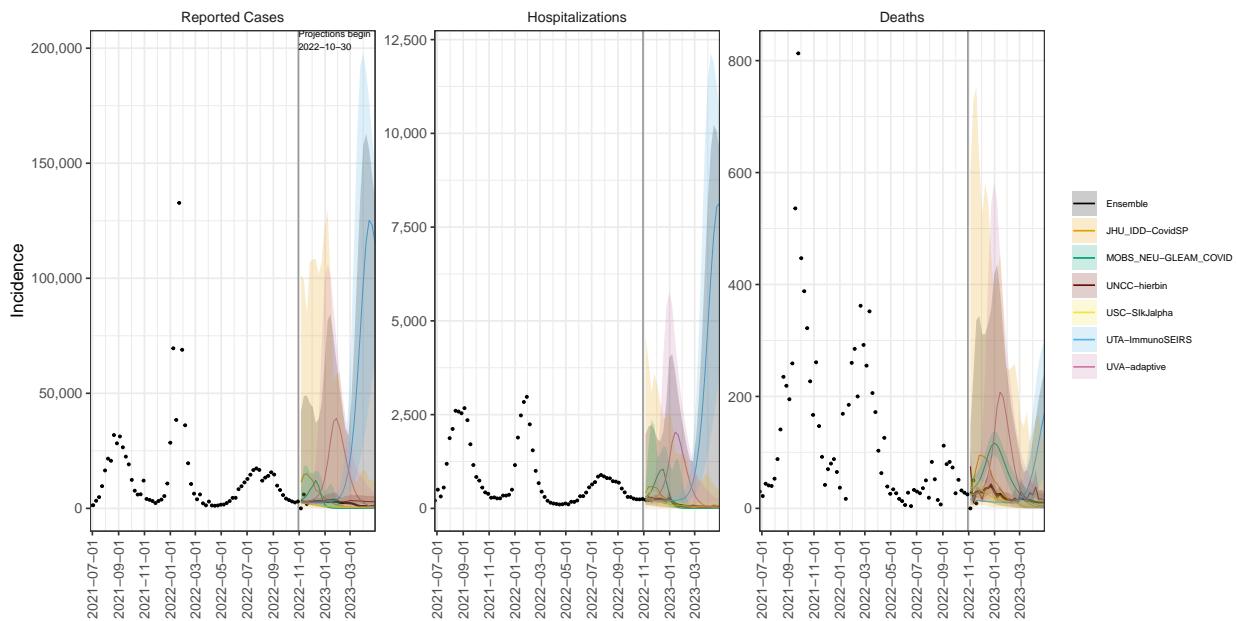


VI model variance & 95% projection intervals – Low booster, Moderate immune escape variant

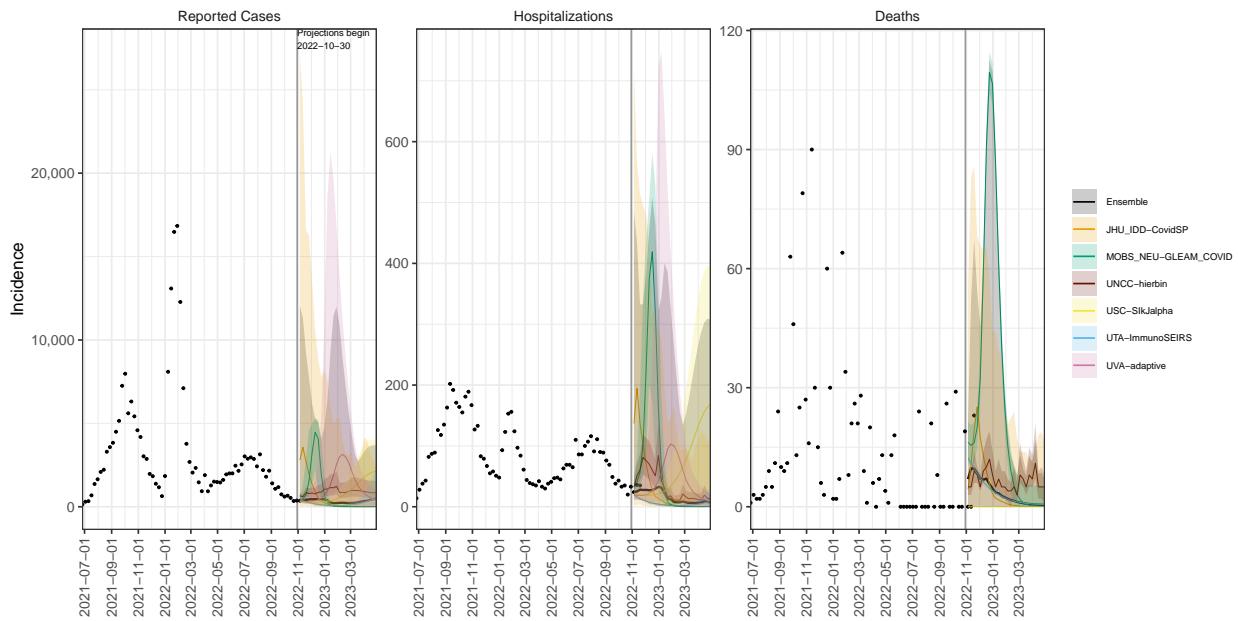


National model variation for the Low booster, High immune escape variant scenario.

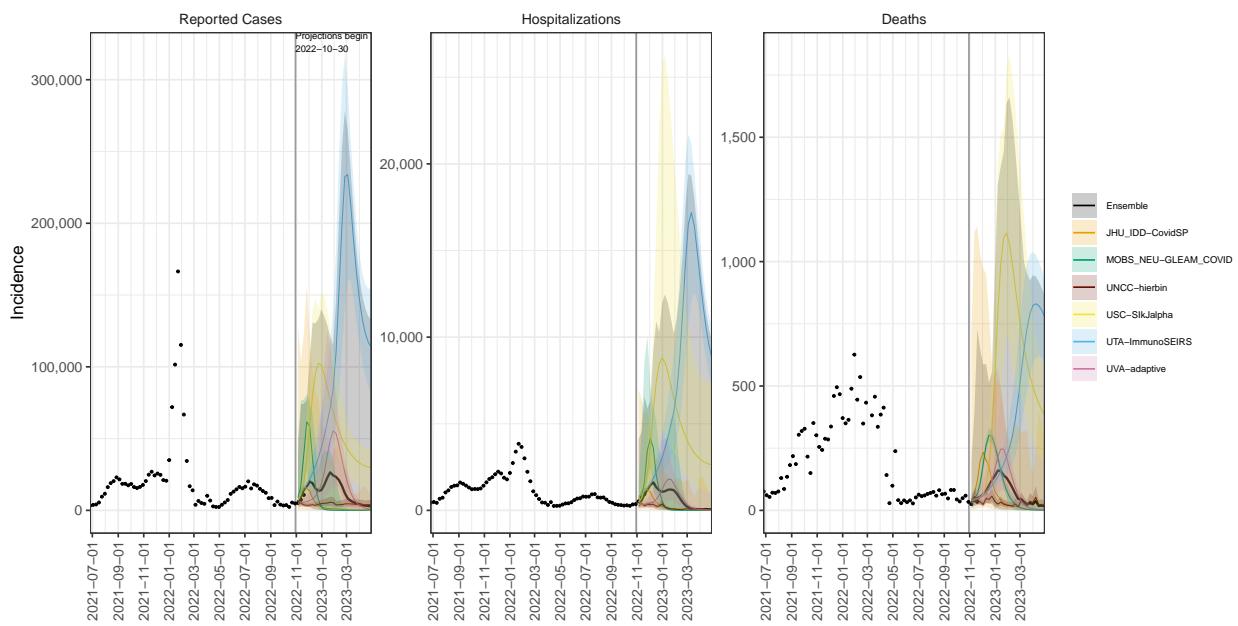
AL model variance & 95% projection intervals – Low booster, High immune escape variant



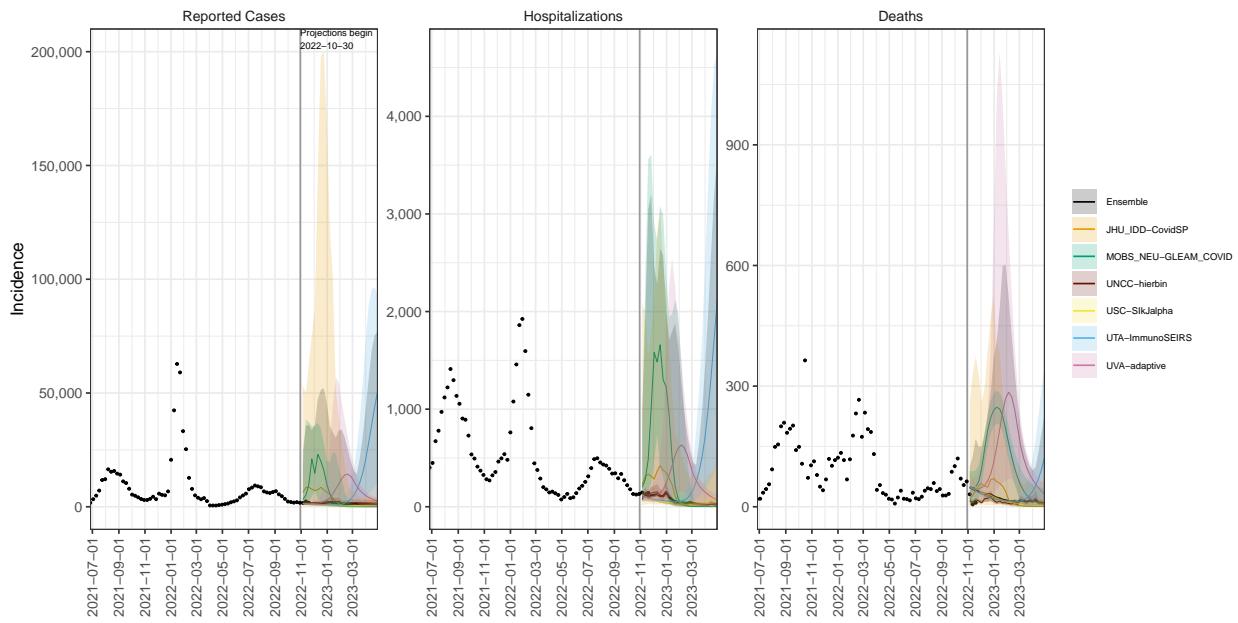
AK model variance & 95% projection intervals – Low booster, High immune escape variant



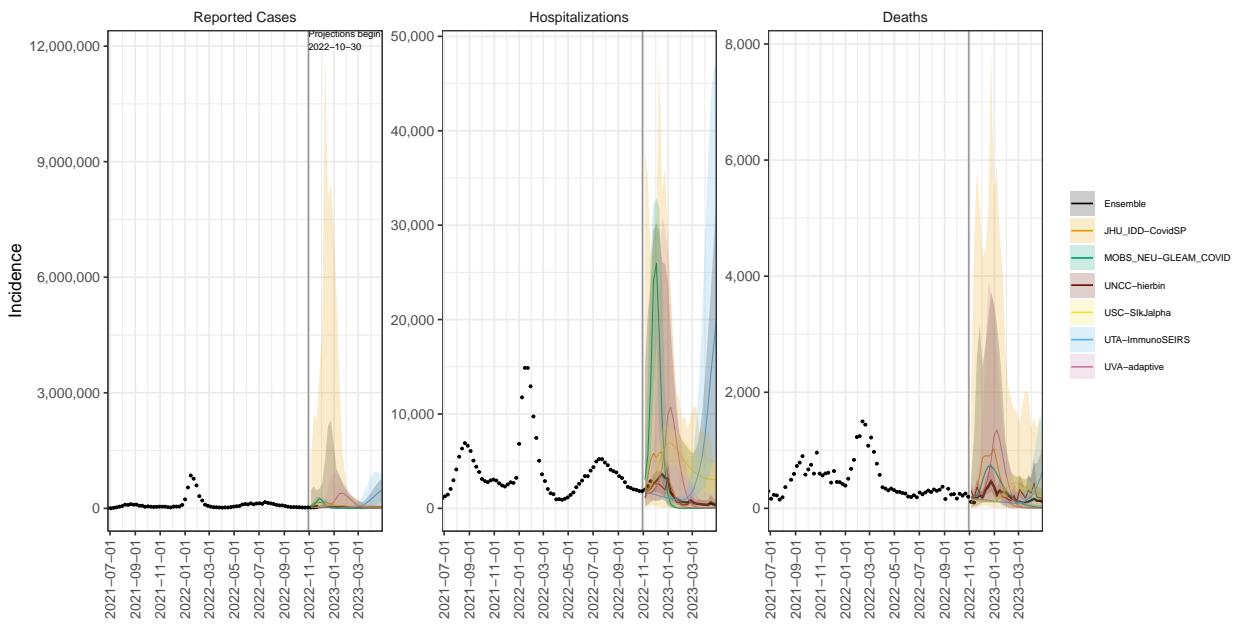
AZ model variance & 95% projection intervals – Low booster, High immune escape variant



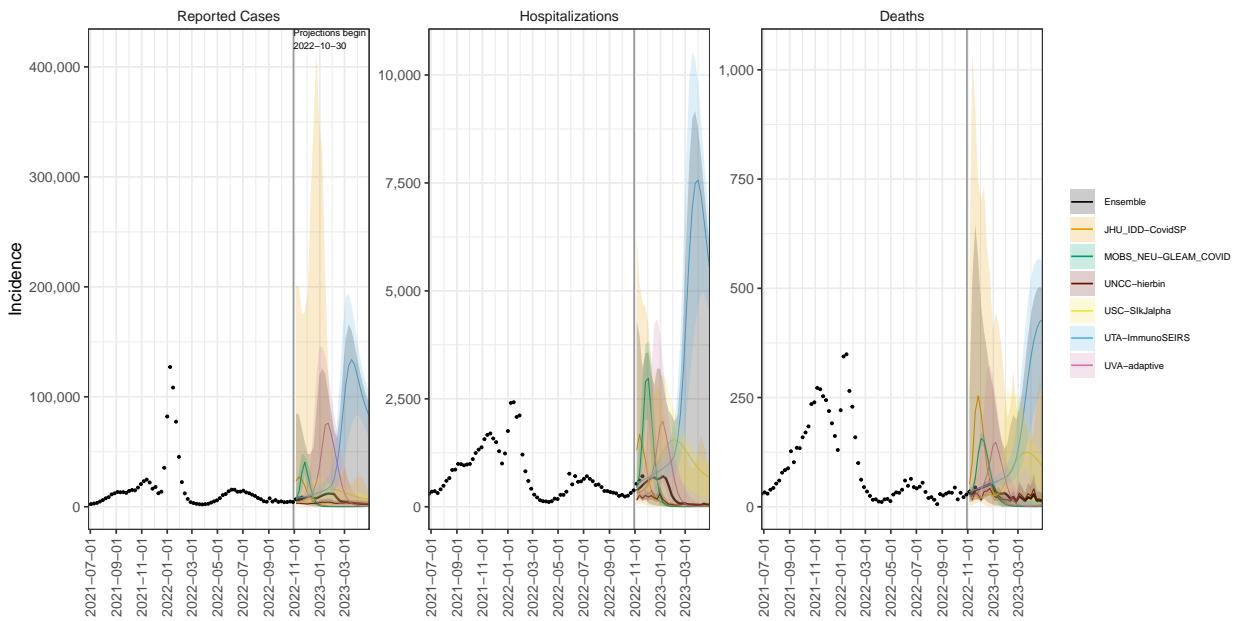
AR model variance & 95% projection intervals – Low booster, High immune escape variant



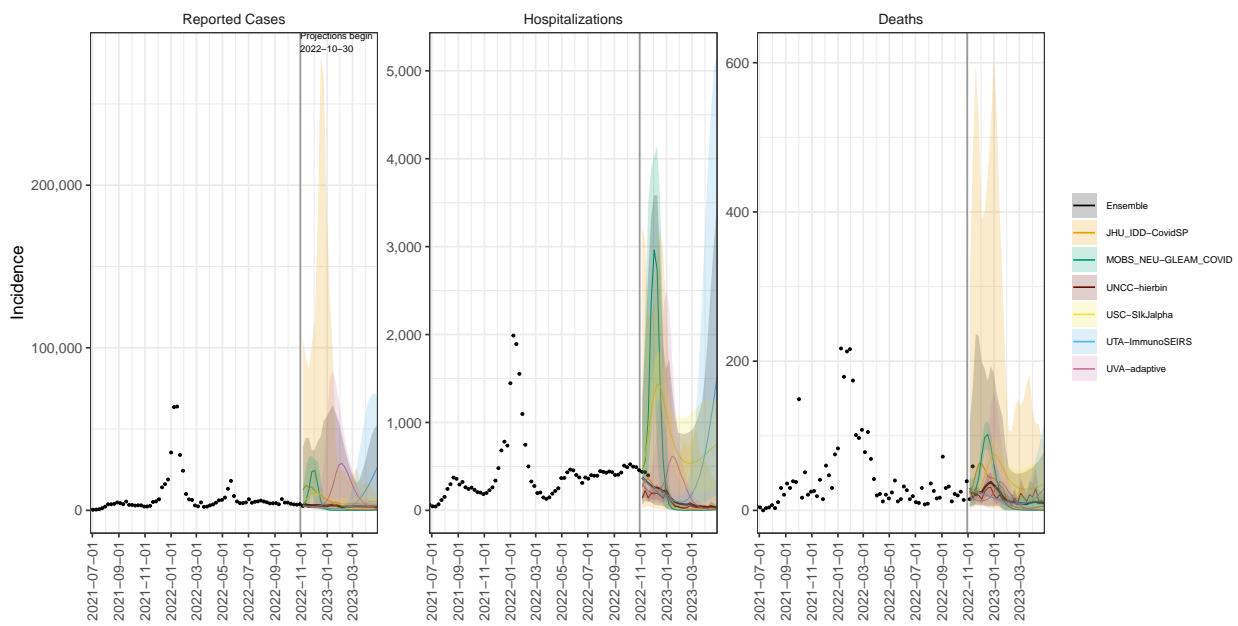
### CA model variance & 95% projection intervals – Low booster, High immune escape variant



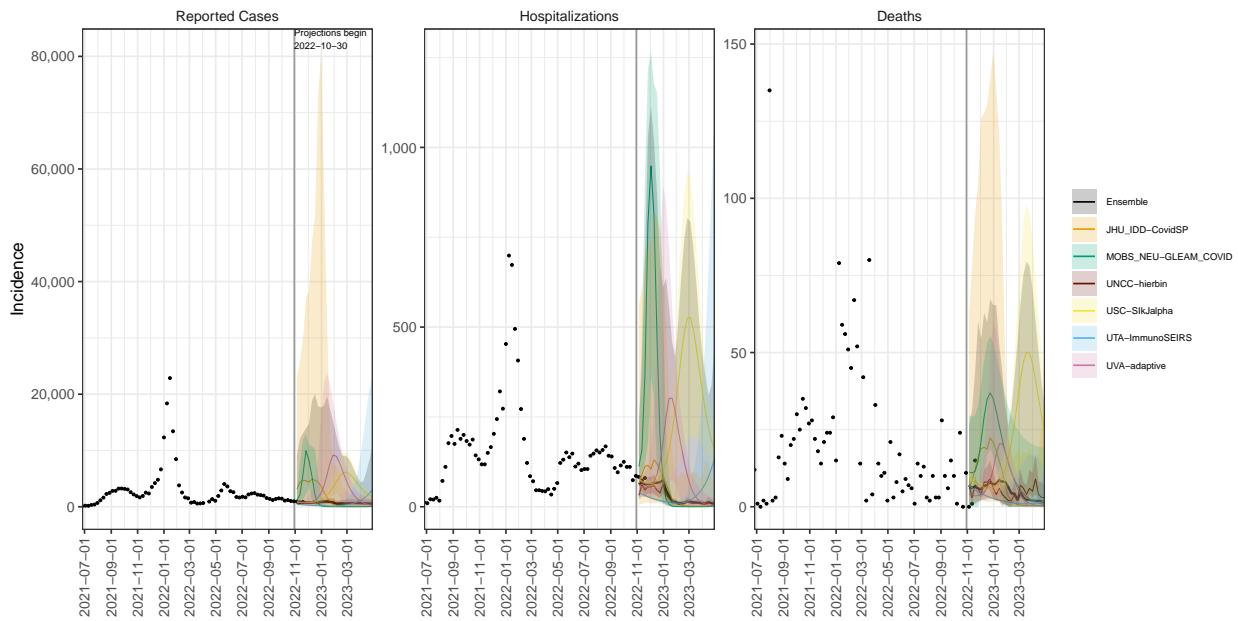
### CO model variance & 95% projection intervals – Low booster, High immune escape variant



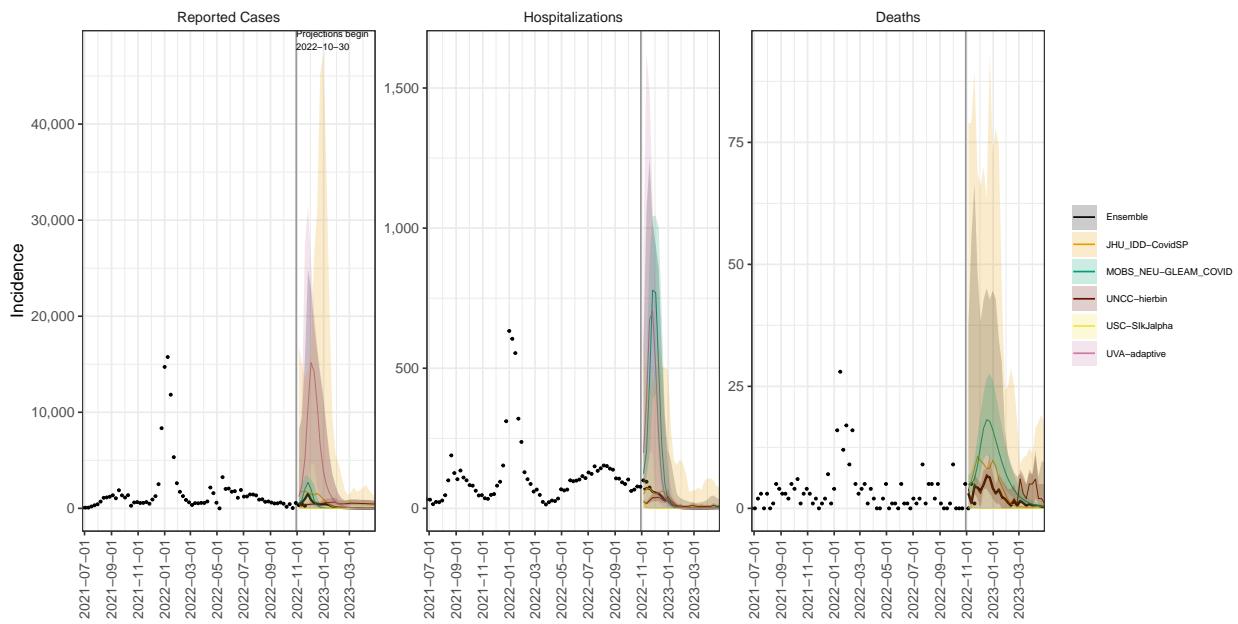
CT model variance & 95% projection intervals – Low booster, High immune escape variant



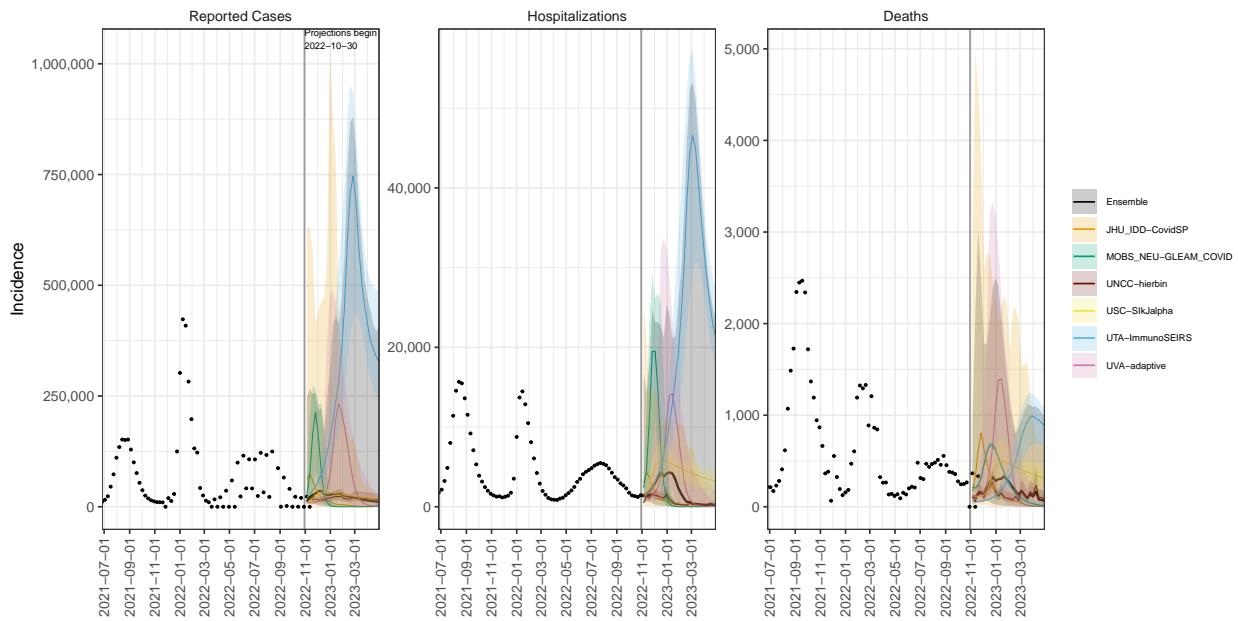
DE model variance & 95% projection intervals – Low booster, High immune escape variant



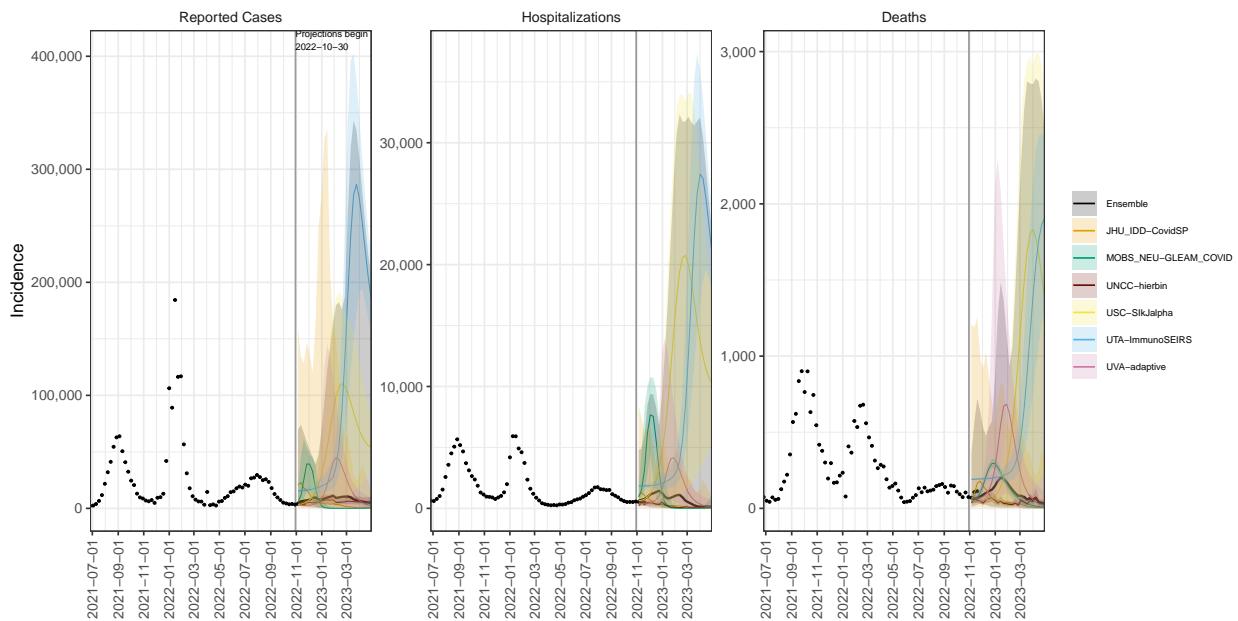
DC model variance & 95% projection intervals – Low booster, High immune escape variant



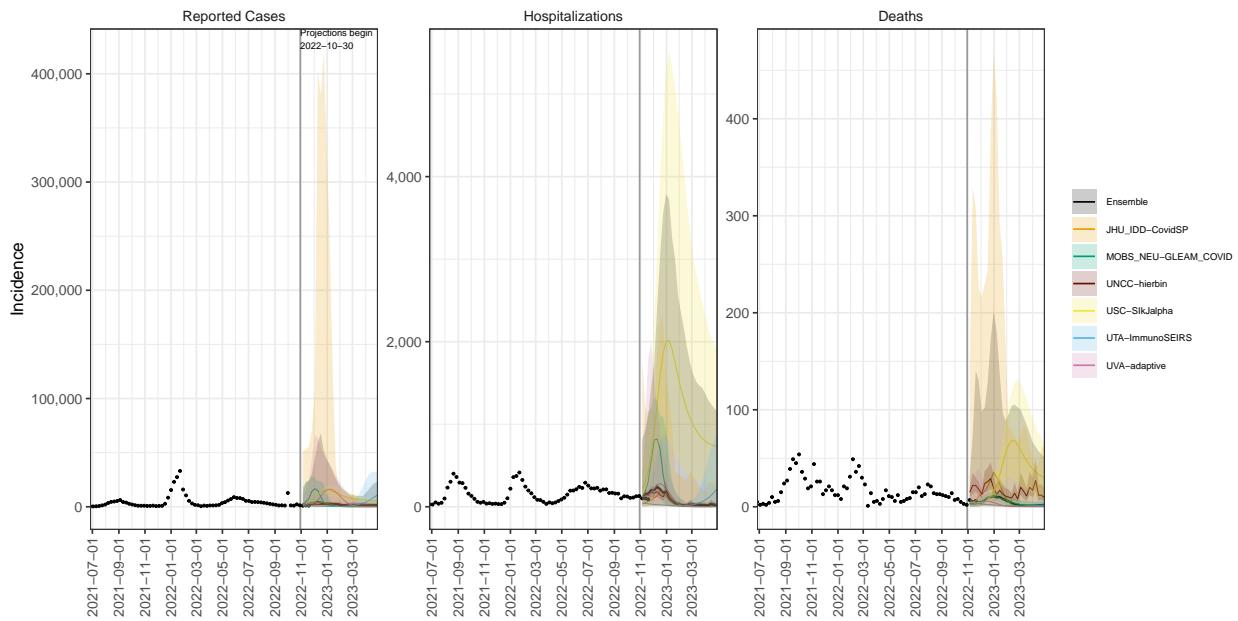
FL model variance & 95% projection intervals – Low booster, High immune escape variant



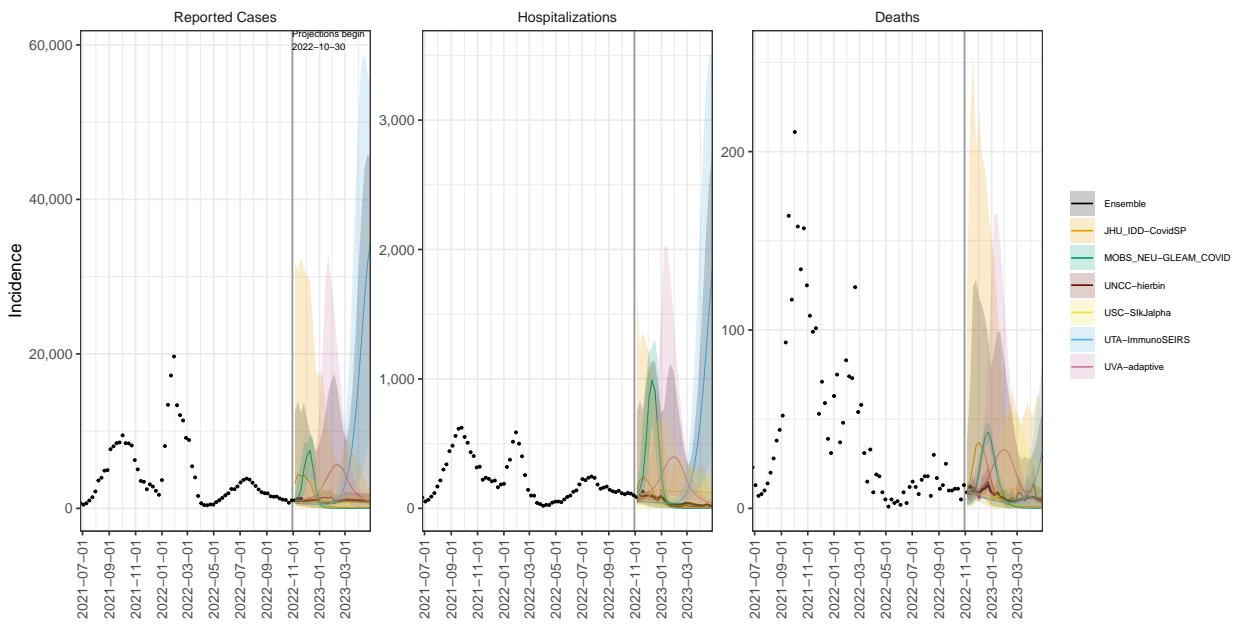
### GA model variance & 95% projection intervals – Low booster, High immune escape variant



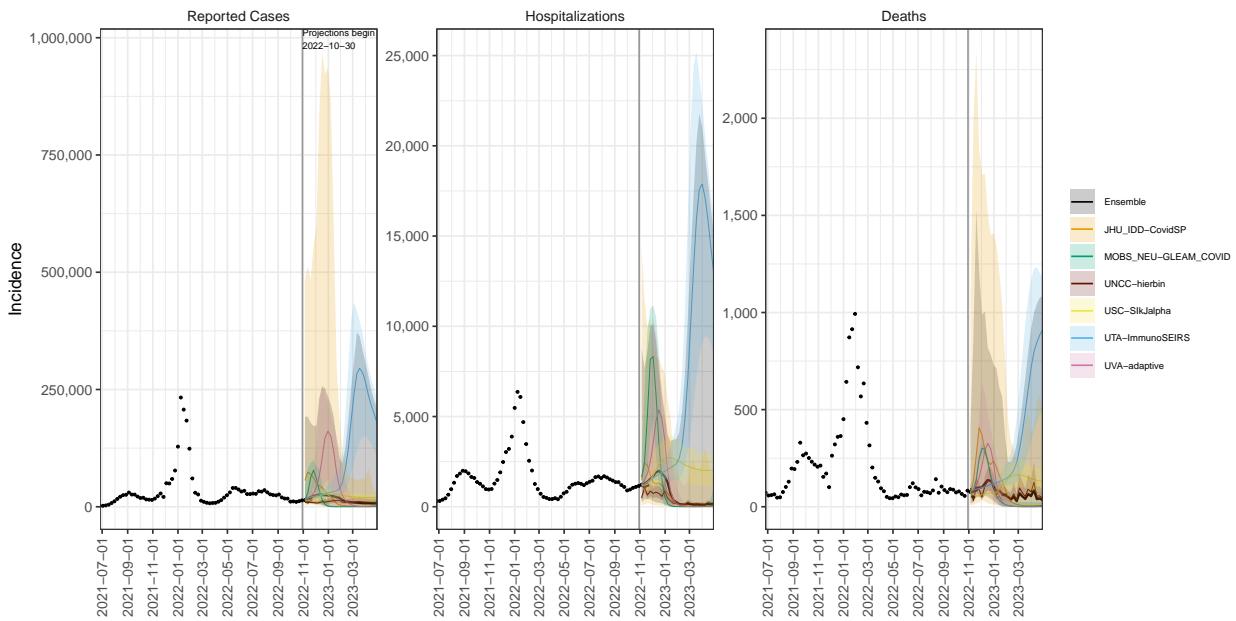
### HI model variance & 95% projection intervals – Low booster, High immune escape variant



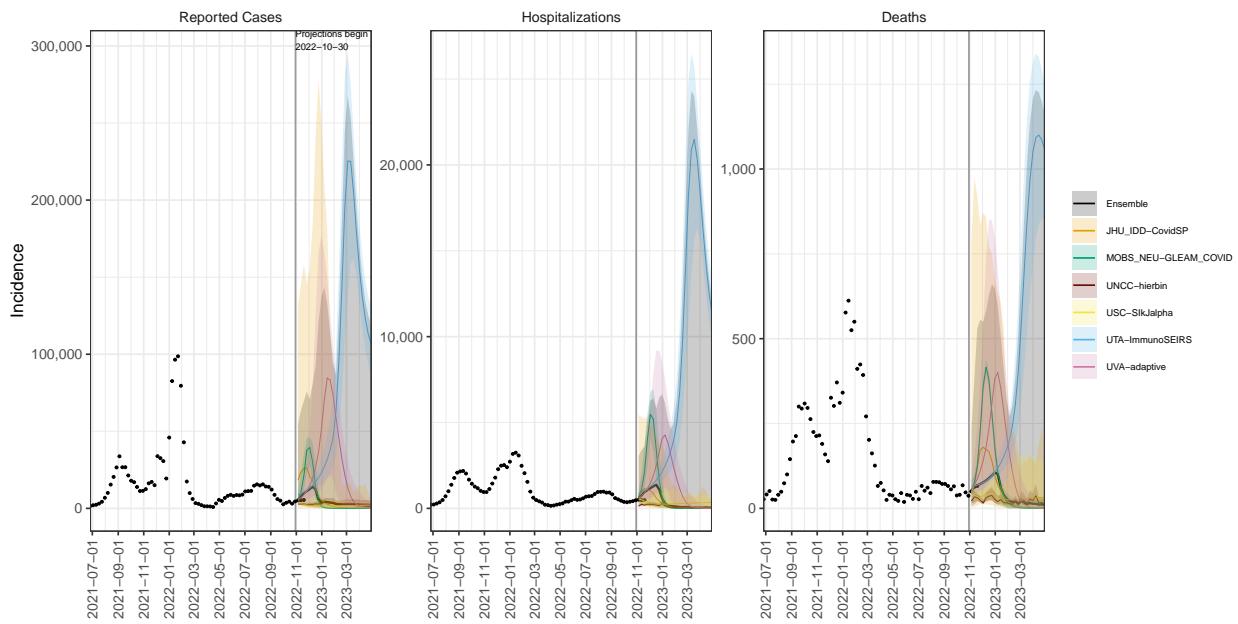
ID model variance & 95% projection intervals – Low booster, High immune escape variant



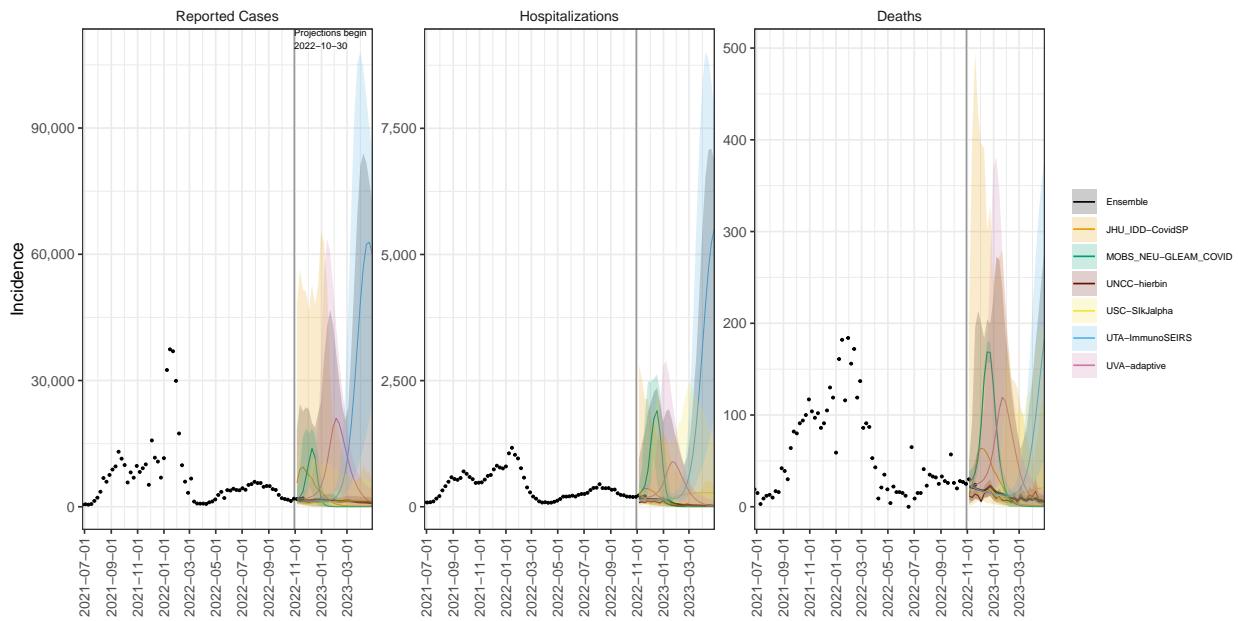
IL model variance & 95% projection intervals – Low booster, High immune escape variant



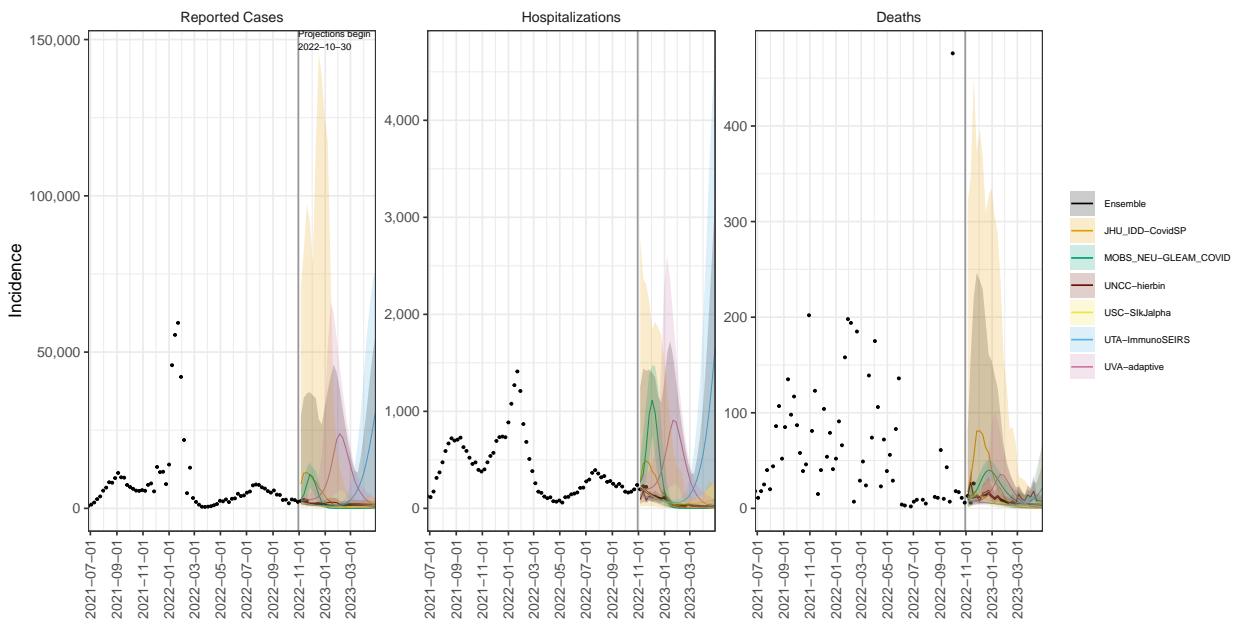
IN model variance & 95% projection intervals – Low booster, High immune escape variant



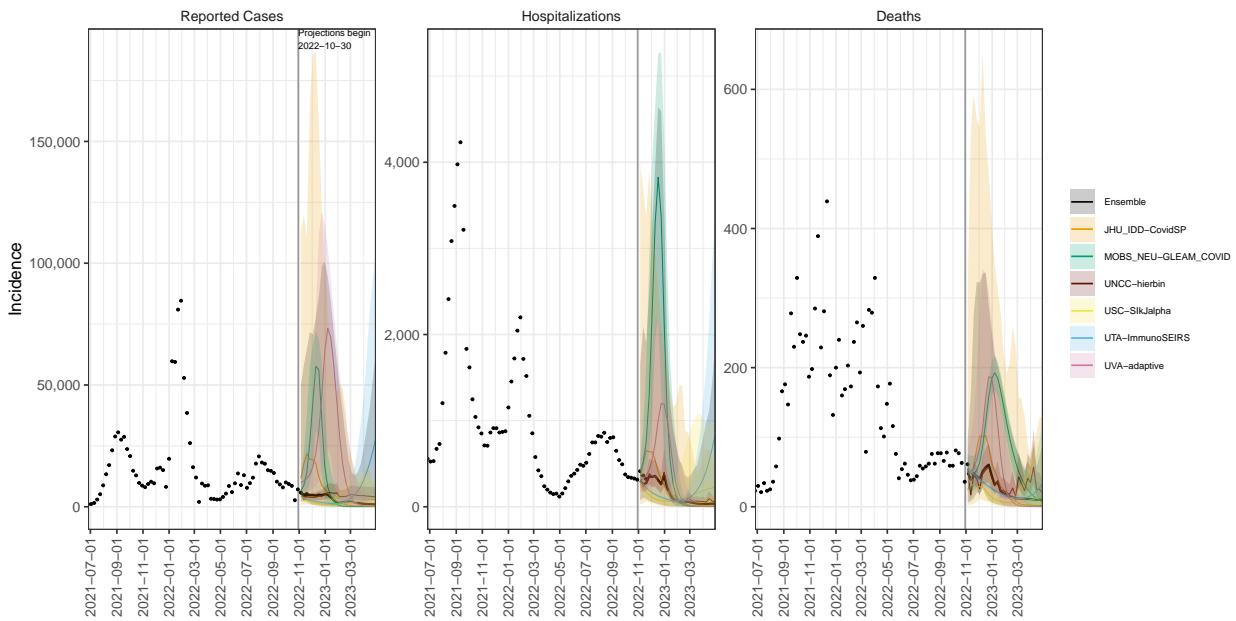
IA model variance & 95% projection intervals – Low booster, High immune escape variant



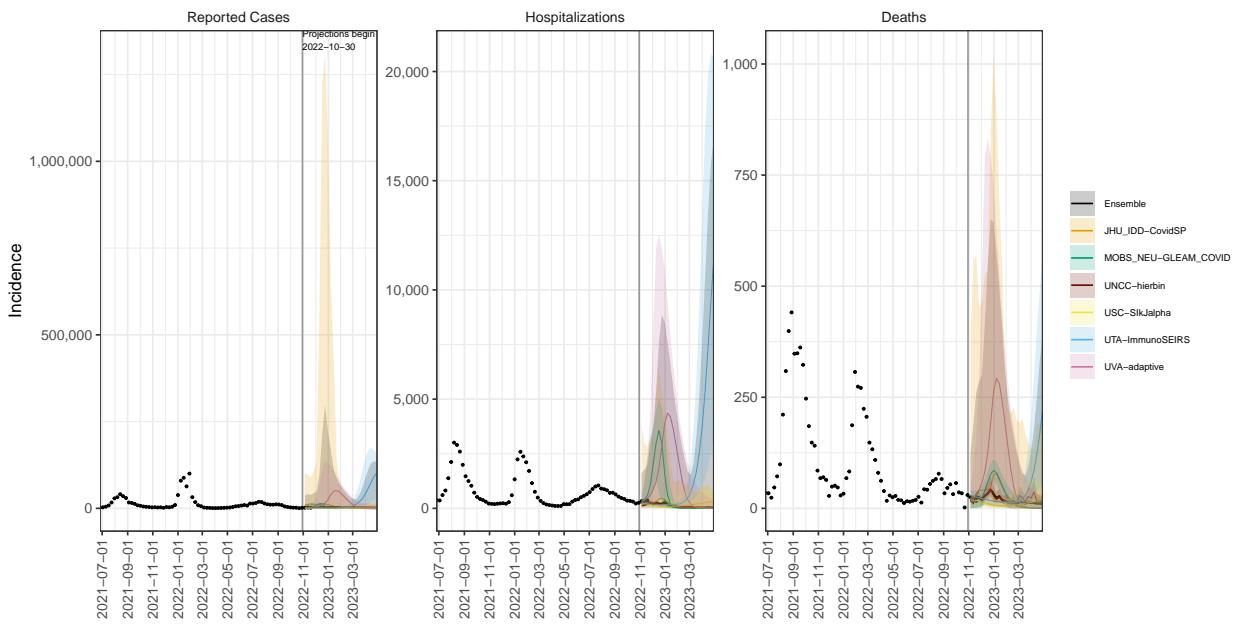
KS model variance & 95% projection intervals – Low booster, High immune escape variant



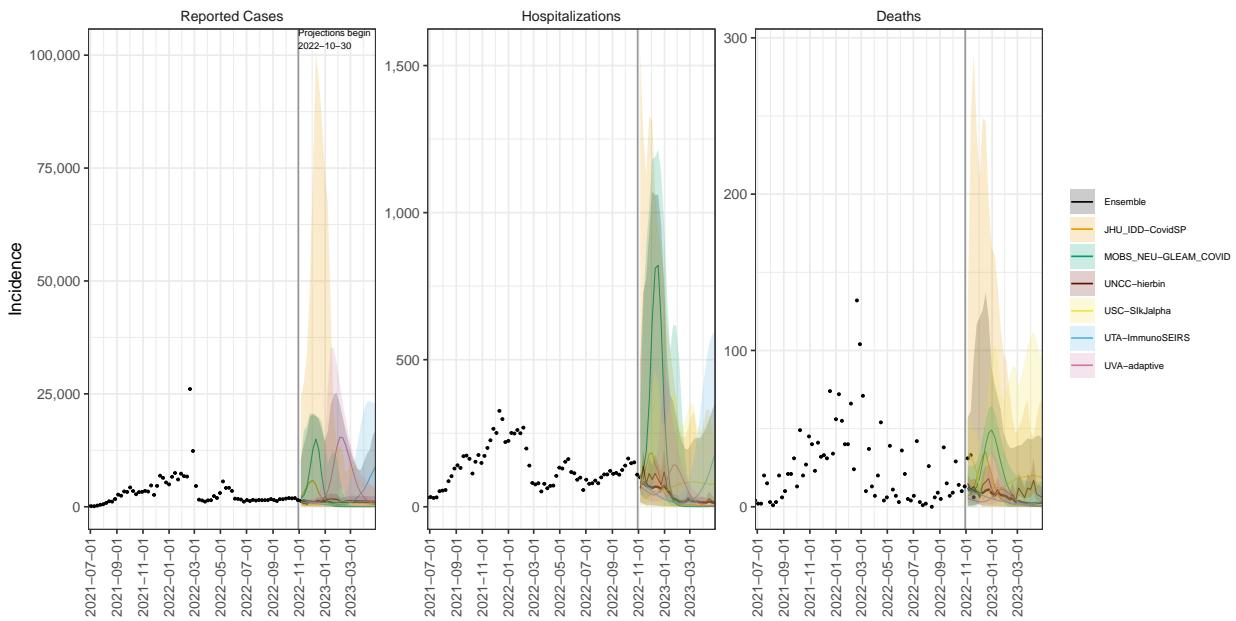
KY model variance & 95% projection intervals – Low booster, High immune escape variant



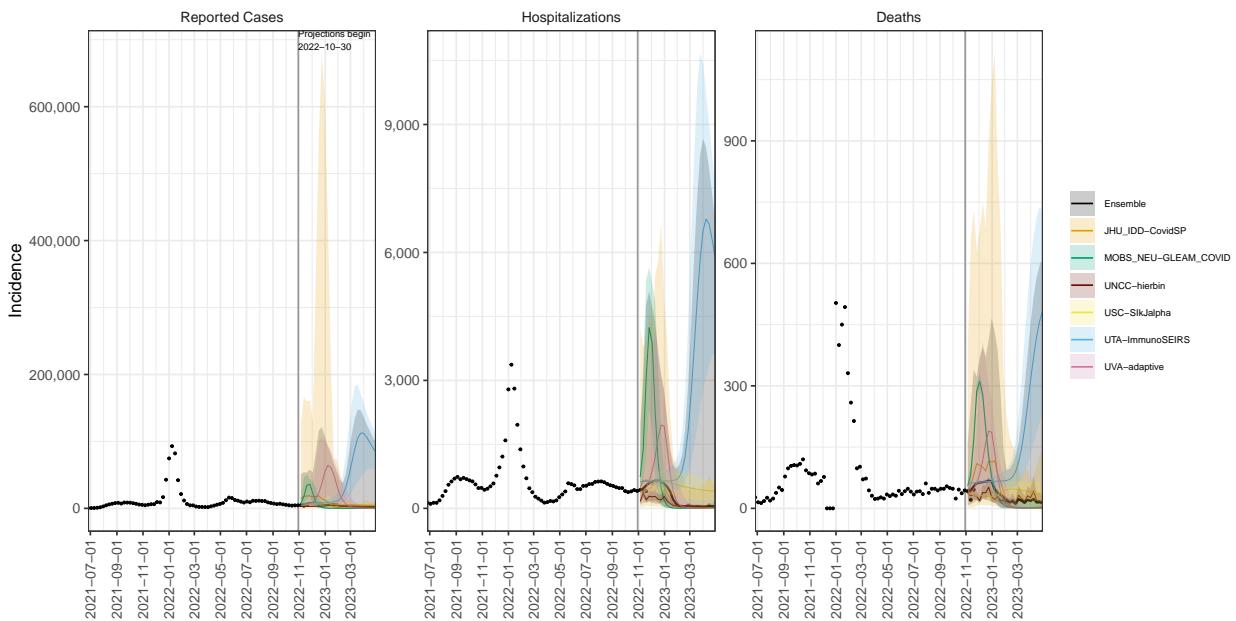
LA model variance & 95% projection intervals – Low booster, High immune escape variant



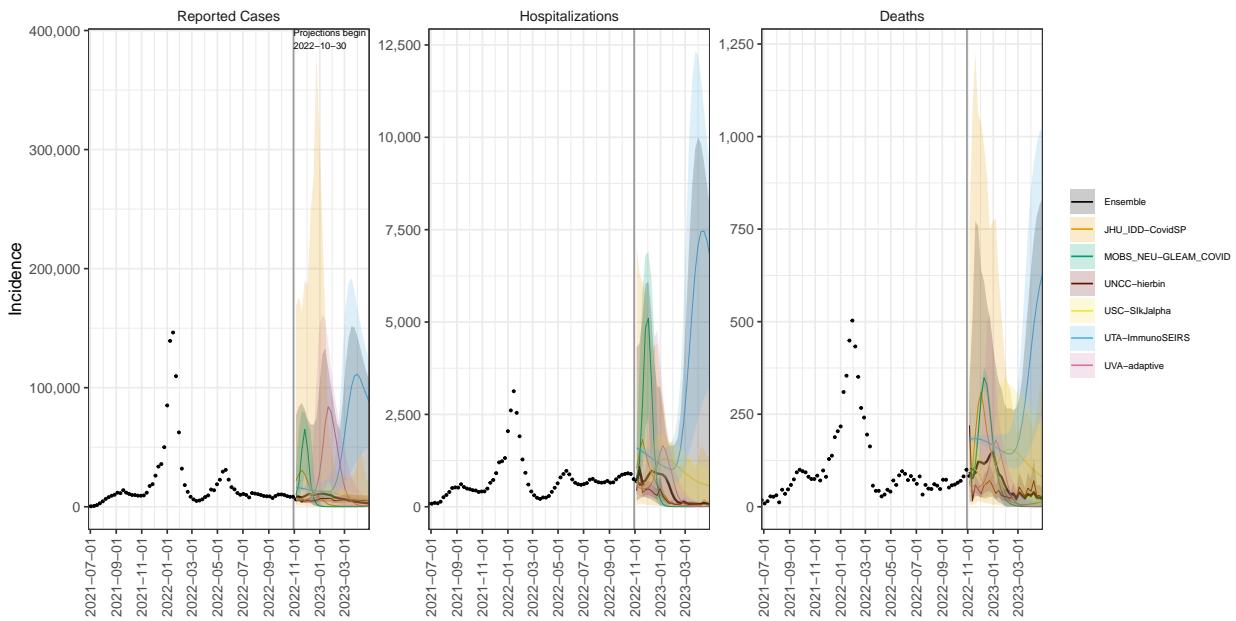
ME model variance & 95% projection intervals – Low booster, High immune escape variant



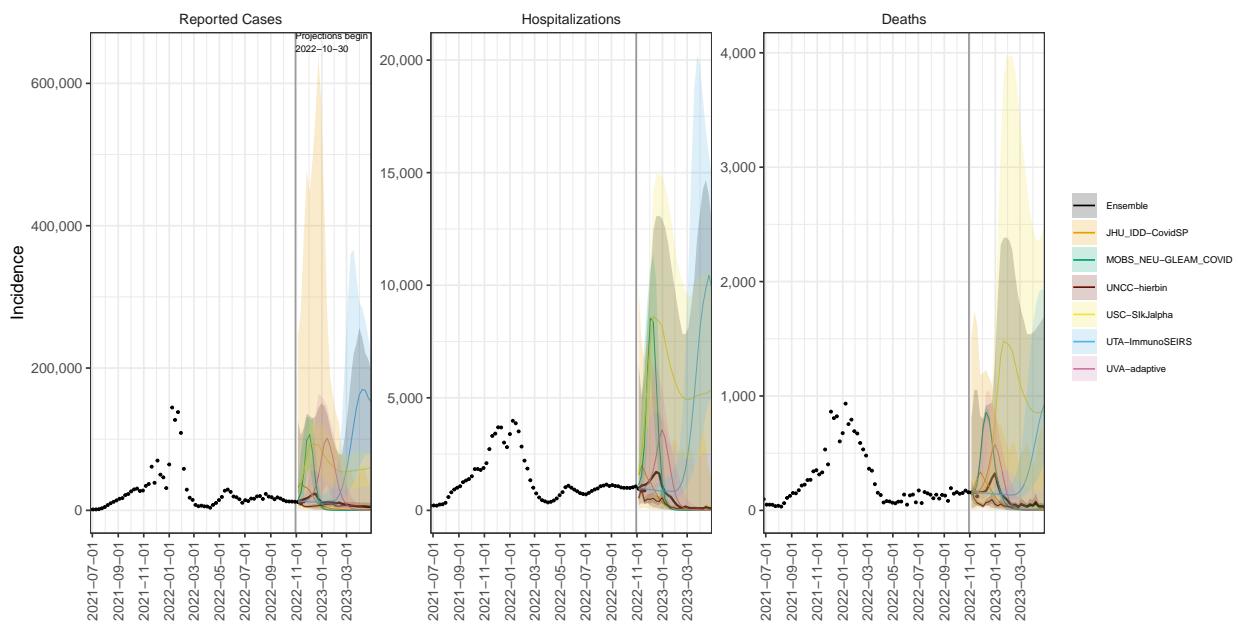
MD model variance & 95% projection intervals – Low booster, High immune escape variant



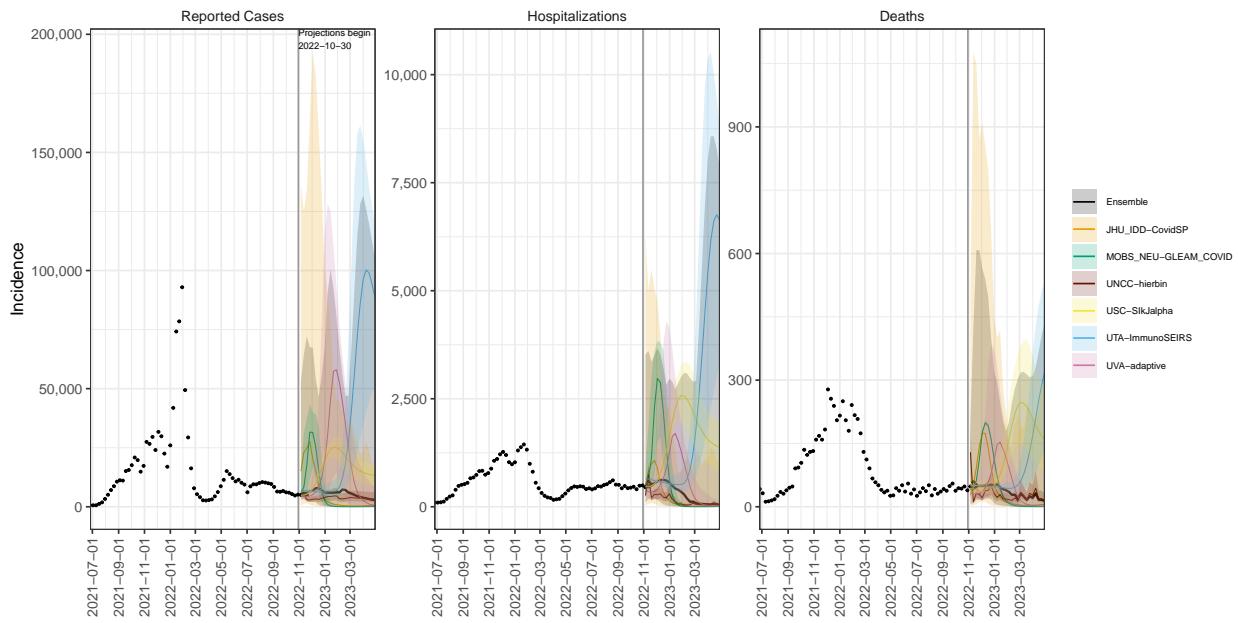
MA model variance & 95% projection intervals – Low booster, High immune escape variant



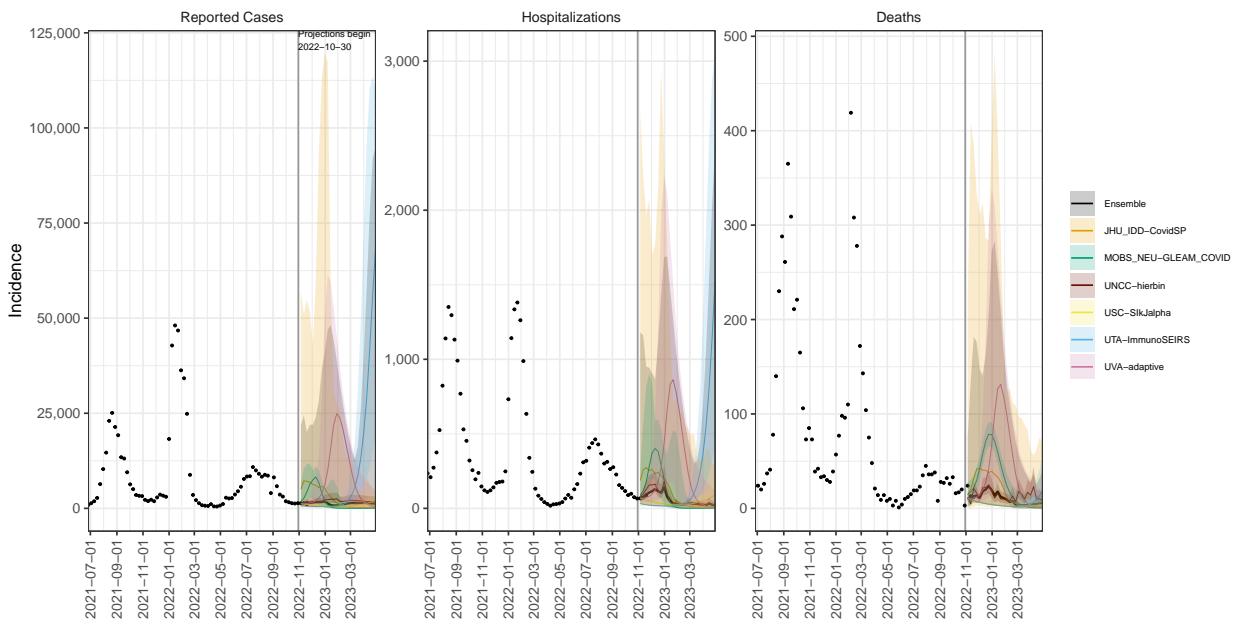
MI model variance & 95% projection intervals – Low booster, High immune escape variant



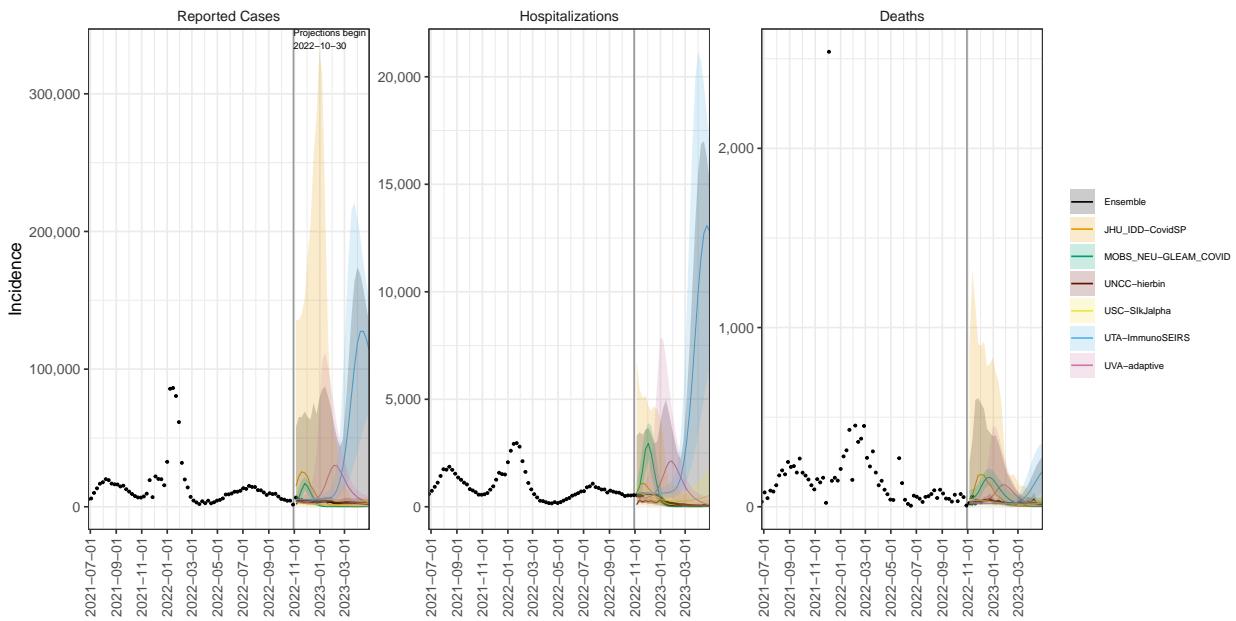
MN model variance & 95% projection intervals – Low booster, High immune escape variant



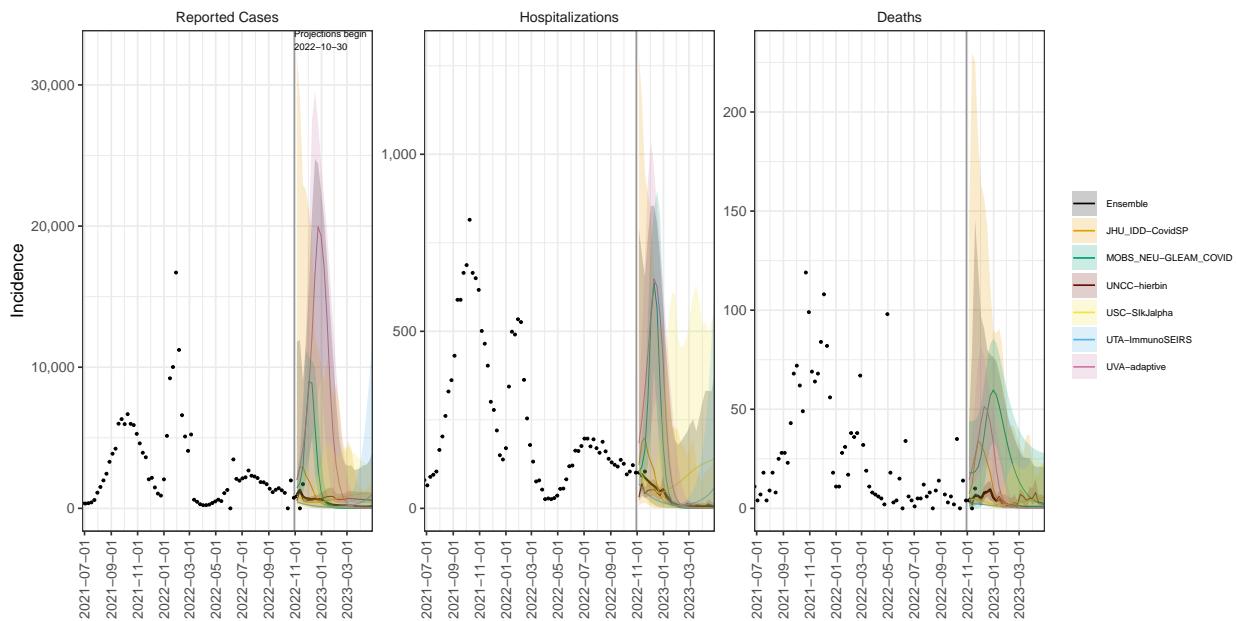
MS model variance & 95% projection intervals – Low booster, High immune escape variant



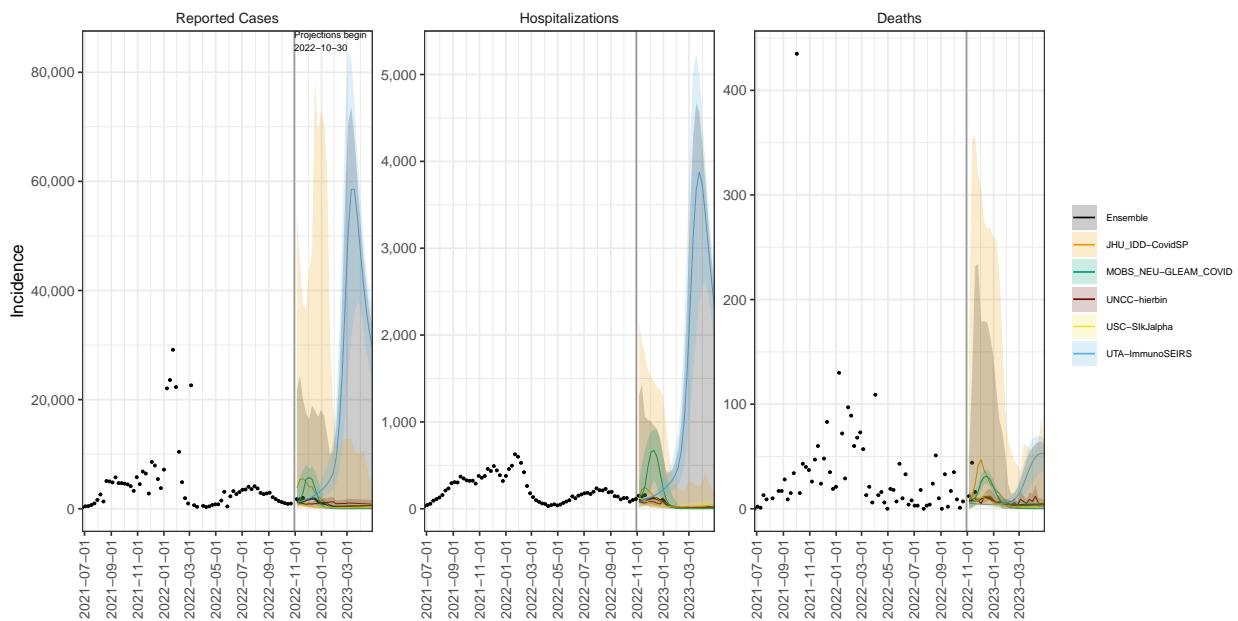
MO model variance & 95% projection intervals – Low booster, High immune escape variant



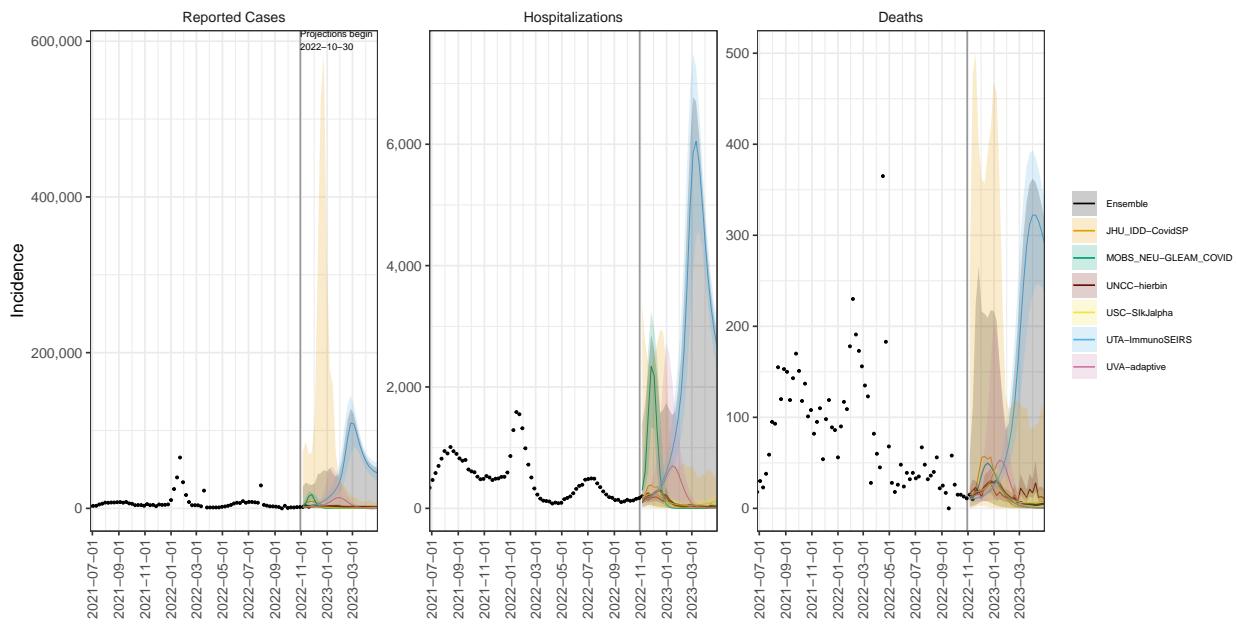
### MT model variance & 95% projection intervals – Low booster, High immune escape variant



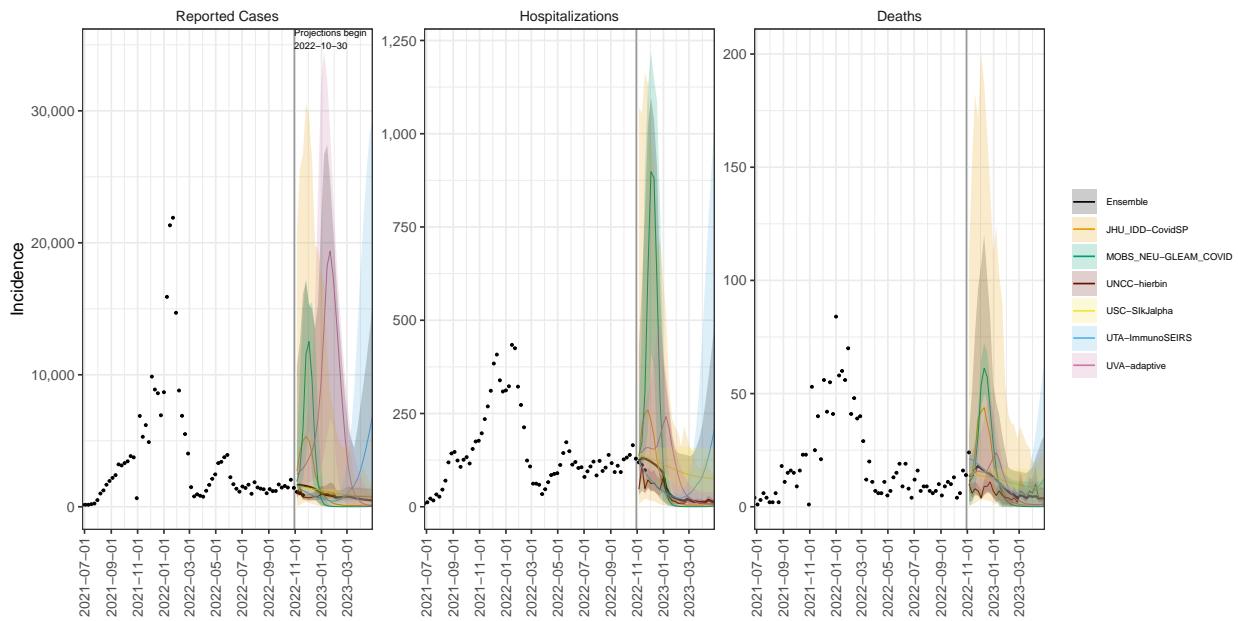
### NE model variance & 95% projection intervals – Low booster, High immune escape variant



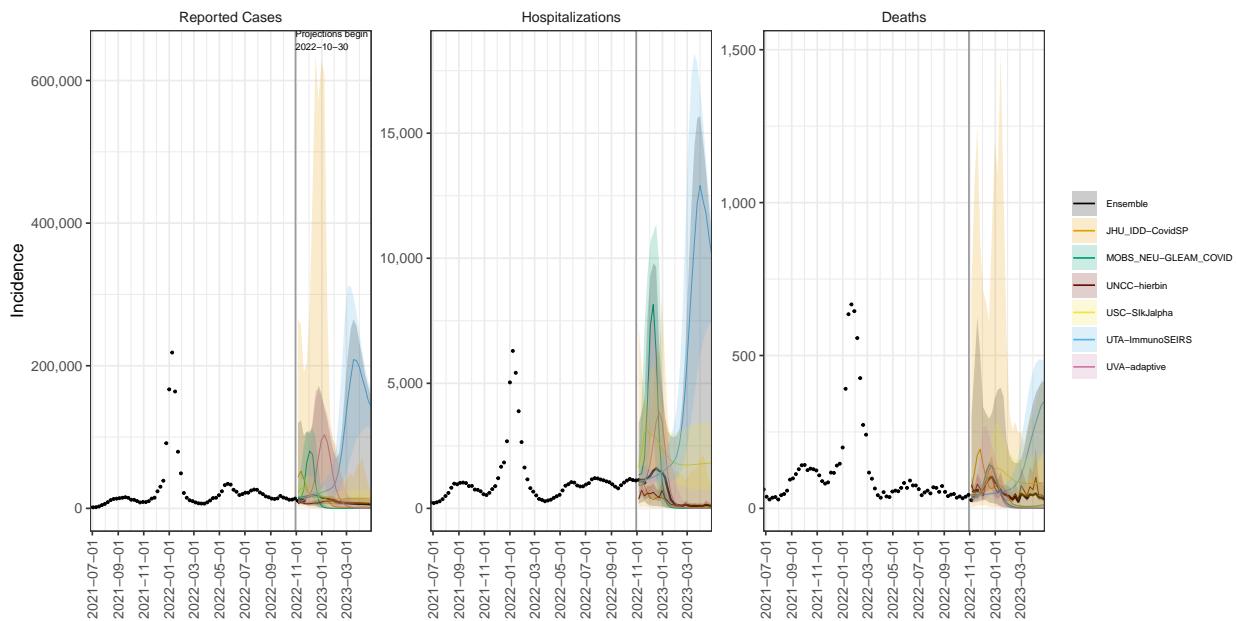
### NV model variance & 95% projection intervals – Low booster, High immune escape variant



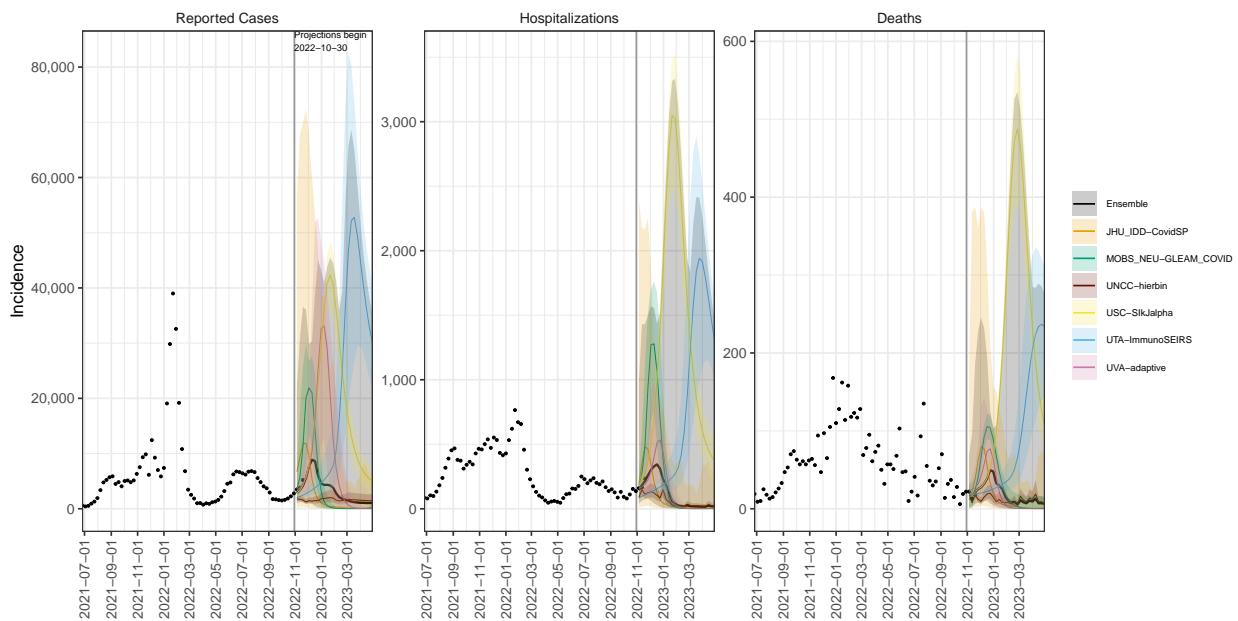
### NH model variance & 95% projection intervals – Low booster, High immune escape variant



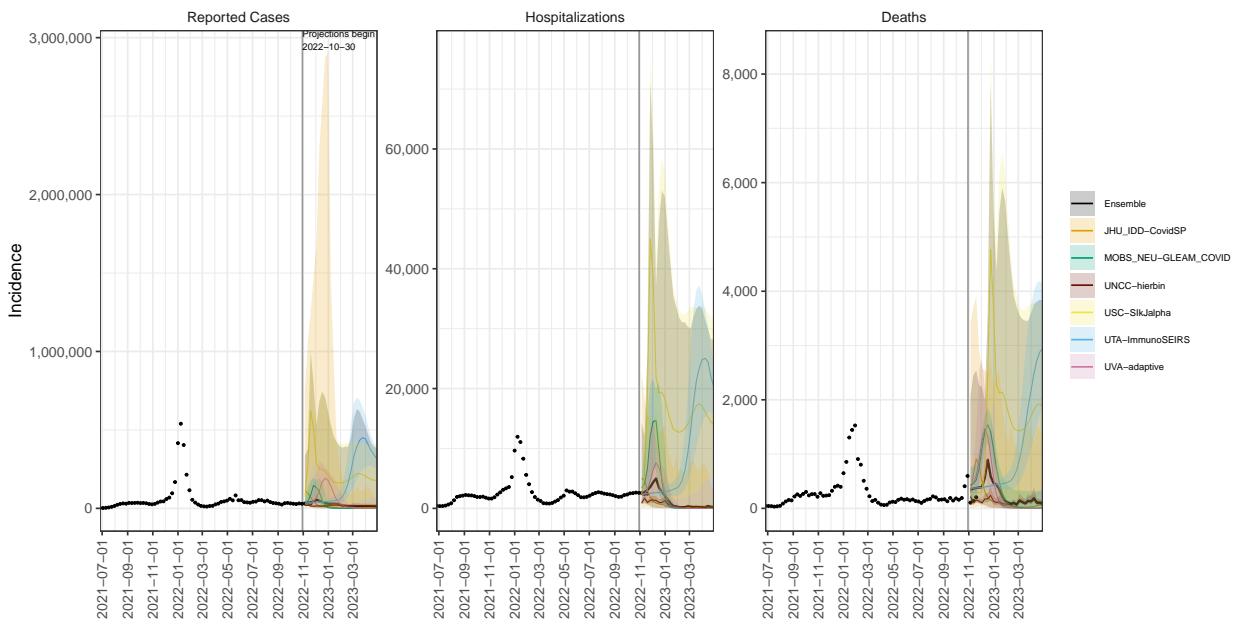
### NJ model variance & 95% projection intervals – Low booster, High immune escape variant



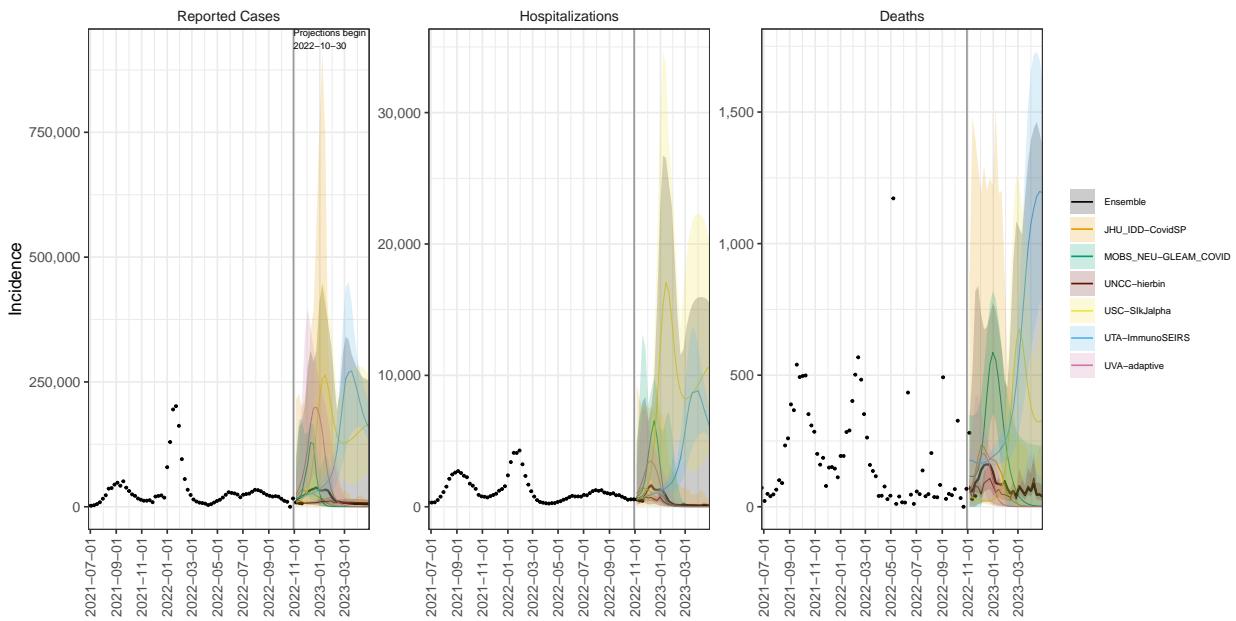
### NM model variance & 95% projection intervals – Low booster, High immune escape variant



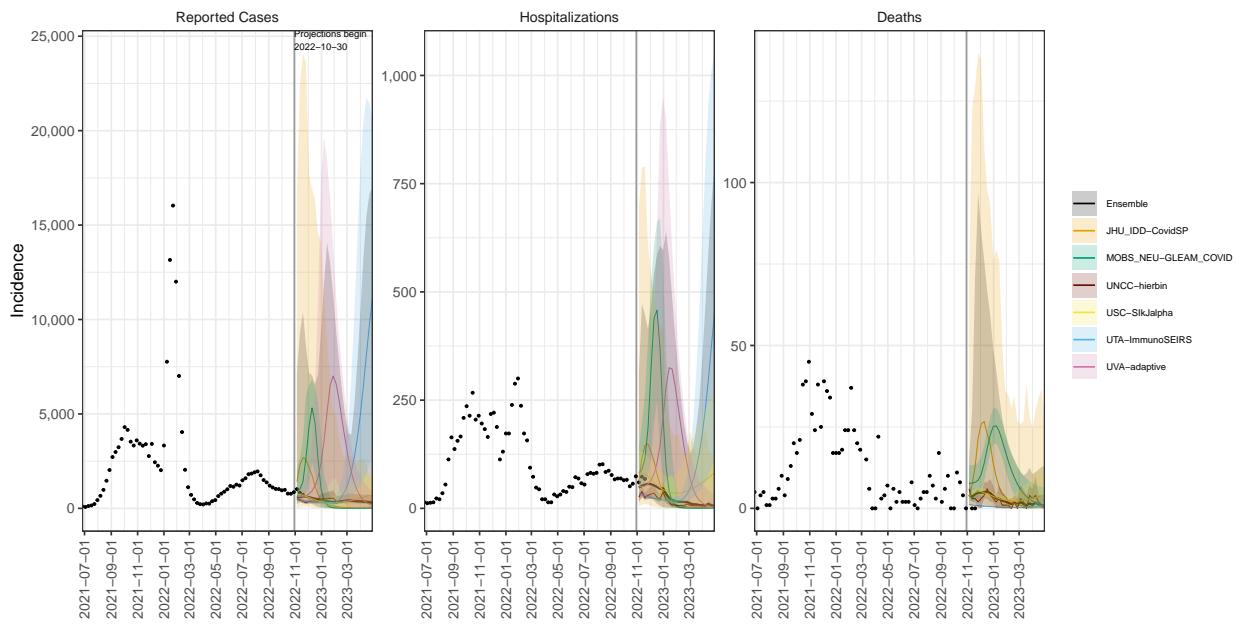
NY model variance & 95% projection intervals – Low booster, High immune escape variant



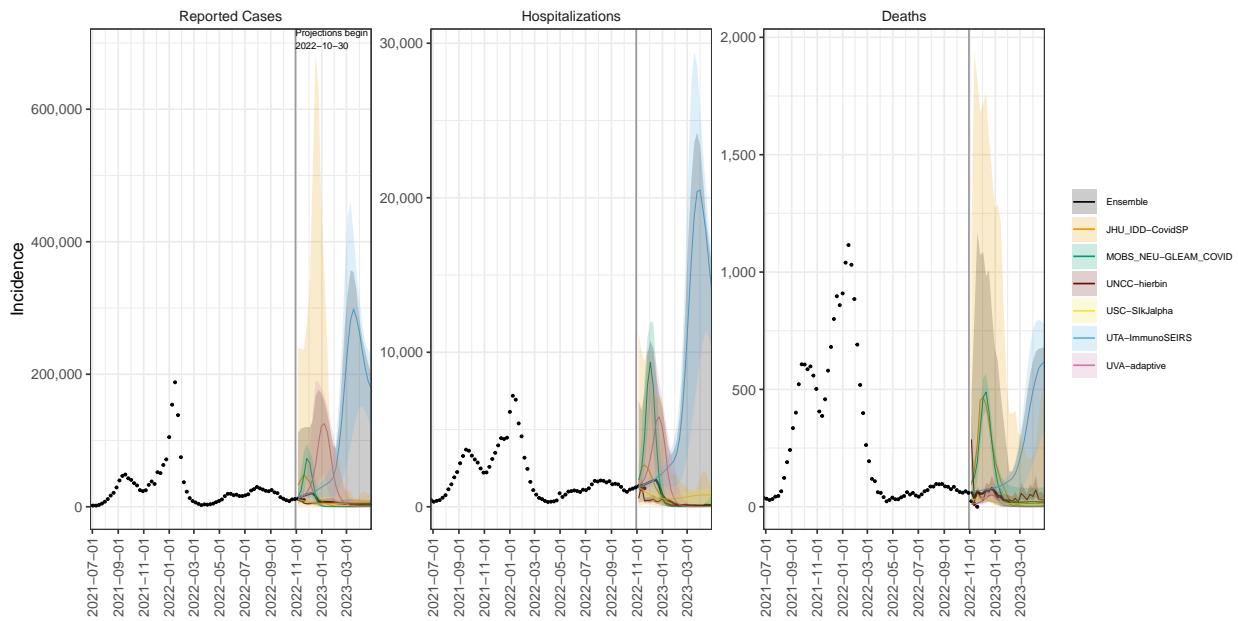
NC model variance & 95% projection intervals – Low booster, High immune escape variant



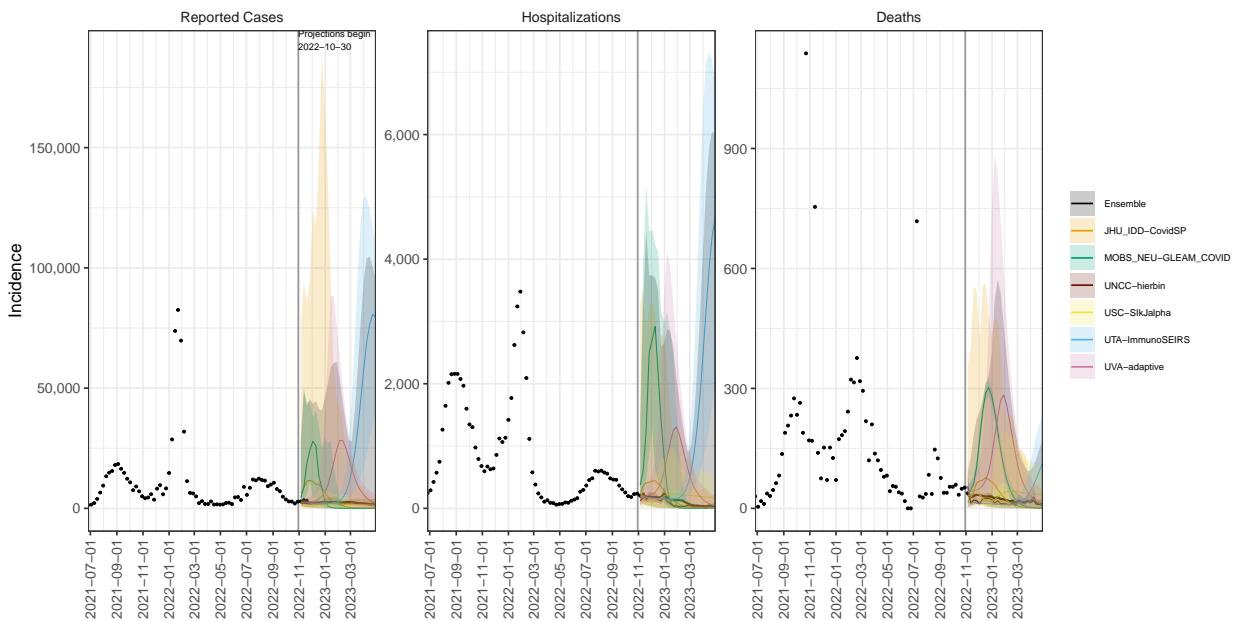
ND model variance & 95% projection intervals – Low booster, High immune escape variant



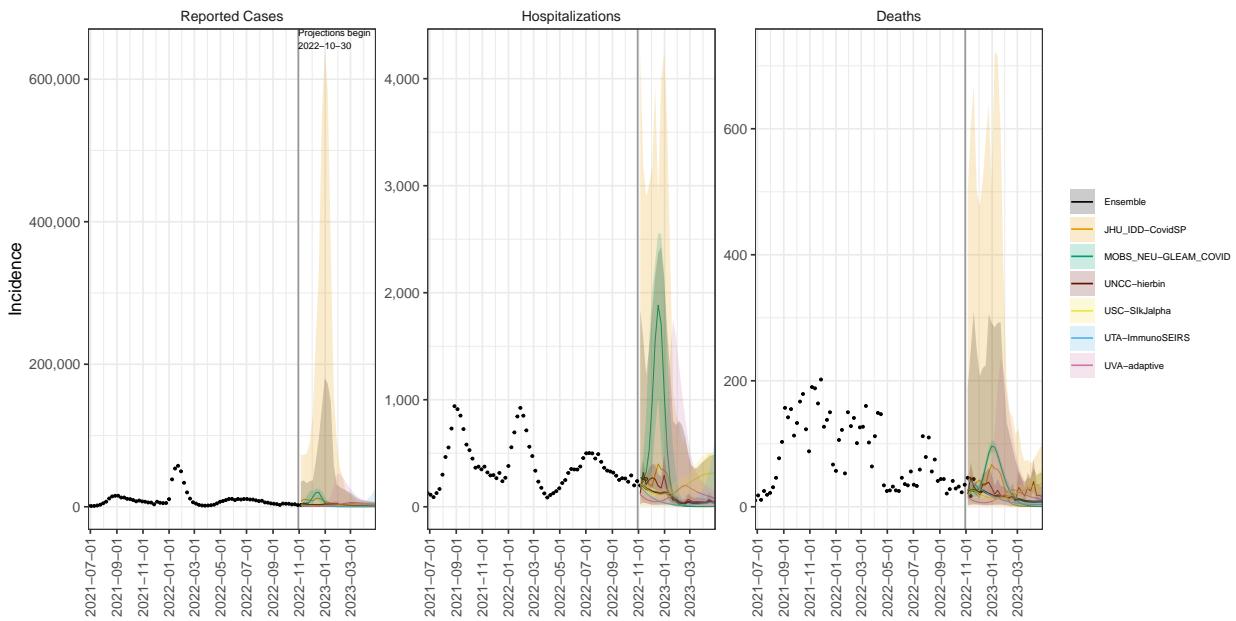
OH model variance & 95% projection intervals – Low booster, High immune escape variant



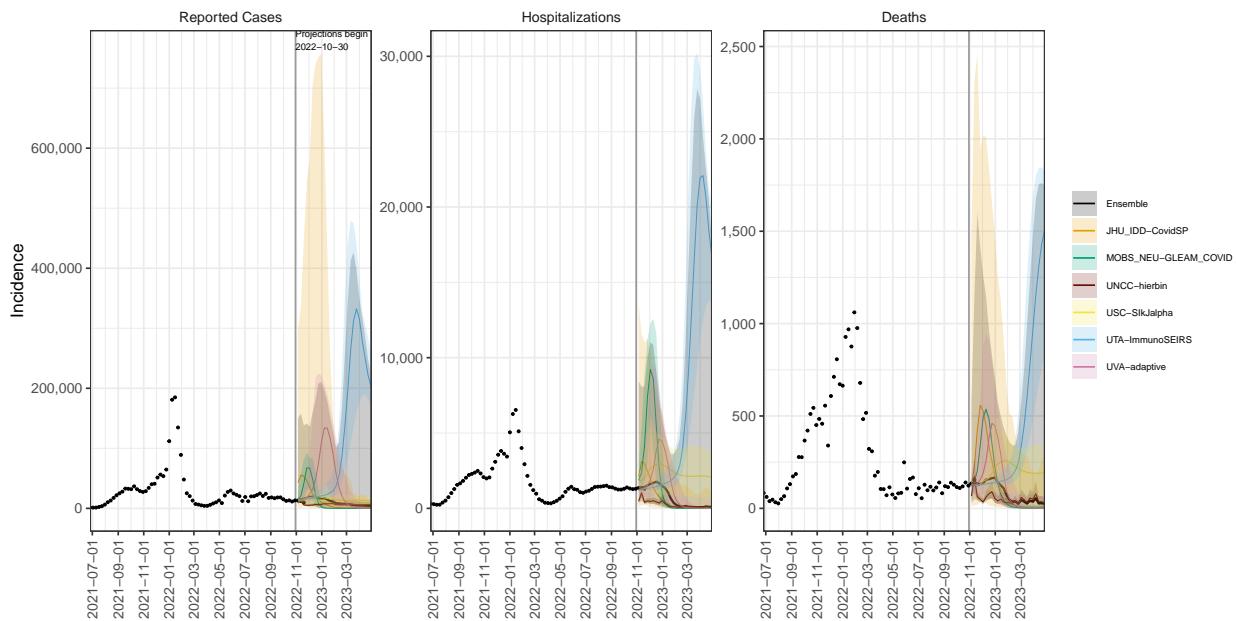
OK model variance & 95% projection intervals – Low booster, High immune escape variant



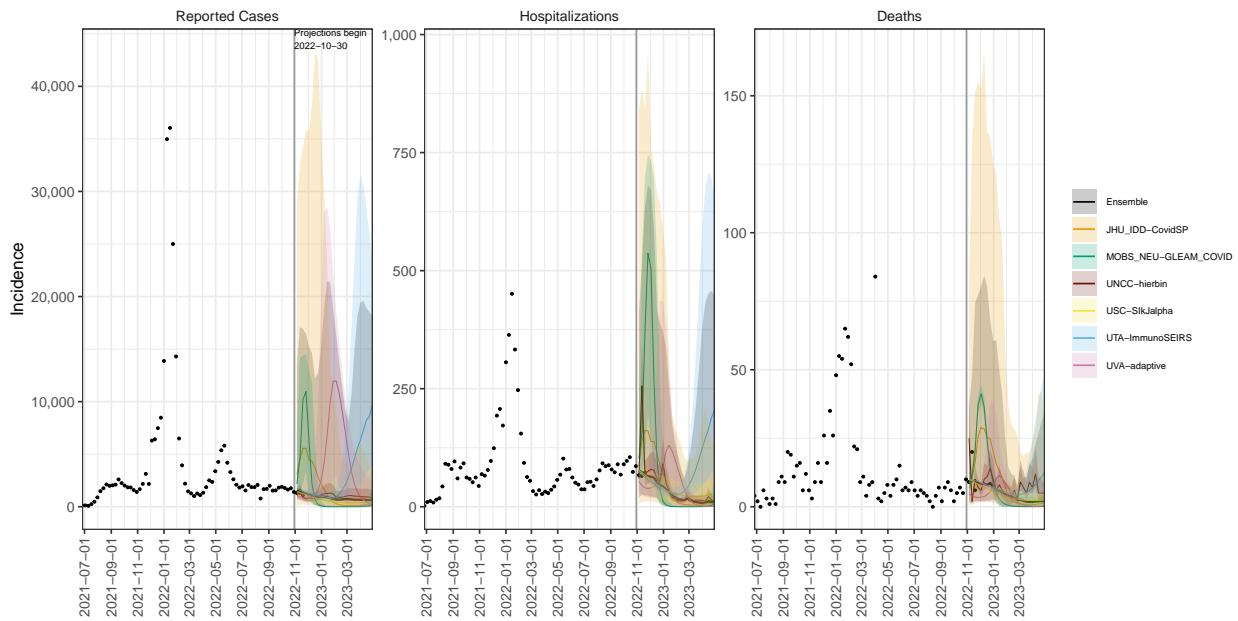
OR model variance & 95% projection intervals – Low booster, High immune escape variant



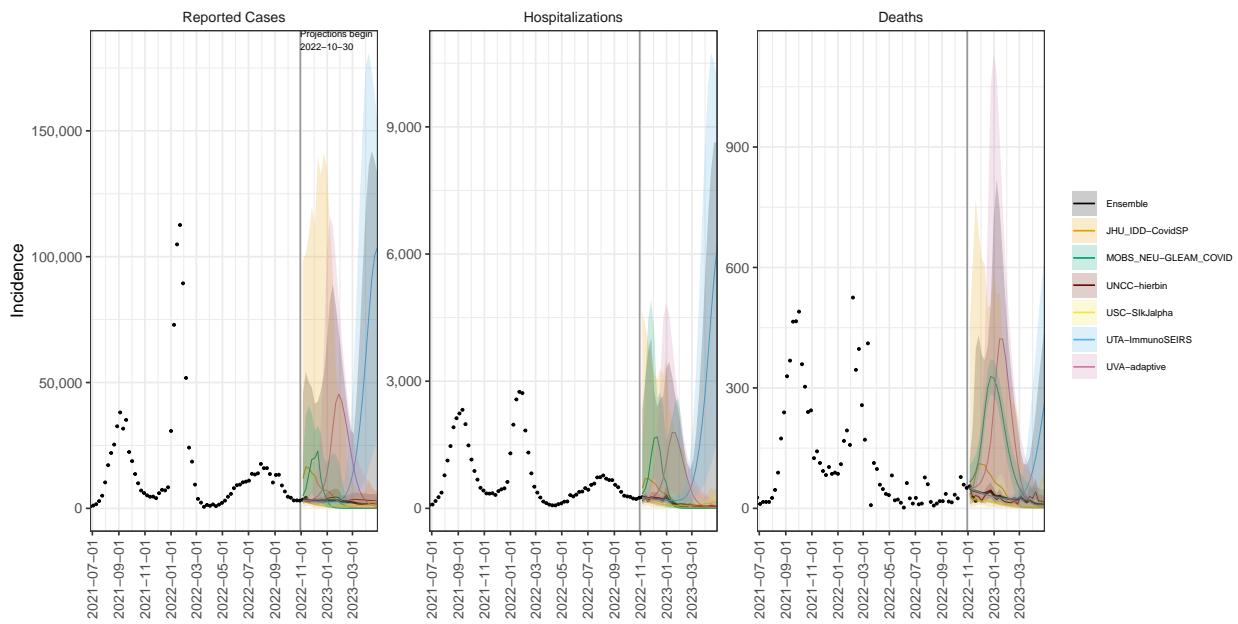
PA model variance & 95% projection intervals – Low booster, High immune escape variant



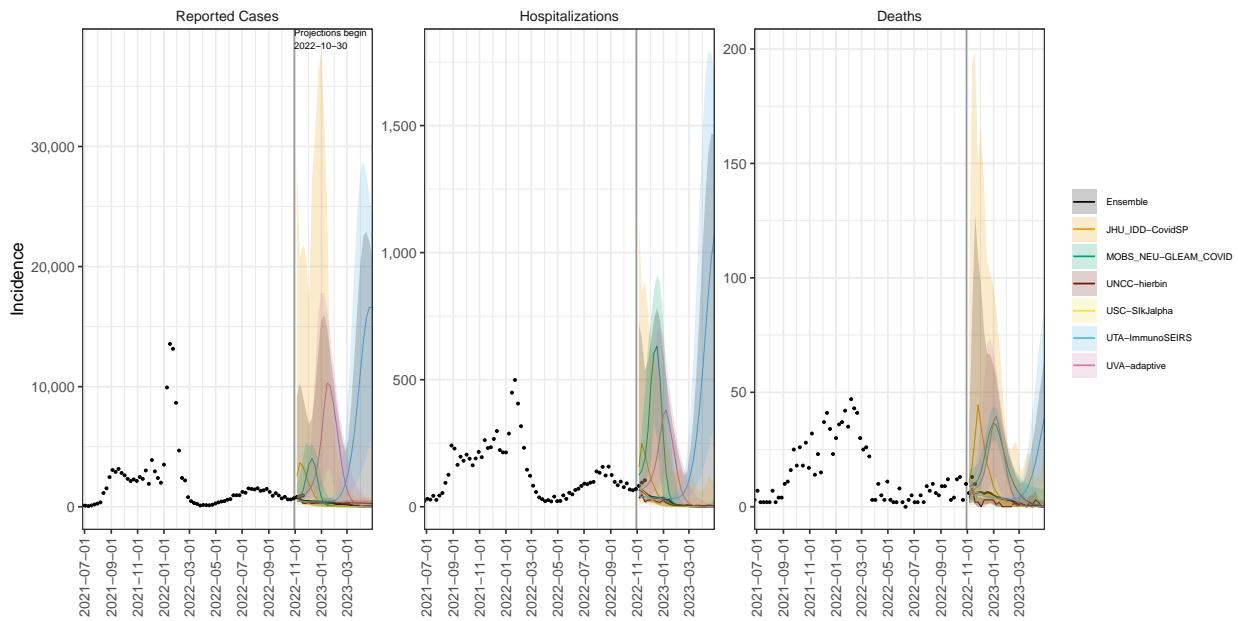
RI model variance & 95% projection intervals – Low booster, High immune escape variant



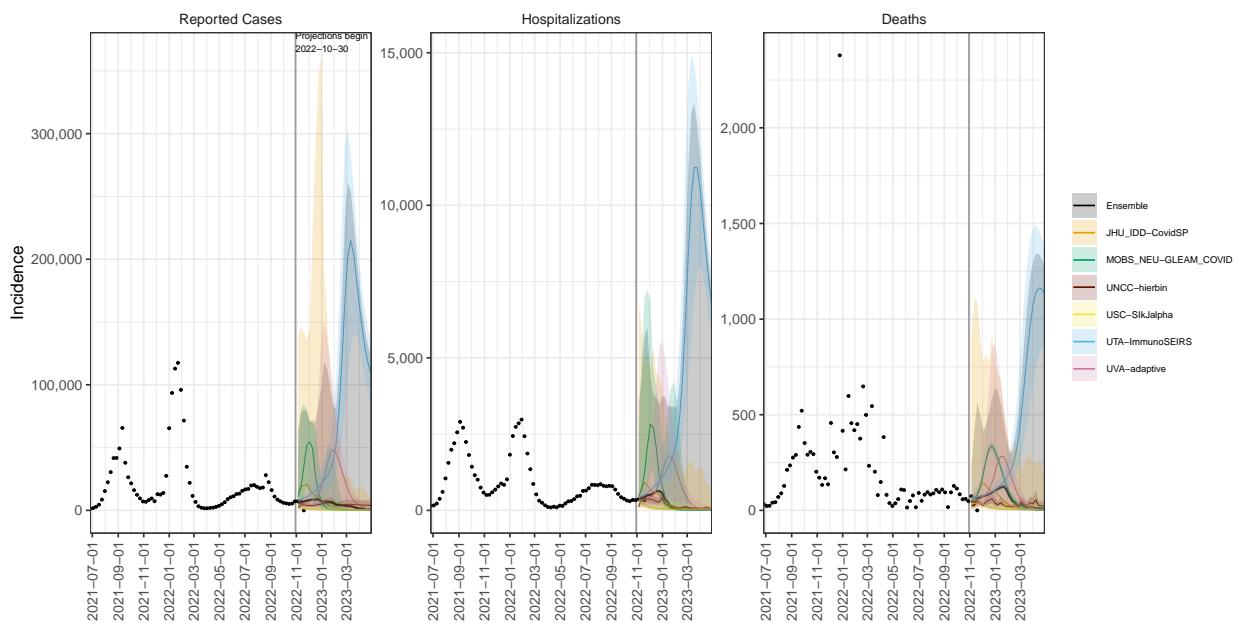
SC model variance & 95% projection intervals – Low booster, High immune escape variant



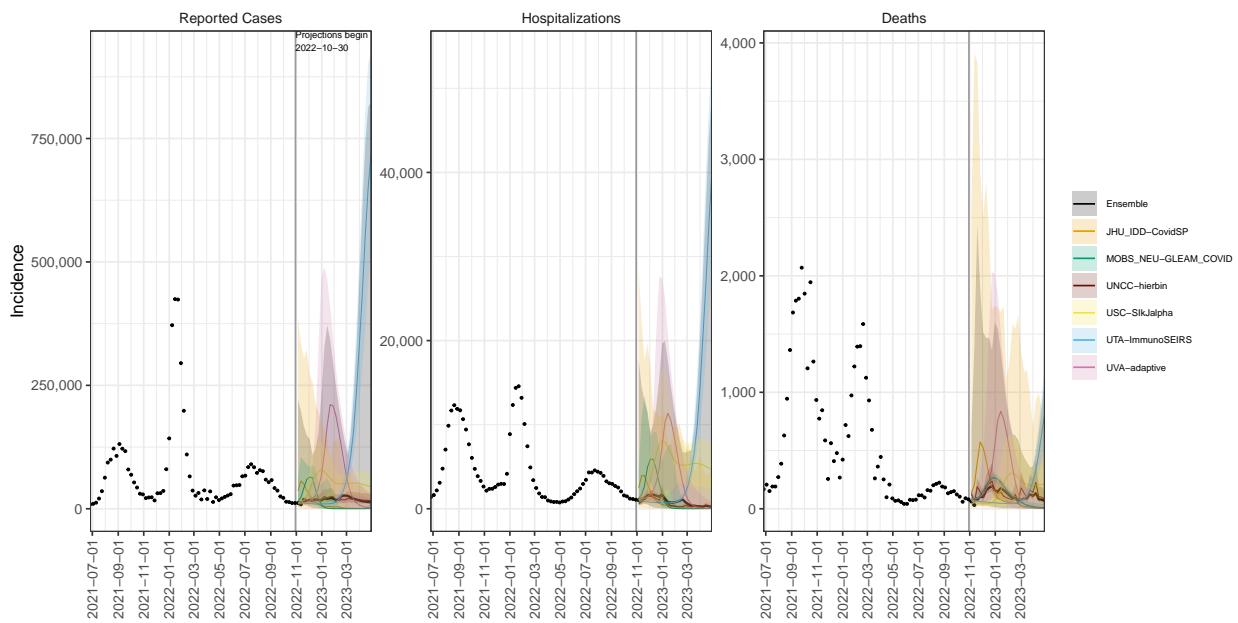
SD model variance & 95% projection intervals – Low booster, High immune escape variant



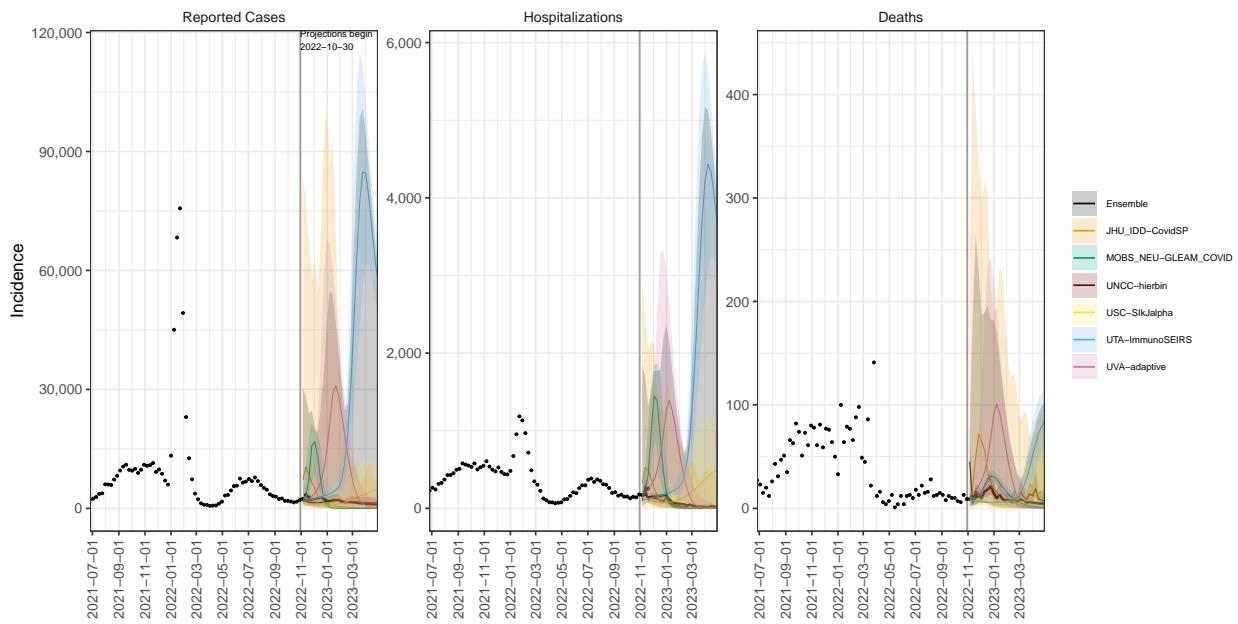
TN model variance & 95% projection intervals – Low booster, High immune escape variant



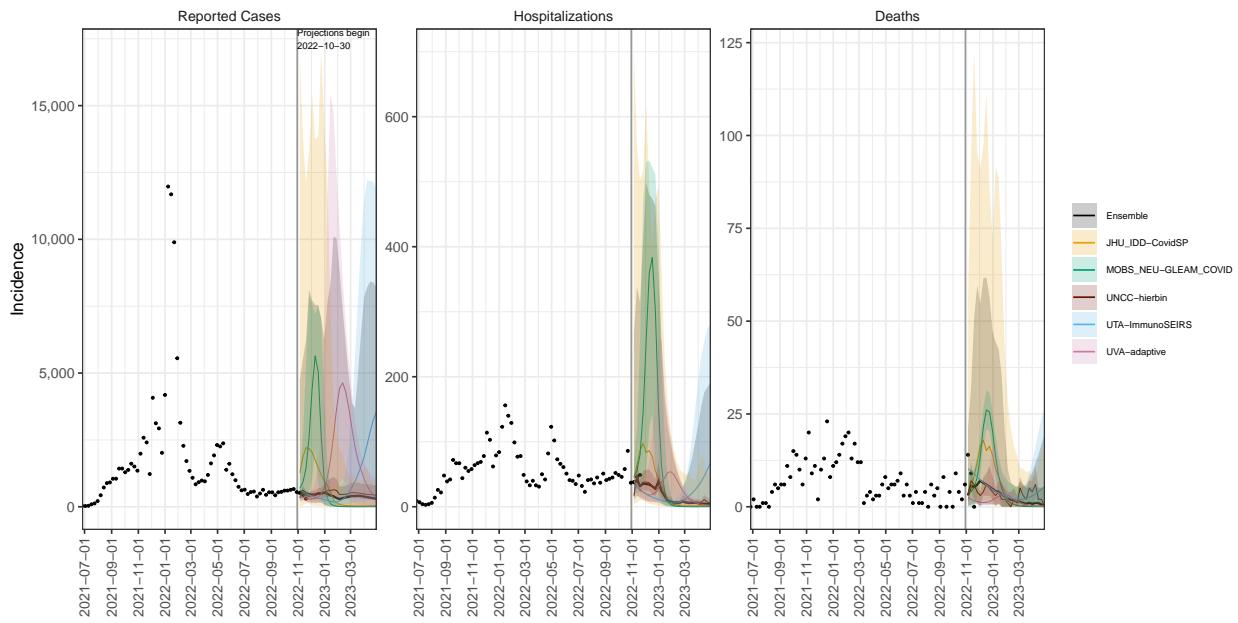
TX model variance & 95% projection intervals – Low booster, High immune escape variant



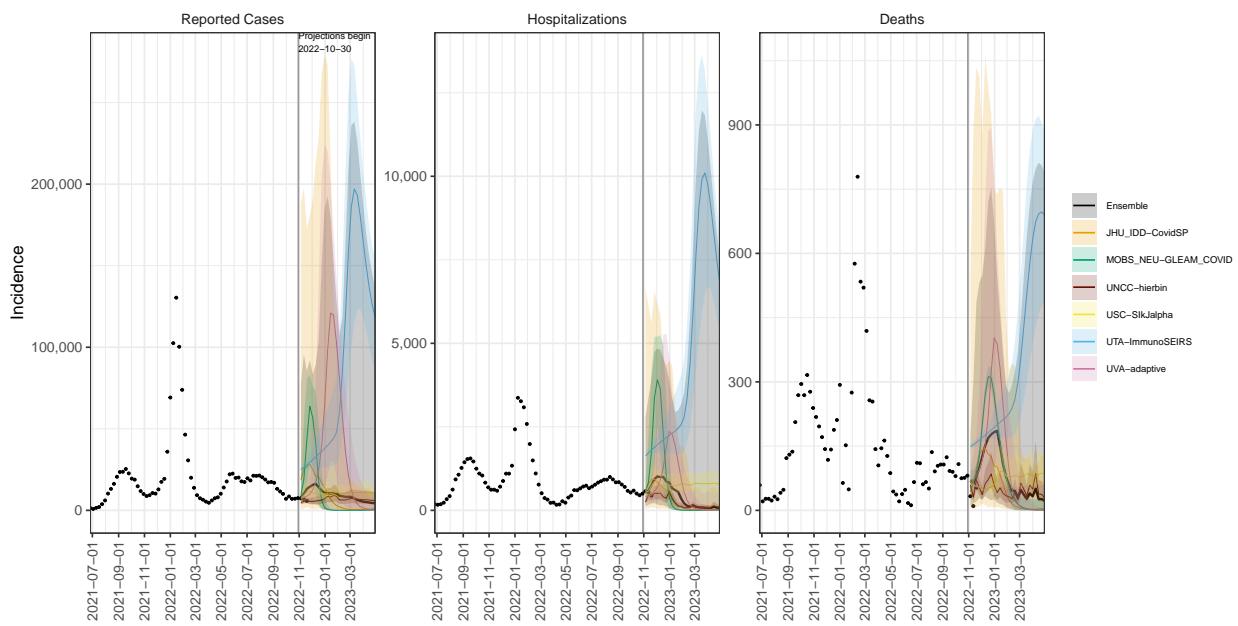
UT model variance & 95% projection intervals – Low booster, High immune escape variant



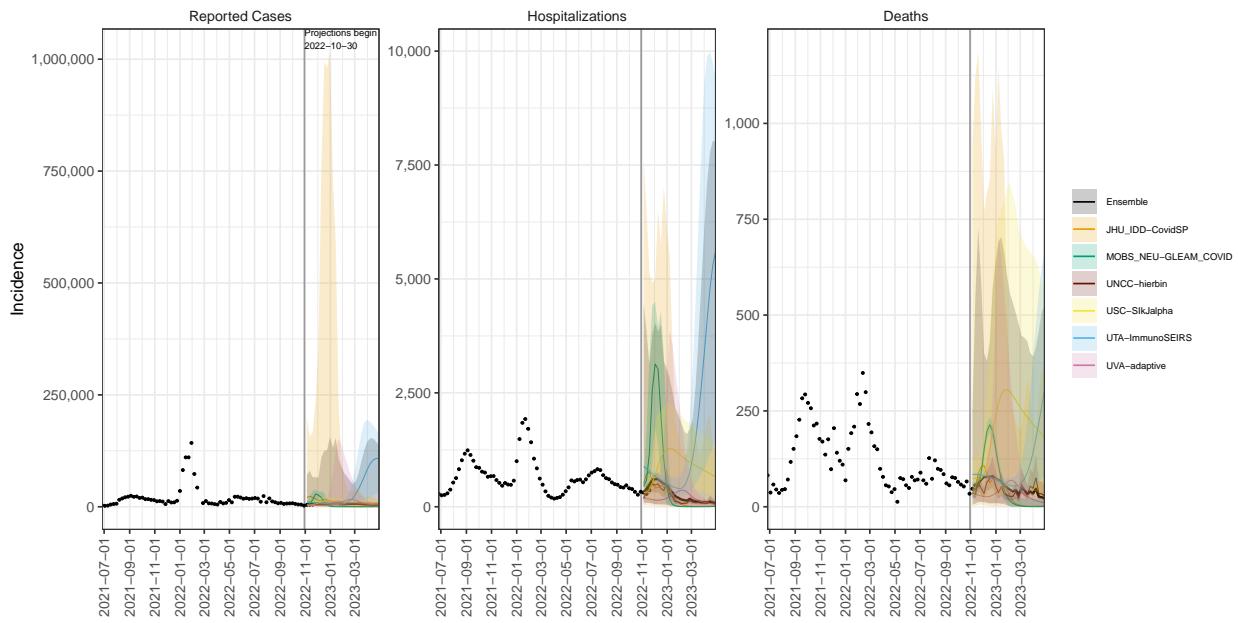
VT model variance & 95% projection intervals – Low booster, High immune escape variant



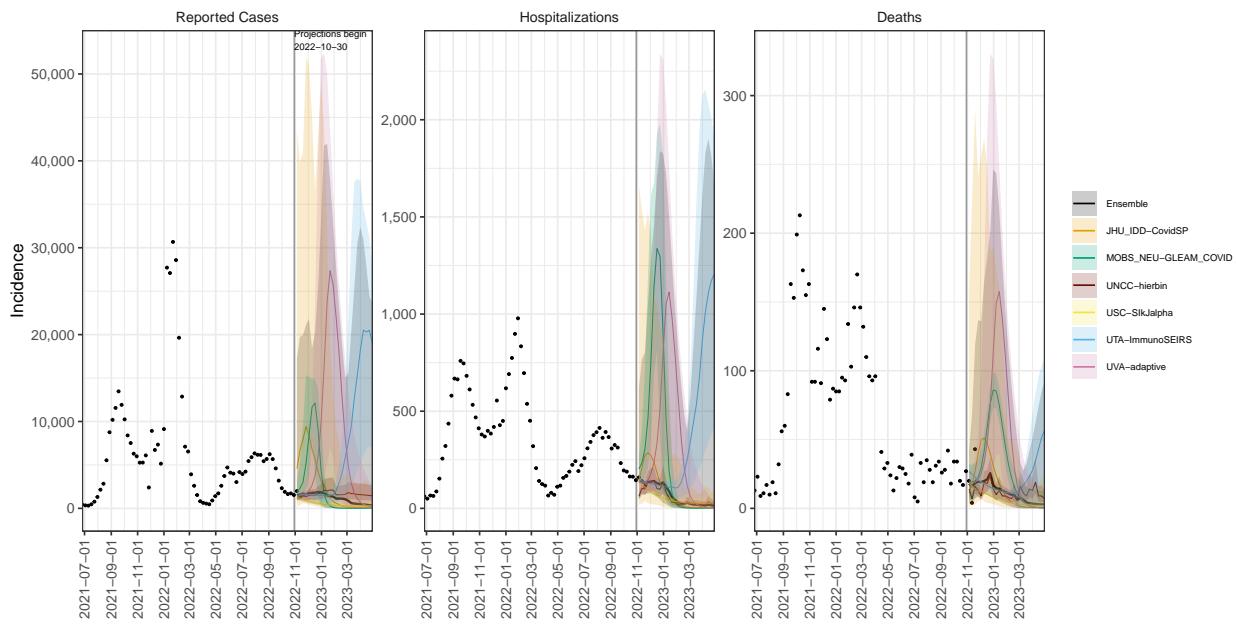
VA model variance & 95% projection intervals – Low booster, High immune escape variant



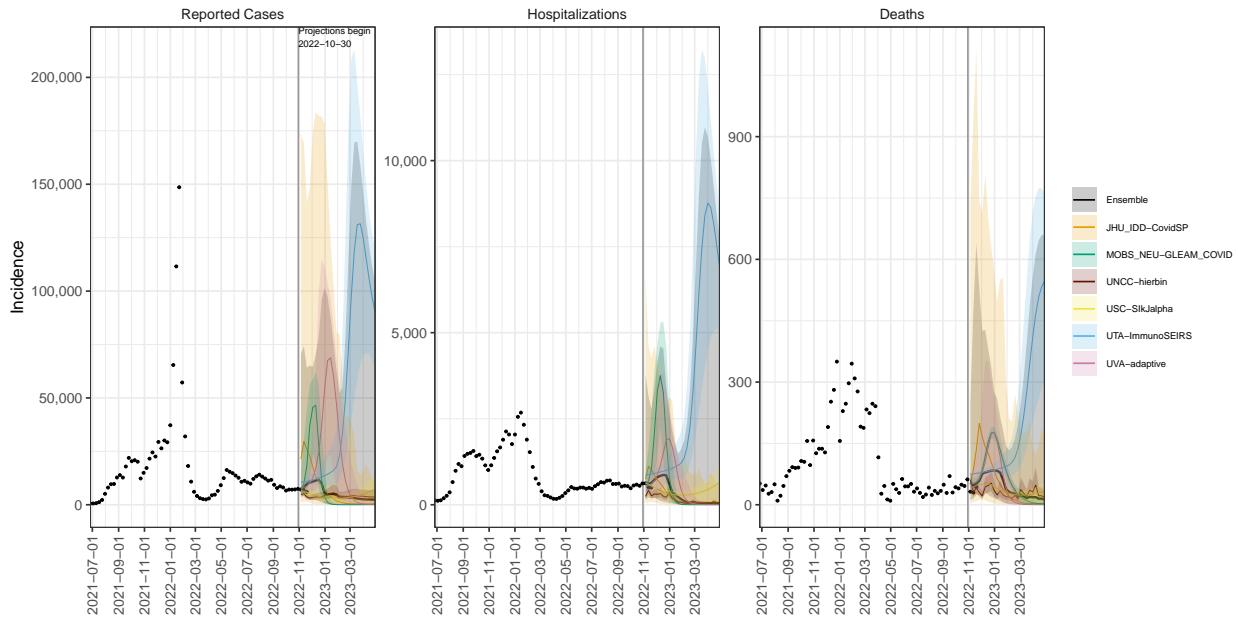
WA model variance & 95% projection intervals – Low booster, High immune escape variant



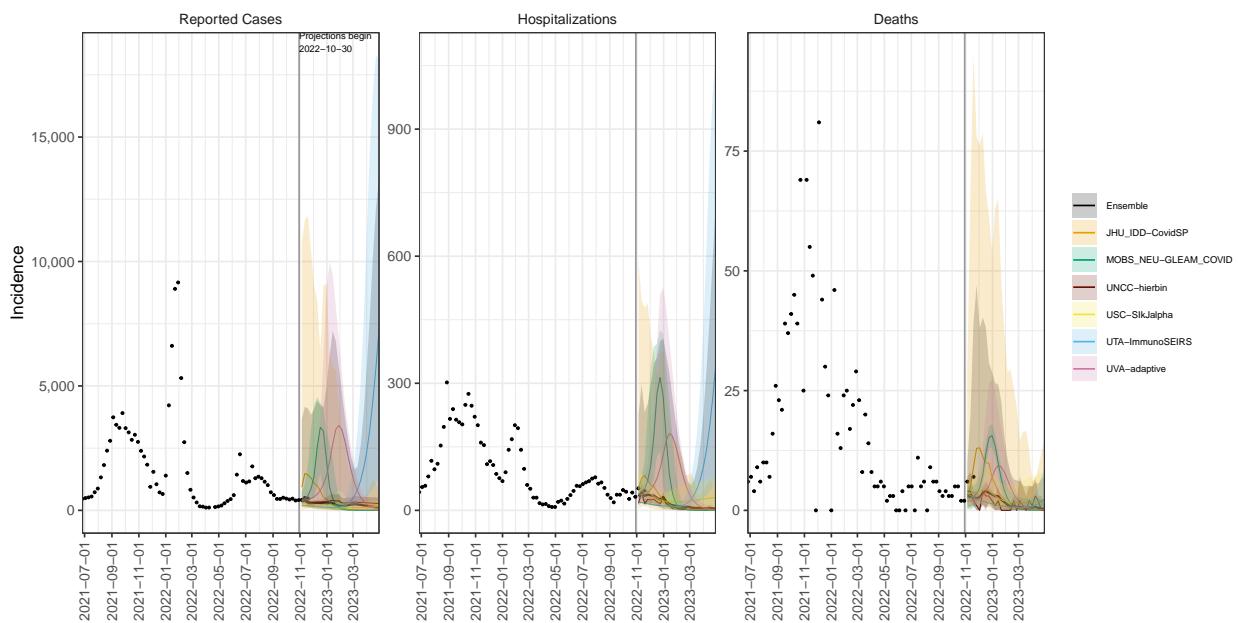
WV model variance & 95% projection intervals – Low booster, High immune escape variant



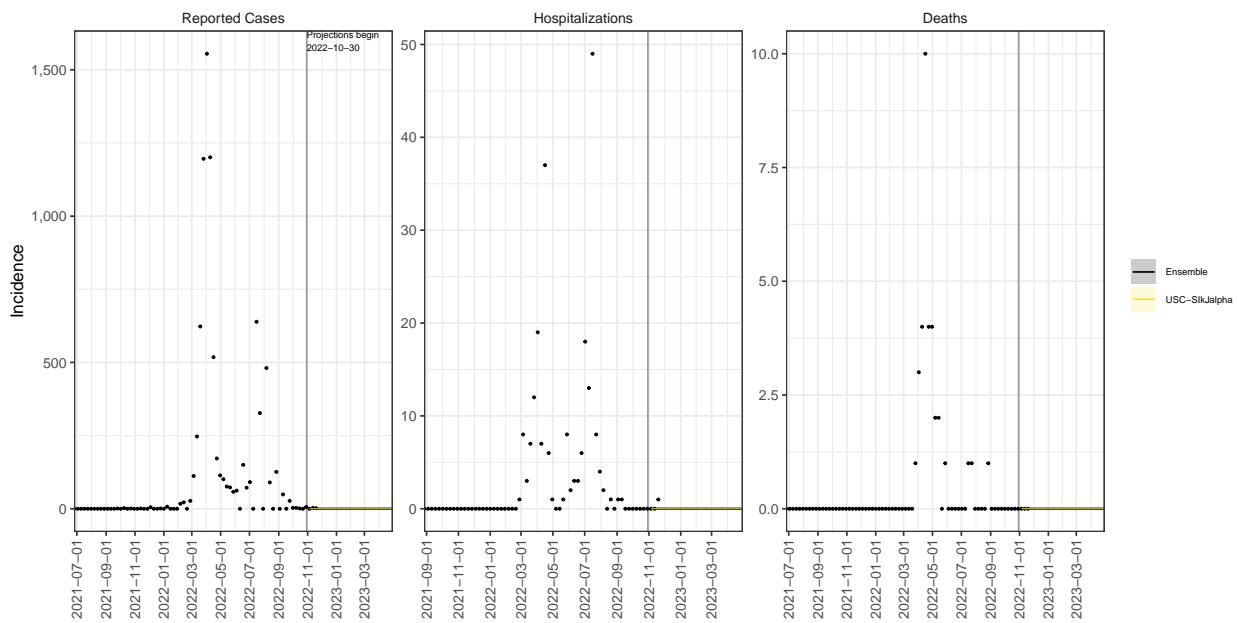
WI model variance & 95% projection intervals – Low booster, High immune escape variant



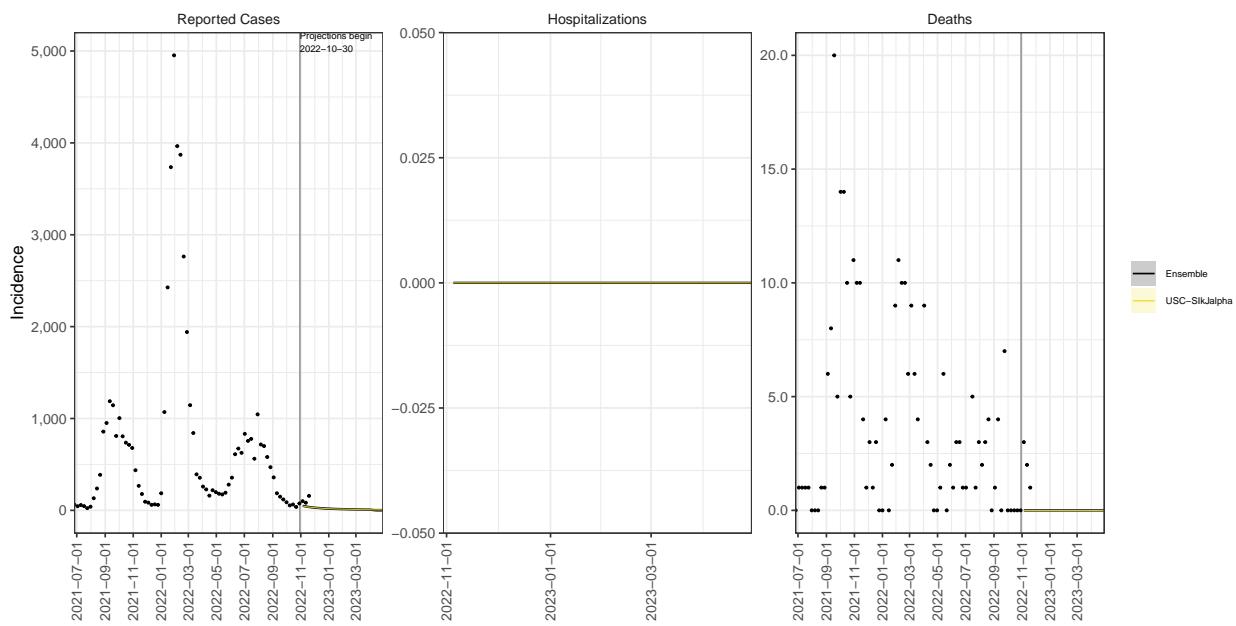
WY model variance & 95% projection intervals – Low booster, High immune escape variant



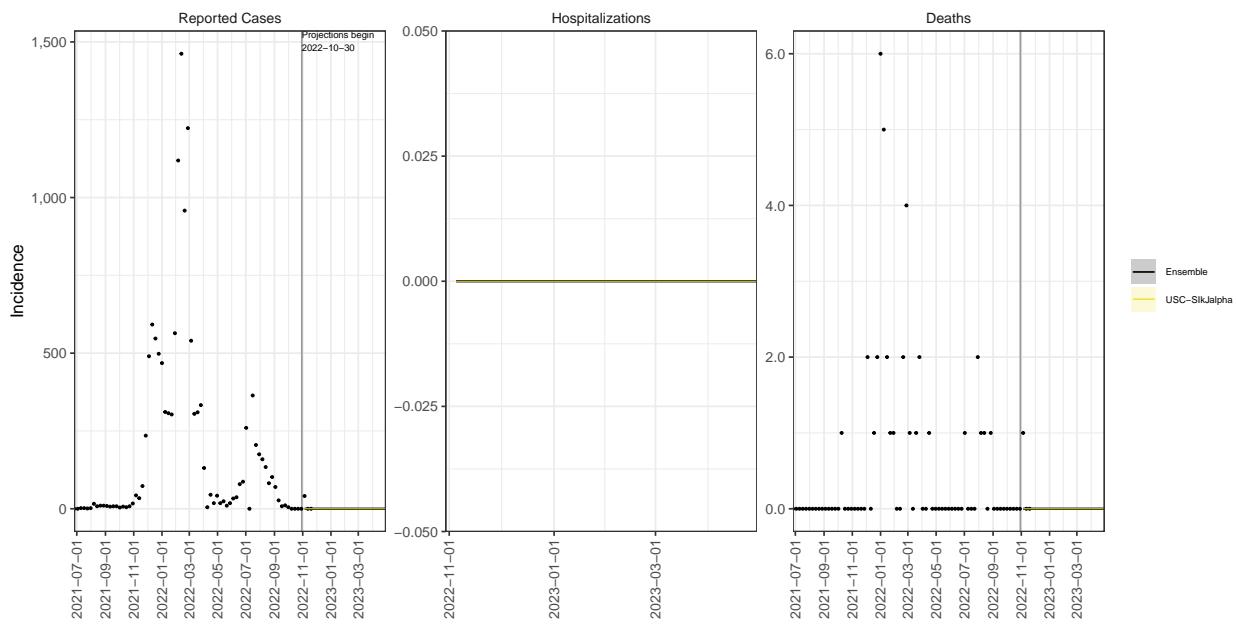
AS model variance & 95% projection intervals – Low booster, High immune escape variant



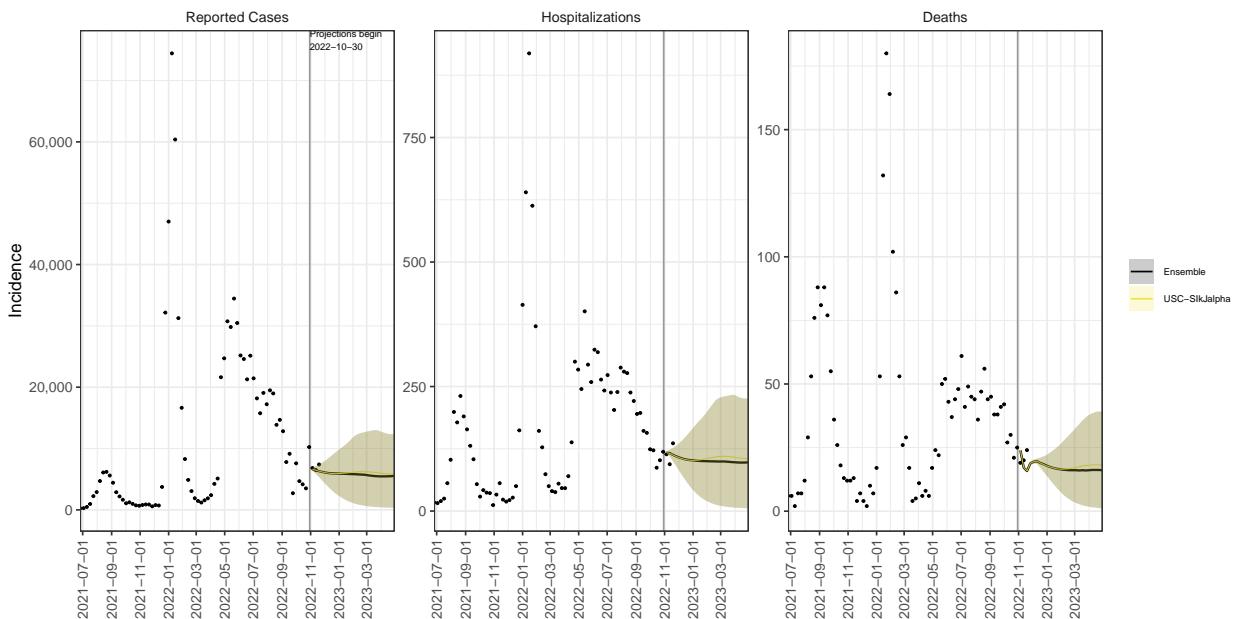
GU model variance & 95% projection intervals – Low booster, High immune escape variant



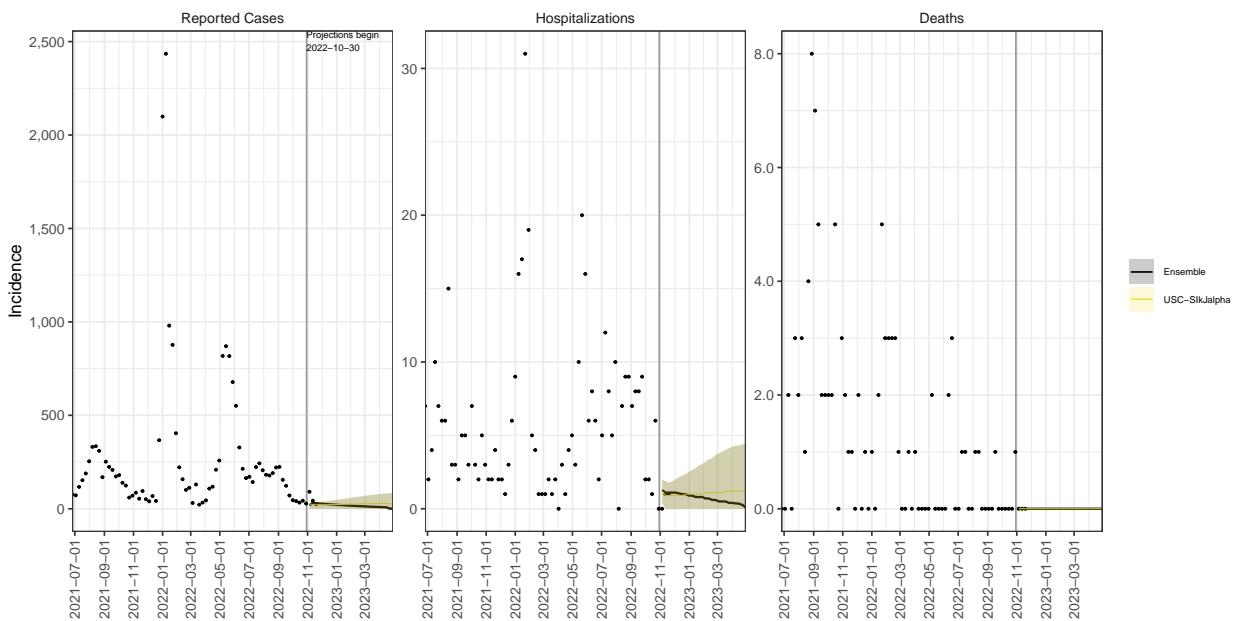
MP model variance & 95% projection intervals – Low booster, High immune escape variant



#### PR model variance & 95% projection intervals – Low booster, High immune escape variant



#### VI model variance & 95% projection intervals – Low booster, High immune escape variant



## Teams and models

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