



**Cabinet Office**

Directorate General for Analysis, C19 Taskforce

# COVID-19: Updated Scenarios for Autumn/Winter 21/22

This product is intended to aid HMG planning, the scenarios are plausible, not predictions of what will happen.

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Contains data not yet in the public domain

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# Introduction

- These scenarios have been produced jointly by the C-19 TF Foresight Team and DHSC. They outline hypothetical but plausible paths for COVID-19 covering the Autumn/Winter 2021/22 period, and are an update to those produced in May 2021.
- By late September we expect that there will be further data, including: details of the final JCVI advice on booster vaccinations and policy decisions on certification; further data on waning immunity and cross infection of COVID-19 and influenza; and data reflecting the impact of the return to in-person teaching in schools and some further education. As such, **these scenarios are an interim product and will be revised once more data becomes available and we have updated modelling from SPI-M.**
- They are intended to support planning across HMG, enabling us to pinpoint scenario-specific risks and mitigations.
- The scenarios make no assumptions about possible policy responses - including NPIs - and none of the scenarios are intended to be a formal Reasonable Worst Case Scenario (RWCS).

## How to use these Scenarios

- The projections outlined here (including of COVID-19 cases) are not the product of quantitative modelling, but are aligned with the latest available insights from SPI-M (produced for Step 4 of the Roadmap: see Annex for more details).
- Workforce figures (cases + 25% of contacts unvaccinated; 3.5 contacts assumed per case) are illustrative: they do not reflect any modelled estimate derived from COVID-19 case levels and do not consider the role of policies such as critical worker exemptions. Actual isolation numbers will be sensitive to many factors, e.g. behaviours.
- Whilst our pessimistic scenario is based on an immune-escape variant of concern (VOC), alternative pessimistic scenarios could include: a more transmissible VOC; a VOC resulting in increased morbidity & mortality; or immunity waning faster than anticipated.
- We have produced three scenarios: an optimistic, contingency and pessimistic scenario. We recommend that central plans are aligned against both the optimistic and contingency scenarios, and are stress-tested against the pessimistic scenario.

# Scenario Assumptions

Key assumptions	Optimistic	Contingency	Pessimistic
<b>Dominant Variant</b>	Delta	Delta	A new <b>variant of concern</b> with mild/moderate immune-escape properties
<b>Cautious Behaviours &amp; Contact Patterns</b>	Cautious behaviours and adherence with guidance remain <b>high</b> . Increased social mixing.	Cautious behaviours and adherence with guidance are <b>low</b> . Increased social mixing.	Cautious behaviours and adherence with guidance are moderate
<b>Vaccine Rollout and Booster Uptake (To be revisited once further data is available)</b>	Vaccine rollout faster than expected. Booster uptake high and faster than anticipated for all cohorts identified in final JCVI advice	Vaccine rollout continues to meet targets but with lower coverage in under 30s. Booster uptake moderate and proceeds as planned for all cohorts identified in final JCVI advice	Vaccine rollout slower than planned with significantly lower coverage in under 30s. Booster uptake lower than previous phases and slow to reach all cohorts identified in final JCVI advice
<b>Vaccine Effectiveness / Length of Immunity (To be revisited once further data is available)</b>	A significant reduction in risk of infection and an extremely significant reduction in risk of hospitalisation after two doses. Vaccine effectiveness sustained; waning of immunity is compensated by boosters.	A reduction in risk of infection and a very significant reduction in risk of hospitalisation after two doses. Vaccine effectiveness mostly sustained; boosters unable to wholly compensate waning immunity.	A variant with moderate immune-escape increases the risk of infection and hospitalisation, equivalent to significant waning of immunity

We assume that cautious behaviours and contact patterns have the most impact on the differing trajectories of our optimistic and contingency scenarios (highlighted above), and Delta remains the dominant variant. In our pessimistic scenario, the emergence of a variant with moderate immune-escape is the primary driver of disease trajectory (highlighted above); a more transmissible VOC, or one with increased morbidity, could equally result in this scenario, as would more pessimistic assumptions on waning immunity.



# Scenarios: Summary

**Cautious behaviours and contact patterns** are the key factor determining whether we trend towards an optimistic or contingency scenario. The emergence of a VOC (with moderate immune-escape, or increased transmissibility or morbidity) drives our pessimistic scenario; it could equally be reached if waning immunity is worse than anticipated.

	OPTIMISTIC	CONTINGENCY	PESSIMISTIC
DAILY COVID CASES AND INFECTIONS AT PEAK	<b>30-50K cases / 60-100K infections early Autumn.</b> Significant regional variation in prevalence. Testing capacity is strained.	<b>50-100K cases / 100-200K infections mid-Autumn.</b> Some regional variation in prevalence. Testing capacity severely strained with demand often outstripping supply.	<b>Cases on path to 300K by early Winter.</b> Minimal regional variation in prevalence. Testing demand significantly outstrips supply throughout Autumn/Winter.
SHAPE OF PEAK (ILLUSTRATIVE ONLY)	Moderate rise in infections which falls gradually over the Autumn period. Delta variant remains dominant.	Cases grow from c.30K/day in early Autumn, peaks in mid-Autumn which could be sustained through Winter. Delta remains dominant.	Cases grow gradually, then rapidly in late Autumn. A variant with mild/moderate immune-escape properties (20-30% reduction in vaccine effectiveness) is discovered to have spread and becomes dominant.
PEAK HOSPITAL OCCUPANCY (NOT NECESSARILY CONCURRENT)	<b>COVID-19: Below 10K</b> <b>Influenza: c.4K-8K</b>	<b>COVID-19: 10-20K</b> <b>Influenza: c.8K</b>	<b>COVID-19: &gt;35K</b> <b>Influenza: c.4K-8K</b>
WIDER HEALTH & SOCIAL CARE	Difficult flu year; increased non-COVID emergency demand over Winter. Significant impact on recovering elective treatments, with significant regional variation.	Difficult flu year; significantly increased non-COVID emergency demand over Winter. Areas of enduring COVID-19 transmission cause intense pressure in some localities. Major step back in recovering elective services and reducing backlog (with some regional variation). NHS staff burnout worsens.	Difficult flu year due to possible behavioural response following VOC emergence; increased non-COVID emergency demand over Winter. Major step back in recovering the backlog of routine and elective care, with a corresponding increase in preventable deaths. NHS staff burnout worsens.
WORKFORCE	<b>Some workforce disruption</b> , instructions to isolate remain below 100K a day.	<b>Moderate workforce disruption</b> , up to 200K instructions, or those with symptoms, isolating a day at peak. High incidence of Long COVID creates extra health service pressure and burden on all economic sectors. Impacts felt disproportionately in areas of deprivation.	<b>Significant workforce disruption</b> , over 200K instructions, or those with symptoms, isolating a day at peak. High incidence of Long COVID creates extra health service pressure and burden on all economic sectors. Impacts felt disproportionately in areas of deprivation.
SCHOOLS	Moderate, localised disruption at schools.	Significant disruption in some schools.	Widespread disruption to in-person teaching.
INTERNATIONAL	International prevalence remains high but global vaccine roll-out increases at pace.	International prevalence remains high but global vaccine roll-out continues slowly.	International prevalence is very high, and compounded by slow global vaccine roll-out.

## Optimistic Scenario Narrative

As schools return in mid-September, cases begin to rise, with the increase mostly confined within school-aged groups and their immediate families. There are second order effects for Disproportionately Impacted Groups - where vaccine coverage is lower. Cautious behaviours and adherence with guidance is high: cases and infections increase slowly through autumn but never exceed 50K cases a day. There is a moderate flu year which, combined with increased pressure from other seasonal illnesses, increases non-COVID emergency demand for the NHS. There is significant regional variation in COVID prevalence, and therefore resulting NHS pressures. Peak hospital occupancy never exceeds 10K for COVID-19 and c.4K for influenza. Rising cases, together with increasing incidence of seasonal respiratory illnesses (e.g. flu, RSV), strain testing capacity. The gradual return to offices through Autumn coincides with an increase in cases and isolation and illness, resulting in some workforce disruption. However, instructions to isolate remain below 100K a day and are mainly localised to high contact sectors, NHS workers and parents. Global prevalence remains high, but greater global supply means that the international rollout of vaccines gathers pace. Delta remains the dominant variant.



## Contingency Scenario Narrative

Cases grow quickly in early Autumn as in-person teaching resumes; the return of office workers happens more quickly than expected; and cautious behaviours and adherence to guidance wane. Resulting in moderate workforce disruption, with up to 200K instructions, or those with symptoms, isolating a day at the peak. By mid-Autumn, cases approach a peak of c.100K a day, with testing capacity severely strained, particularly as incidence of non-COVID respiratory illness (e.g. flu, RSV) also increase. By mid-Winter it becomes clear we are in a severe flu year which, combined with significant pressure from other seasonal illnesses, significantly increases non-covid emergency demand on the NHS. Wider health & social care pressures rise, including from: Long COVID (creating additional pressures on the health service, including increased use of primary care services, as well as increased sickness absences across all sectors of the economy); staff burnout & absences; and reduced ability to address elective backlogs and provide routine care. Areas of enduring transmission cause intense pressure in some localities. Health - and second order economic and educational - impacts are once again felt disproportionately in areas of deprivation and amongst disproportionately Impacted Groups, due to higher exposure to the virus, severity of illness and lower vaccine uptake. International prevalence remains high, with global vaccine roll-out continuing slowly. Delta remains the dominant variant.



## Pessimistic Scenario Narrative

A variant with mild/moderate immune-escape (20-30% reduction in vaccine effectiveness) properties is discovered to have spread and eventually becomes dominant. Cases grow gradually, then rapidly in late Autumn, and are on a path to 300K by early Winter - severely straining testing capacity. Intense NHS pressure is felt nationwide, and is exacerbated by concurrent seasonal pressures despite a moderate flu season. Staff absences from burnout and isolation compound these pressures. Delivery of routine and elective care are impacted, leading to a rise in preventable deaths. High case rates additionally drive wider workforce disruption across different sectors: there are over 200K instructions to isolate a day at peak. Higher case rates also lead to increased prevalence and incidence of Long COVID creating additional pressures on the health service, including increased use of primary care services, as well as increased sickness absences across all sectors of the economy. In-person teaching is widely disrupted by rising cases. The resulting impacts from such disruptions to workforce and education are felt most acutely by Disproportionately Impacted Groups. International prevalence remains very high, driven by the global spread of the new VOC, and compounded by a continuing slow global vaccine roll-out.



# Annex: COVID and influenza numbers

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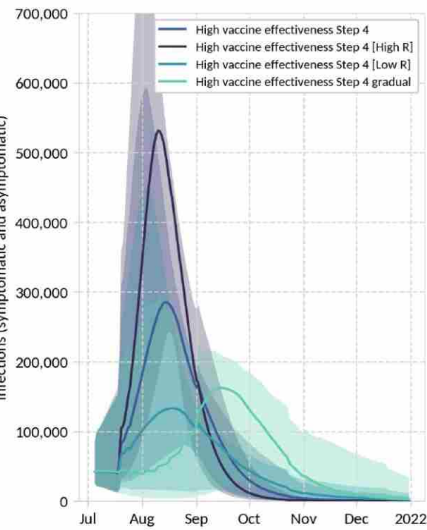
9

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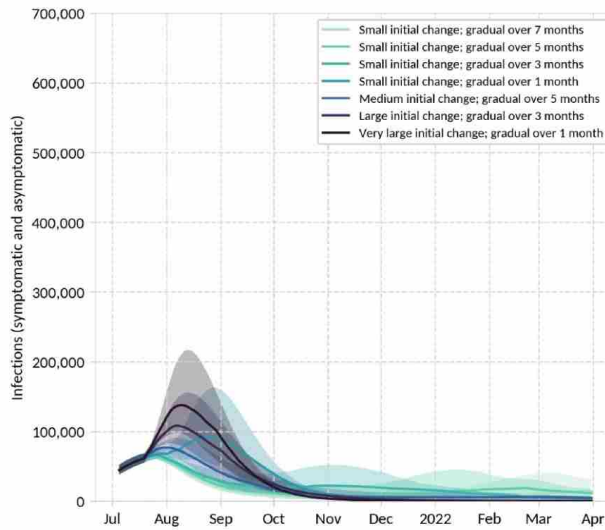
# Background to COVID-19 infection numbers

## Modelling produced for Step 4 of the Roadmap

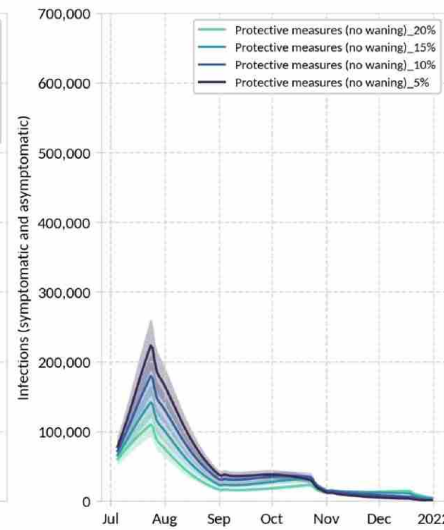
### Imperial



### Warwick



### LSHTM



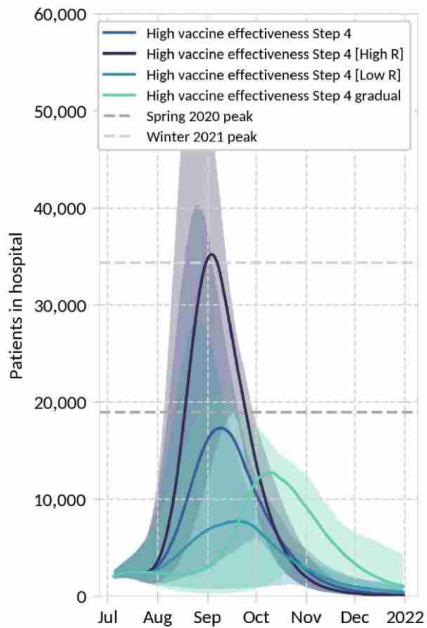
Source: SPI-M-O: Summary of further modelling of easing restrictions – Roadmap Step 4 on 19 July 2021, 7 July 2021

- At Step 4, SPI-M modelling projected peaks of infections ranging from c.70K to over 500K per day. There was considerable variation between the different modelling teams (see graphics).
- In our optimistic scenario, we assume infections peak at the lower end of this range: 60-100K per day
- In our contingency scenario, we assume infections peak at 100-200K per day, which broadly falls into the upper range for modelled output from Warwick and many of those from LSHTM.
- Our pessimistic scenario assumes cases (rather than infections) are on a path to 300K per day, broadly in line with the more pessimistic modelled outputs from Imperial.
- Throughout, we have assumed cases are c.50% of infections.
- By comparison, the January 2021 peak in cases was 55K.

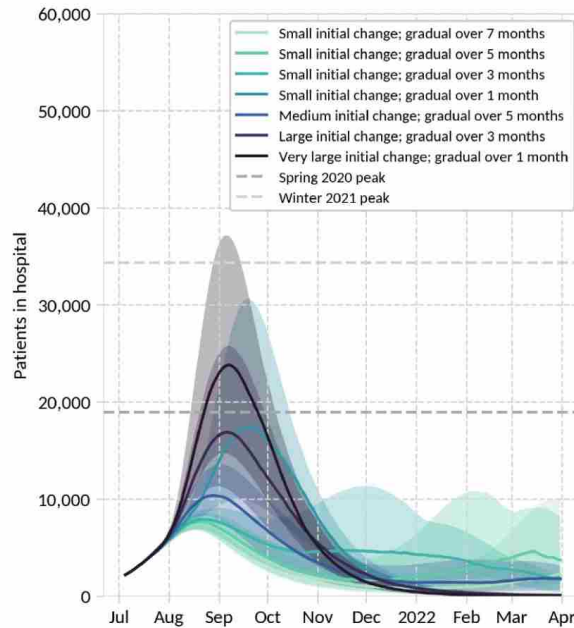
# Background to COVID-19 hospital occupancy numbers

## Modelling produced for Step 4 of the Roadmap

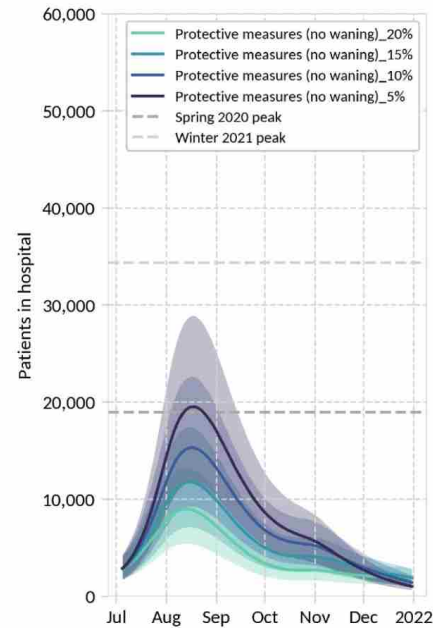
### Imperial



### Warwick



### LSHTM



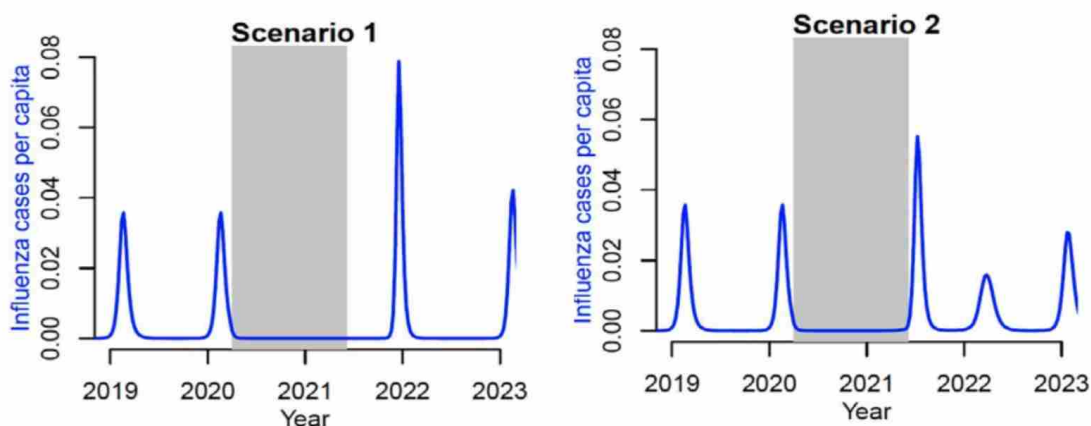
- At Step 4, SPI-M modelling projected peaks of hospital occupancy ranged from c.7K to c.35K. As with infection numbers, there was considerable variation between the different modelling teams (see graphics).
- By comparison the January 2021 peak in hospital occupancy was c.35K.
- In our optimistic scenario, we assume hospital occupancy peaks at the lower end of this range: not over 10K.
- In our contingency scenario, we assume hospital occupancy peaks at 10-20K, which broadly falls into the upper range for modelled output from Warwick and LSHTM.
- Our pessimistic scenario assumes hospital occupancy peaks at over 35K, in line with the most pessimistic modelled output from Imperial.

Source: SPI-M-O: Summary of further modelling of easing restrictions – Roadmap Step 4 on 19 July 2021, 7 July 2021



# Background to influenza hospital occupancy numbers

## RWCS for an influenza epidemic



Sources: [Academy of Medical Sciences](#), DHSC

- Modelling by the Academy of Medical Sciences (AMS) in July 2021 suggested two potential reasonable worst case scenarios for an influenza epidemic; ranging from ~1.5 to ~2.2 times the magnitude of a 'normal' flu year (see right), noting the considerable uncertainty with these projections.
- In winter 2019/20, patients in hospital with influenza peaked at c.4,000 in late December - we have assumed this is typical of a 'normal' flu year.
- Our optimistic and pessimistic scenarios assume influenza hospitalisations peak at up to 4,000, reflecting assumed moderate to high levels of precautionary behaviours in these scenarios, set against the likelihood that population immunity to influenza have diminished following the very low levels last winter and possibility of vaccine mismatch (the range reflects uncertainty on impact of preventative behaviours).
- Our contingency scenario assumes influenza hospitalisations peak at 8,000 (ie double a 'normal year'). This is equivalent to the AMS RWCS, and is driven by the assumed low levels of precautionary behaviours in this scenario.