# SPI-M-O: Consensus Statement on COVID-19

***Date: 18th November 2020***

***FINAL: SIGNED OFF BY CO-CHAIRS ON BEHALF OF SPI-M***

## Summary

1. SPI-M-O's best estimate for **R in both the UK and England is between 1.0 and 1.1.** Estimates of R for Scotland, Wales and Northern Ireland are all 0.8-1.0. R is a lagging indicator. **These estimates are based on the latest data available on 17th November and do not yet accurately reflect the interventions introduced in England on 5th November.**
2. SPI-M-O estimate that there are between **48,000 and 76,000 new infections per day in England.**
3. Estimates of R and growth rates have fallen slightly in recent weeks. SPI-M-O are not confident that R is *currently* above 1 in England, although this will not be fully reflected in the data streams on which our models are based. We currently estimate that R is below 1 in the North West of England.
4. The delay between initial infection, developing symptoms, the need for hospital care, and death means that **we cannot yet evaluate the impact of the national restrictions introduced in England on 5th November.** It is highly likely to have reduced R from the levels we currently estimate, but it is highly unlikely to be as low as 0.6.
5. It is almost certain that changes in contact patterns during the festive period will result in a step change in prevalence of infection. The risk associated with permitting more household mixing would be smaller if pre-Christmas prevalence were driven as low as possible.

## Incidence and prevalence

6. Combined estimates from six SPI-M-O models, using data available up to 16th November, suggest there are between **48,000 and 76,000 new infections per day in England**. This is broadly unchanged from last week's estimate. Modelling from the ONS community infection survey for the most recent week of the study (8th to 14th November) estimates that there were **38,900 new infections per day in England** (credible interval of 34,300 to 44,100). The ONS survey does not include people in care homes, hospitals, or university halls of residence.

7. The ONS study estimates that, during the same week, an average of **664,700 people had COVID-19** in the community in England (credible interval 628,300 to 701,200) – this is only marginally higher than their estimate for the previous week. We would expect data from this study to reflect changes in prevalence more rapidly than the clinical data on which SPI-M's modelling is based. The equivalent estimates for the devolved administrations are:

| | |
|---|---|
| England | 664,700 (credible interval 628,300 to 701,200) |
| Scotland | 33,800 (credible interval 23,600 to 45,300) |
| Wales | 18,400 (credible interval 11,700 to 26,700) |
| Northern Ireland | 13,600 (credible interval 8,800 to 19,700) |

## Reproduction number, growth rate, and doubling times

8. The reproduction number is the average number of secondary infections produced by a single infected individual. R is an average value over time, geographies, and communities. This should be considered when interpreting the R estimate for the UK given the differences in policies across the four nations.

9. **SPI-M-O's best estimate for R in the both the UK and England is between 1.0 and 1.1. Estimates of R for Scotland, Wales and Northern Ireland are all 0.8-1.0.** R is a lagging indicator. These estimates are based on the latest data available on 17 November and do not yet accurately reflect the interventions in England on 5th November.

10. SPI-M-O's agreed national and regional estimates are summarised in Table 1 and Figures 3, 4, and 6. **SPI-M-O are confident that R is below 1 in Scotland, Wales and Northern Ireland.**

11. The epidemic in the North West of England is now shrinking, with R estimated as 0.8-1.0 in that region. However, incidence and prevalence there remain high, with associated healthcare demand and mortality.

12. The delay between initial infection, developing symptoms and the need for hospital care, means that such estimates cannot yet fully reflect the most recent changes in transmission from the past two to three weeks. This means that **we cannot yet evaluate the impact of the national restrictions introduced in England on 5th November.** It is highly likely to have reduced R from the levels we currently estimate, but it is highly unlikely to be as low as 0.6.

13. For small daily changes, the growth rate is approximately the proportion by which the number of infections increases or decreases per day, i.e. the rate at which an epidemic is growing or shrinking[1].

14. SPI-M-O's consensus estimate is that the **growth rate in the both the UK and England is between 0% to +2% per day**. SPI-M-O's national and regional estimates of growth rates are summarised in Table 1 and Figure 5. As SPI-M-O are not confident that the epidemic is still growing, we have not estimated doubling times, which may not be finite.

## Other scenarios

15. SPI-M-O continues to produce epidemic scenarios over the next six weeks, combining estimates from a subset of the same SPI-M-O models that are used to produce the medium-term projections to explore the possible impacts of the interventions from 5th November. **These are not forecasts or predictions**. The scenarios have been produced in which the interventions of 5h November led to decreased R values ranging between 0.6 and 1.1. These scenarios are run for four weeks following 5h November, before returning to their 4th November values on 2nd December. These illustrate a range of scenarios (in terms of COVID-19 hospitalisations and mortality) that SPI-M-O consider to be plausible over the next six weeks. **The impact of the new measures in England are not yet clear from the data and so differentiation between these scenarios is not possible. However, it is already unlikely that the epidemic is tracking the scenarios for R = 0.6.**

16. Figure 1 and 2 show the combined scenarios for hospitalisations and deaths over a range of R values (0.6 – purple; 0.8 – blue; 0.9 – green; 1.1 – yellow) that might be expected under the interventions implemented on 5th November and maintained for four weeks. The scenarios are plotted over a six-week period from 17th November. Figure 7 and 8 show the equivalent charts for NHS England regions.

[1] Further technical information on the growth rate can be found in Plus magazine.

**Figure 1**: Medium-term scenarios for daily hospitalisations in England over a range of R values (0.6 – purple; 0.8 – blue; 0.9 – green; 1.1 – yellow) where interventions took place on 5 November and were held in place for four weeks, before regions return to their pre-5 November trajectories. All scenarios show interquartile ranges of model combinations as the shaded band. The red dashed line is the peak from the first wave of the epidemic in spring 2020. The wobbles in the yellow trajectories are the result of hospital admissions being different at weekends.

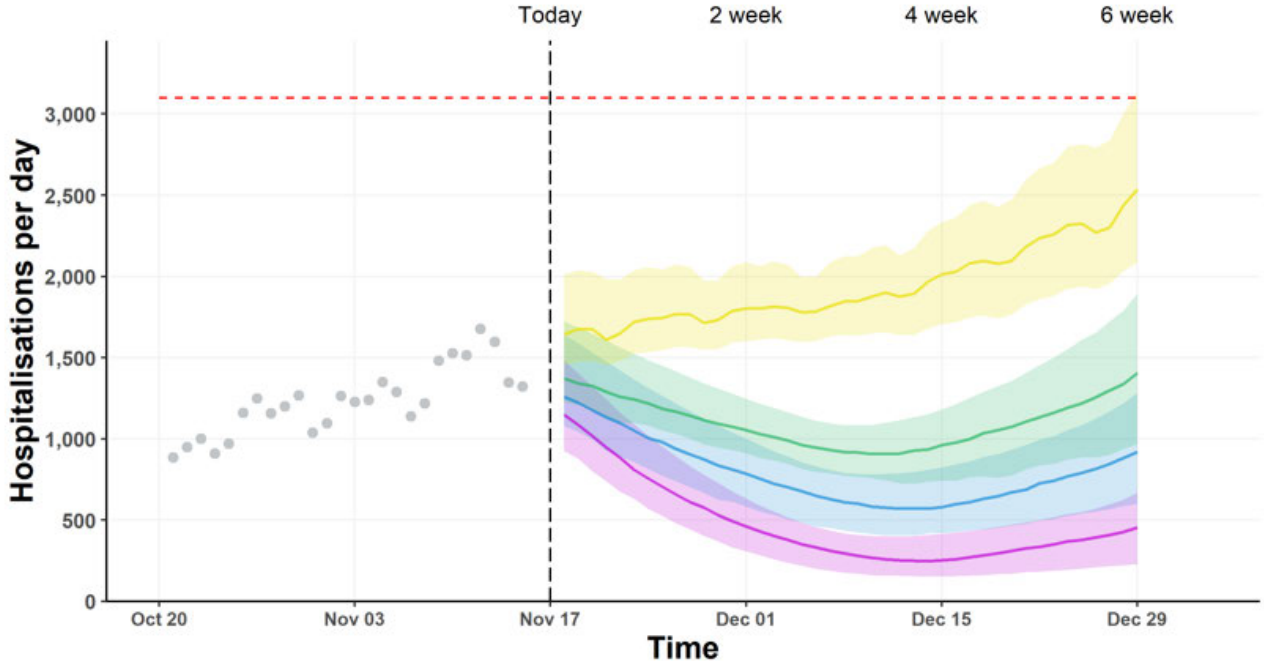
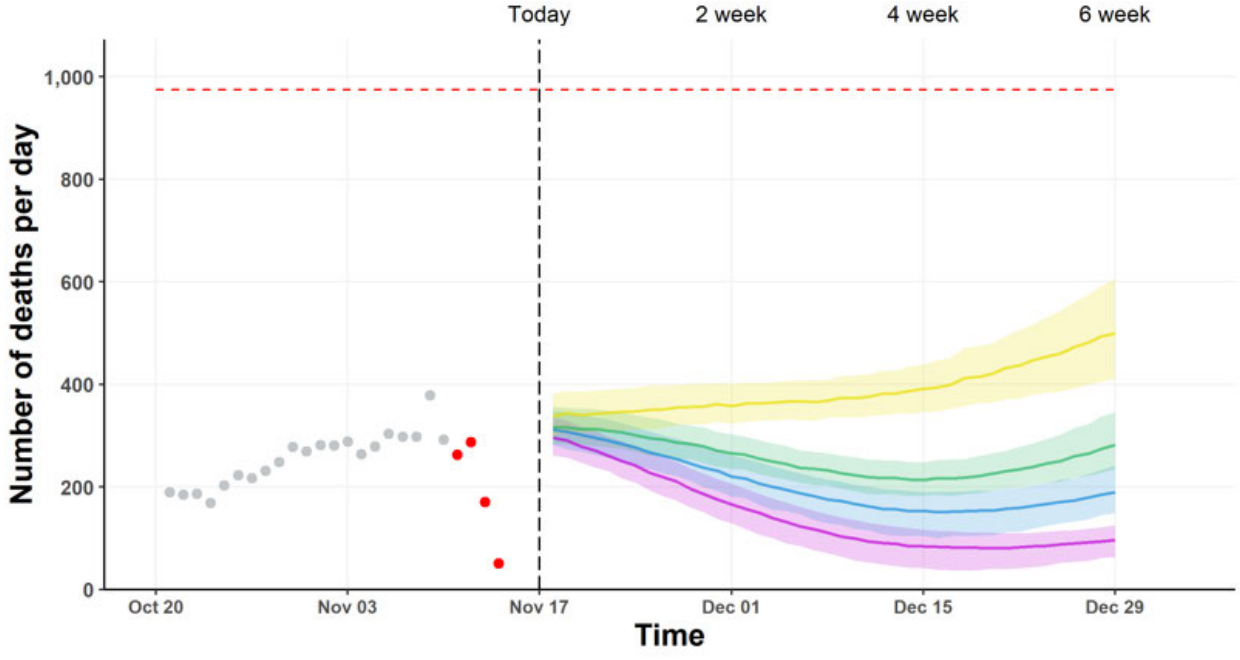



**Figure 2:** Medium-term scenarios for daily deaths in England over a range of R values (0.6 – purple; 0.8 – blue; 0.9 – green; 1.1 – yellow) where interventions took place on 5 November and were held in place for four weeks, before regions return to their pre-5 November trajectories. All scenarios show interquartile ranges of model combinations as the shaded band. The red dashed line is the peak from the first wave of the epidemic in spring 2020. The red data points are incomplete due to reporting delays, and are expected to increase.



## Mass testing

17. If done successfully, mass testing of a large proportion of the UK's population could identify a large number of infected people. This alone will not reduce transmission – this will only happen if people who are early in their infection successfully isolate (and these people would not have isolated otherwise, or would have isolated later). A one-off period of mass testing should not be thought of as reducing R, but as reducing post-testing prevalence compared to what it otherwise would have been. Once the testing period is over, if no additional control measures are put in place, the epidemic will return to its previous trajectory.

18. **Focussed, more frequent testing of people who are at higher risk of being infected (such as key workers, health and social care workers and people in high prevalence areas) is likely to have a bigger impact than less frequent testing of the whole population.** It is plausible that targeting groups who are less likely to have symptoms (and therefore be picked up from symptomatic testing), such as younger adults may have a greater effect, but we are not aware of any work evaluating such a strategy.

19. The reduction in prevalence resulting from a one-off period of nationwide mass testing would be relatively modest. To illustrate the scale of the challenge, if the entire population were offered a single test with 70% sensitivity, 80% of infected people took up the offer and 90% of people who tested positive completely isolated, around 50% of infected people (1-0.7 x 0.8 x 0.9) would not be isolated.

20. Further work has provided quantitative estimates of the potential impact of mass testing on the prevalence of infection. Once test assay characteristics, viral kinetics, test sample variations and within-household transmission from isolated infected people are accounted for, a reduction in prevalence of 15-20% might be a realistic "best-case" goal for a single round of highly effective untargeted mass testing. For context, the ONS Community Infection Survey estimates that swab positivity (akin to prevalence) increased by 6% between 31 October and 6 November compared to the week before, and by 50% between 2 October and 8 October compared to the week before.

## Festive period

21. It is highly likely that an increase in prevalence will occur during the festive period if contact patterns change and increase, which will inevitably lead to a rise in hospital admissions and deaths. If pre-Christmas prevalence is high and a lot of indoor mixing takes place, the increase in prevalence could be very large indeed. A parallel can be drawn, albeit on a different scale, between the return of students in Autumn and people from different households mixing intensively over Christmas.

22. It is not possible to reliably model the specific policy proposals, because we do not know how people would act in each circumstance.

23. To permit greater social contact over Christmas while minimising the likelihood of the NHS being overwhelmed in the New Year would need prevalence to be driven as low as possible before Christmas. The lower prevalence is pre-Christmas, the safer that period will be.

24. Analysis of Time Use Survey data suggests that in most years, increases in mixing of younger people in the weeks before Christmas may lead to increase in respiratory infection in older groups over the festive period. While behaviours will be different this year, this suggests that younger people should ideally reduce their levels of social contact in the weeks preceding Christmas to minimise the risk that they infect older relatives.

25. This underscores the importance of the order in which additional social contact takes place. If young people socialise more before meeting older family members at Christmas, the short term impact on mortality is highly likely to be worse than if they socialise more at New Year instead.

26. If large volumes of lateral flow tests are available for people without symptoms, targeting them at younger age groups (who are also less likely to develop symptoms and therefore seek PCR tests) is likely to be disproportionately beneficial.

27. An approach that limits relaxation of mixing rules to household bubbles would limit the expected increase in prevalence, **but faithfulness to bubbles is paramount**. Bubbling would be most effective if time-limited to less than one generation time of infection (about one week).

28. Limiting school and workplace contacts and non-bubble mixing in hospitality around periods of enhanced household mixing would be highly beneficial.

## Annex: PHIA framework of language for discussing probabilities

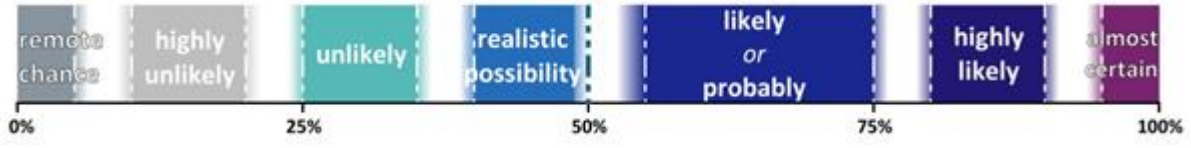


**Table 1**: Combined estimate of R and the growth rate in the UK, four nations and NHS England regions (90% confidence interval)

| Nation | R | Growth rate per day |
|---|---|---|
| **England** | 1.0 – 1.1 | 0% to +2% |
| **Scotland** | 0.8 – 1.0 | -4% to -1% |
| **Wales** | 0.8 – 1.0 | -4% to 0% |
| **Northern Ireland** | 0.8 – 1.0 | -3% to 0% |
| **UK** | **1.0 – 1.1** | **0% to +2%** |

| NHS England region | R | Growth rate per day |
|---|---|---|
| **East of England** | 1.0 – 1.3 | +1% to +4% |
| **London** | 1.0 – 1.2 | 0% to +3% |
| **Midlands** | 1.0 – 1.2 | +1% to +3% |
| **North East and Yorkshire** | 1.0 – 1.1 | 0% to +2% |
| **North West** | 0.8 – 1.0 | -3% to 0% |
| **South East** | 1.1 – 1.3 | +1% to +4% |
| **South West** | 1.0 – 1.3 | +1% to +4% |

**Figure 3:** SPI-M-O groups' estimates of median R in the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded area represents the combined numerical range and the black bar is the combined range after rounding to 1 decimal place. The UK estimate of R is the average over very different epidemiological situations and should be regarded as a guide to the general trend rather than a description of the epidemic state.

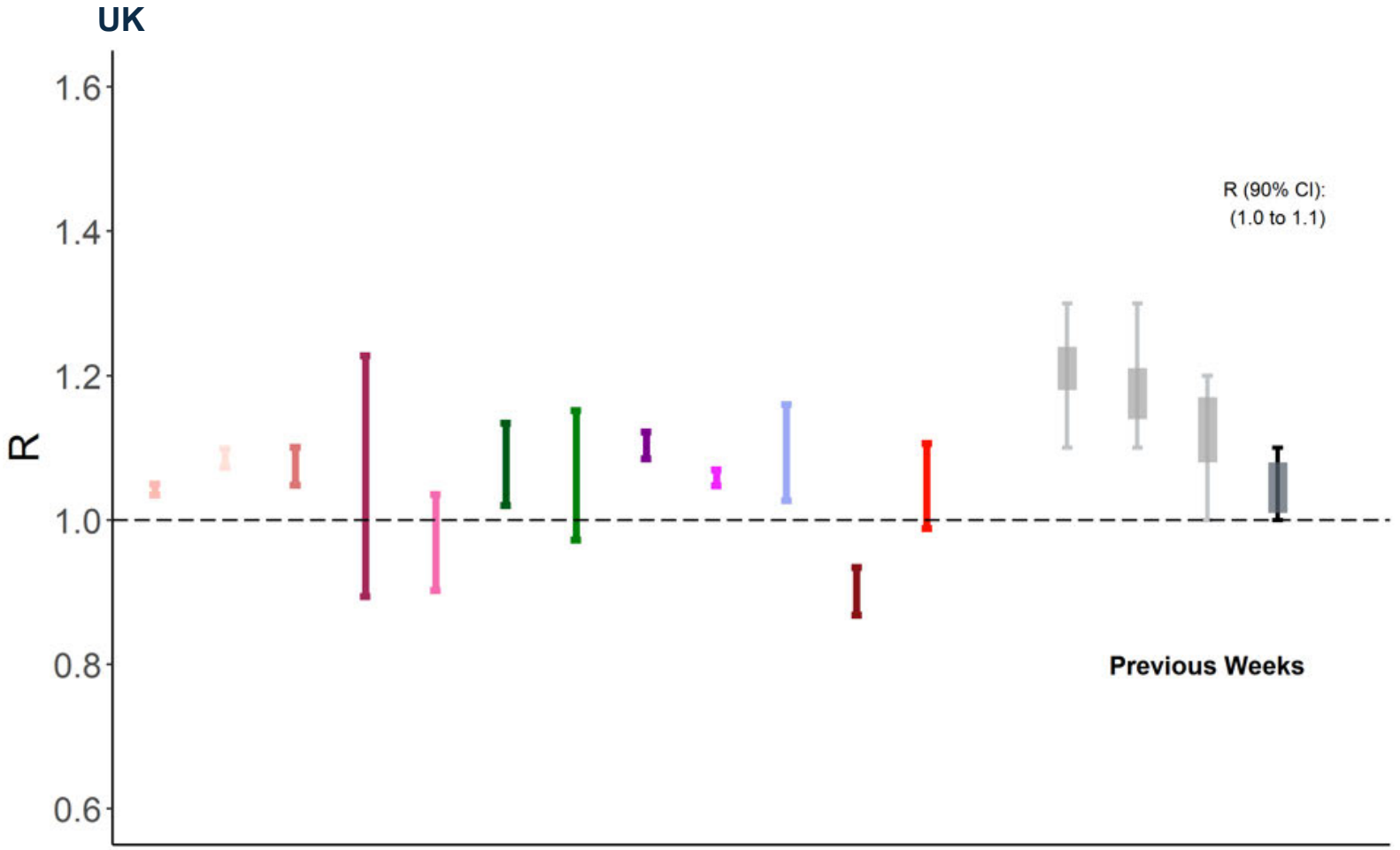


**Figure 4:** SPI-M-O groups estimates of median R in the four nations of the UK, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.

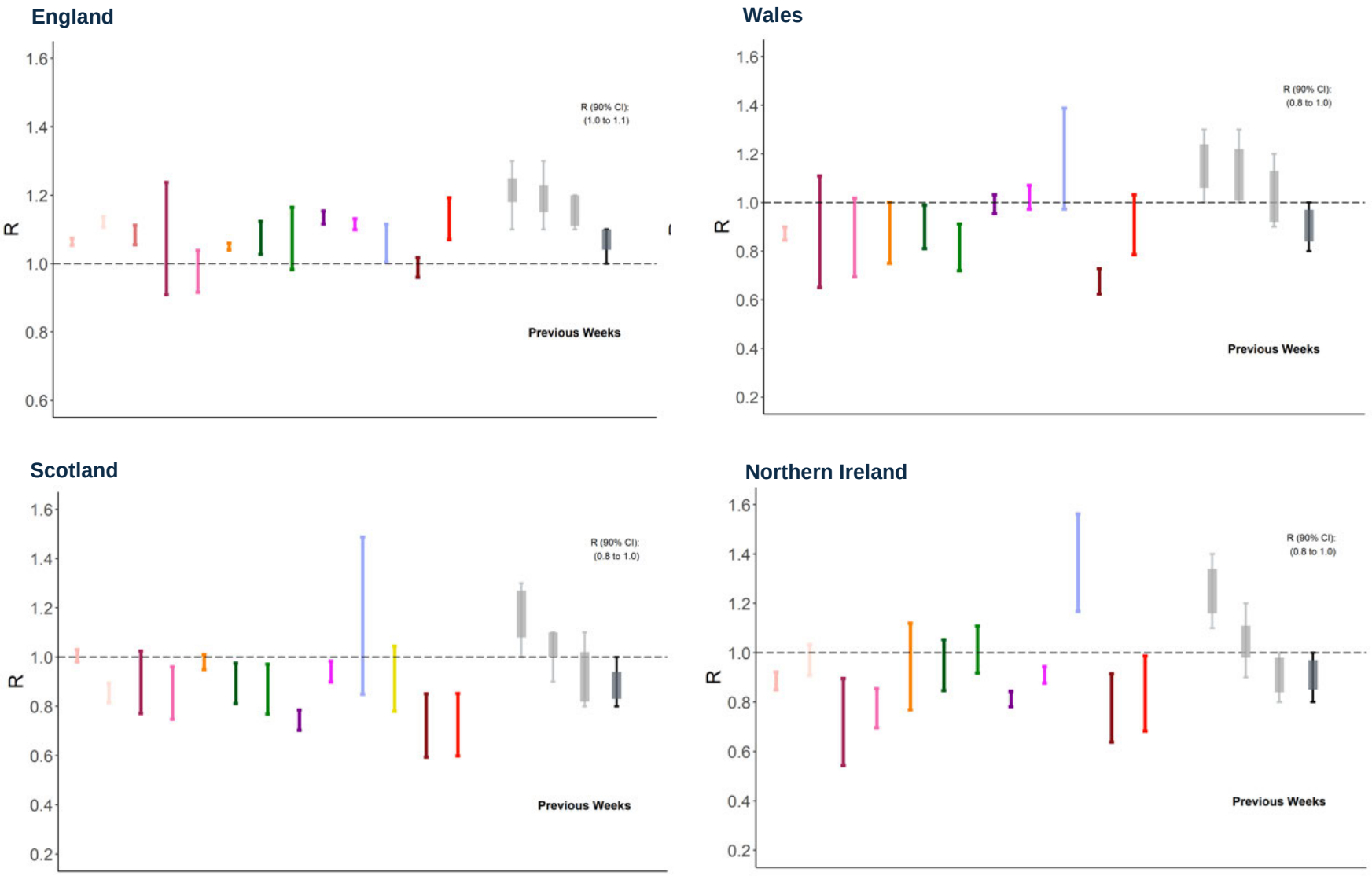


**Figure 5**: SPI-M-O groups estimates of the growth rate in NHS England regions, including 90% confidence intervals. Bars represent different modelling groups. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 2 decimal places.

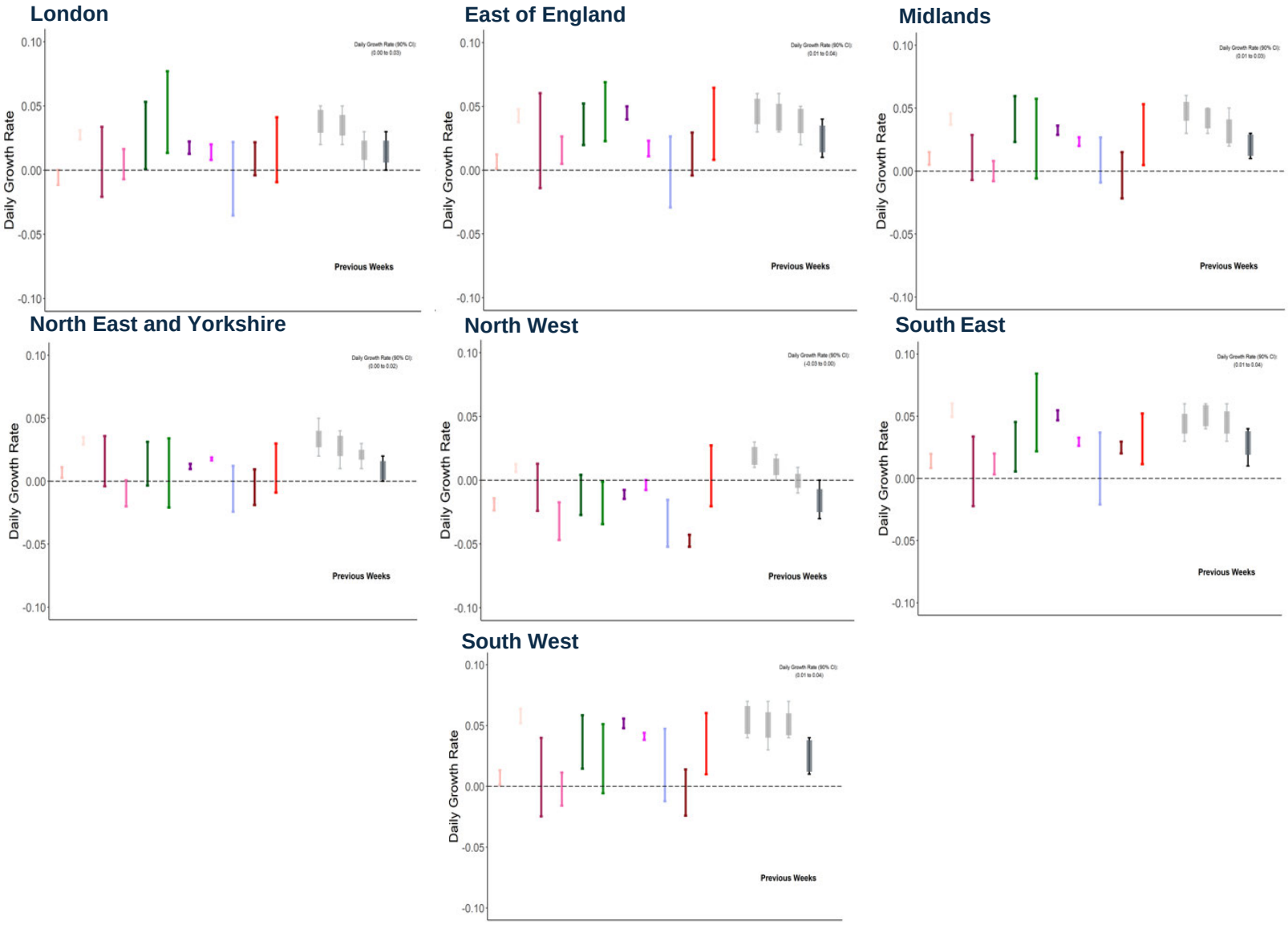


**Figure 6:** SPI-M-O groups estimates of median R in the NHS England regions, including 90% confidence intervals. Bars represent different independent estimates. The grey shaded areas represent the combined numerical range and the black bars are the combined range after rounding to 1 decimal place.

**Figure 7:** Medium-term scenarios taken from a subset of SPI-M-O models for daily hospitalisations in the seven NHS England regions over a range of R values (0.6 – purple; 0.8 – blue; 0.9 – green; 1.1 – yellow) where interventions are taken on 5th November and held in place for four weeks. All trajectories show interquartile ranges of model combinations as the shaded band. The red dashed line is the peak from the first wave of the epidemic in spring 2020.

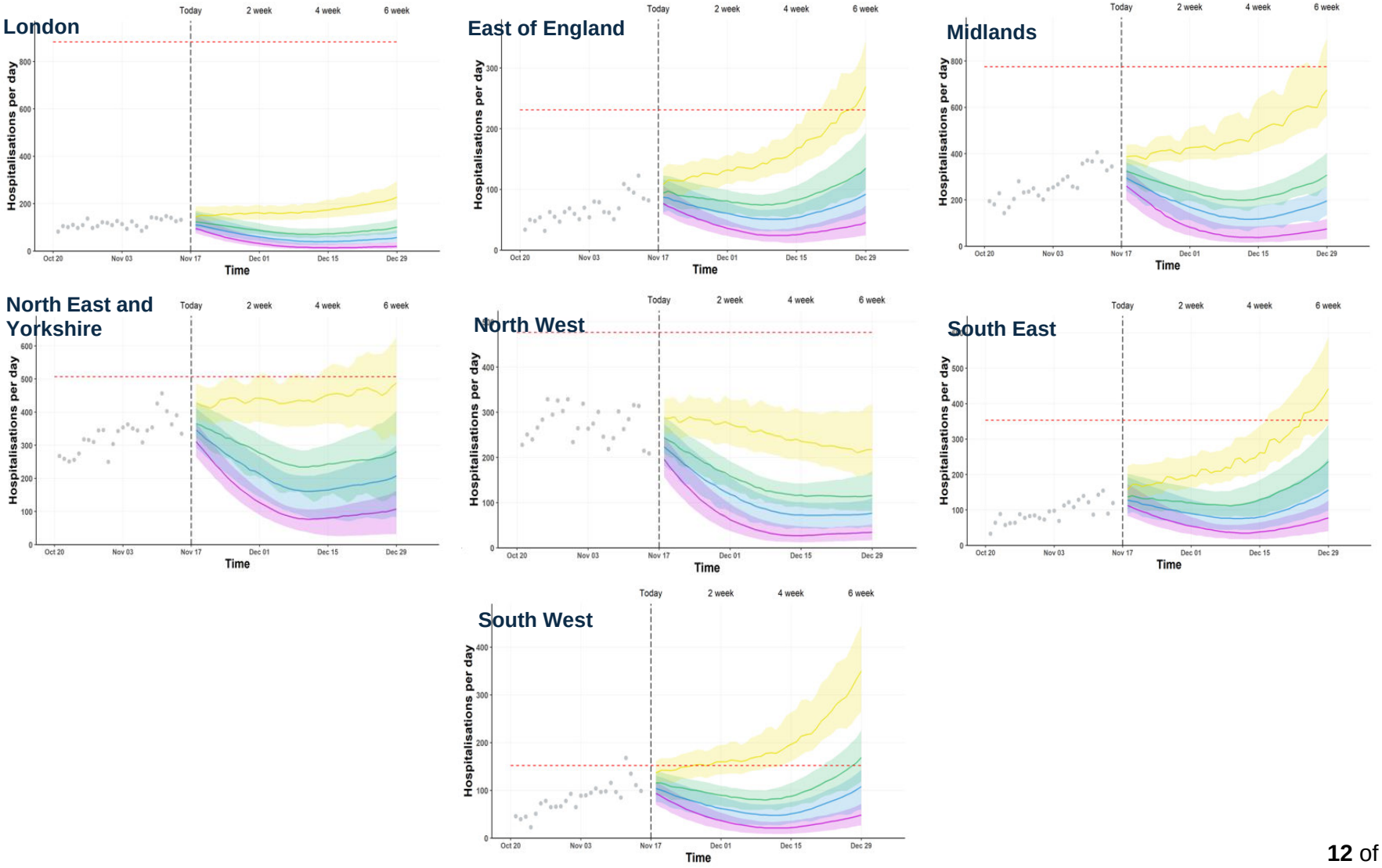


**Figure 8:** Medium-term scenarios taken from a subset of SPI-M-O models for daily deaths in the seven NHS England regions over a range of R values (0.6 – purple; 0.8 – blue; 0.9 – green; 1.1 – yellow) where interventions are taken on 5th November and held in place for four weeks.. All trajectories show interquartile ranges of model combinations as the shaded band. The red dashed line is the peak from the first wave of the epidemic in spring 2020. The red data points are incomplete due to reporting delays, and are expected to increase.