# Current understanding of COVID-19 compared with NSRA 2019 Pandemic Influenza planning assumptions

The table below sets out the current scientific understanding of Covid-19, compared to the pandemic influenza planning assumptions. SAGE (Scientific Advisory Group for Emergencies) does not decide what scenario Government should be planning for. That is a decision for Ministers, based on scientific advice from SAGE.

As of January 2020, Ministers are using the pandemic influenza planning assumptions as the basis for HMG contingency planning for Covid-19. The Cabinet Office, Civil Contingencies Secretariat, will advise HMG when they should work to revised planning assumptions.

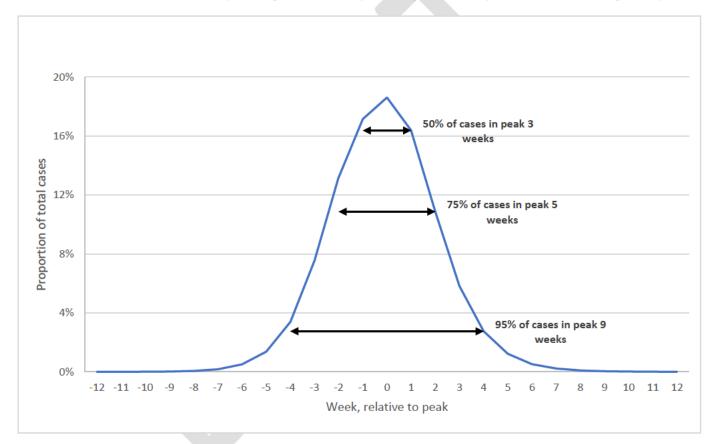| 1st Order Assumptions | Pan Flu reasonable worst case, based on a 2016 UK population, including confidence intervals where possible | COVID-19 key conclusions of SAGE to date, based on a 2016 UK population |
|---|---|---|
| **Basic Reproductive Rate ($R_0$) (Number of secondary cases generated on average by one primary case. Suppression of an outbreak requires R to be sustained below 1)** | No number included in planning assumptions | 2.4 (assumed for the UK) |
| **Doubling Time (Time required for the number of cases to double)** | No number included in planning assumptions | 4.6 days (assumed for the UK) |
| **Incubation period (Time between exposure to infection and symptom onset)** | Short incubation period: 1 to 3 days | Average: 5 days. Range: 1 to 11 days. (assumed for the UK) |
| **Duration of Illness** | Assumes normal flu profile – most people back to normal activities in 7 to 10 days | Most cases probably resolve 7 days after symptom start. From symptom onset to hospitalisation: Average of 7 days. From onset of illness to discharge from hospital: Average of 23 days but may include avoidable delay in discharge. From onset of illness to death: Average of 22 days for severe cases, but large variation around this. Longest time so far appears to be 41 days. |
| **Duration of infectivity** | Adults are infectious for up to 5 days from the onset of symptoms. Longer periods have been found, particularly in those who are immunosuppressed. Children may be infectious for up to 7 days. Some people can be infected, develop immunity, and have minimal or no symptoms but may still be able to pass on the virus. | Duration of infectivity likely to vary depending on severity of individual cases. 14 days as upper limit. Peak infectivity is probably around the start of symptom onset, average 2 to 6 days, then falling off rapidly. |

# Current understanding of COVID-19 compared with NSRA 2019 Pandemic Influenza planning assumptions

| | | |
|---|---|---|
| **Transmission** | Sustained human-to-human transmission.<br><br>Around a third of infected people are asymptomatic. | Current understanding is that the transmission route is respiratory and via contact. This means that viruses are transmitted via touching an infected person and spray of droplets such as coughing and sneezing.<br>Human-to-human transmission outside China has occurred but there is as yet no definitive evidence of a sustained outbreak/epidemic elsewhere. Asymptomatic transmission cannot be ruled out and transmission from mildly symptomatic individuals is likely. |
| **Case Fatality Rate (CFR) (fatality rate for identified cases of covid-19)** | 2.5% (previously defined as only symptomatically infected) | 2-3% of identified cases only |
| **Infection fatality rate (IFR) (cumulative % of all infected including both symptomatic and asymptomatic infections)** | No number included in planning assumptions | 1% of all infections (both symptomatic and asymptomatic). Age distribution: *[To note, there is high confidence for the age distribution data below]*<br><br><table><tr><td>**Age Band**</td><td>**Proportion of infected that die**</td></tr><tr><td>0 − 9</td><td>0.01%</td></tr><tr><td>10 − 19</td><td>0.01%</td></tr><tr><td>20 − 29</td><td>0.04%</td></tr><tr><td>30 − 39</td><td>0.09%</td></tr><tr><td>40 − 49</td><td>0.15%</td></tr><tr><td>50 − 59</td><td>0.69%</td></tr><tr><td>60 − 69</td><td>2.21%</td></tr><tr><td>70 − 79</td><td>5.92%</td></tr><tr><td>80+</td><td>8.76%</td></tr></table> |
| **Origin** | N/A | Current evidence suggests single point zoonotic (i.e. animal to human) outbreak, now sustained entirely by human-to-human transmission. No evidence of ongoing zoonotic transmission. |
| **Duration of outbreak and waves** | Single wave spread over 15 weeks | Single wave with 95% of cases in peak 9 weeks, half of cases in peak 3 weeks (see figure 1 below) |

# Current understanding of COVID-19 compared with NSRA 2019 Pandemic Influenza planning assumptions

| 2nd Order Assumptions | Pan Flu reasonable worst case, based on a 2016 UK population, including confidence intervals where possible | COVID-19 key conclusions of SAGE to date, based on a 2016 UK population |
|---|---|---|
| **Clinical attack rate (CAR) (cumulative % of population, includes symptomatic infections only)** | 50% (32,800,000) | 50% (32,800,000) |
| **Infection attack rate (IAR) (cumulative % of population, includes both symptomatic and asymptomatic infections)** | 85% (55,760,000) | 80% (52,480,000) |
| **Workforce absences** | 17-20% nationally during peak weeks. This may vary for individual businesses. Anticipated that 50% of workforce may require time off at some stage over the entire period of a pandemic either due to illness or to care for others This would be higher were schools to be closed. An average absence duration of 7 (without complications) to 10 days (with complications). | 21% nationally during peak weeks. This may vary for individual businesses. Average absence duration of 14 days based on current government advice. Most cases probably resolve 7 days after symptom start so may be lowered depending on government messaging. Includes absences due to covid-19, background rates of influenza-like illness and caring for others, but not absences due to school closures or "worried well". |
| **Numbers requiring assessment at health services** | 9,840,000 would require assessment by health services. This is 30% of all those that are symptomatic. | Unknown |
| **Proportion of infected people hospitalised (threshold for hospitalisation assumed to be "requiring oxygen")** | 4% (1,312,000) of all those that are symptomatic. (Previously defined without this threshold) | 8% (4,198,000) of infected people, equivalent to 13% of symptomatic people. Age distribution: |

| Age Band | Proportion of infected people hospitalised |
|---|---|
| 0 – 9 | 0.24% |
| 10 – 19 | 0.34% |
| 20 – 29 | 1.05% |
| 30 – 39 | 2.34% |
| 40 – 49 | 3.95% |
| 50 – 59 | 9.81% |
| 60 – 69 | 22.50% |

| | | | |
|---|---|---|---|
| | | 70 – 79 | 36.20% |
| | | 80+ | 43.79% |

| | | |
|---|---|---|
| **Proportion of people requiring ventilation in hospital** | 25% (328,000) of all those requiring hospital care. (Previously defined as number needing critical care) | Of the people requiring oxygen in hospital, 19% (781,000) will require ventilation at some point in their care, consisting of: 9% (390,000) invasive ventilation performed in critical care; and 9% (390,000) non-invasive ventilation. The age distribution of those requiring ventilation is assumed to be the same as for IFR

This is equivalent to 2% of infected people requiring ventilation at some point split between 1% requiring invasive ventilation in critical care and 1% requiring non-invasive ventilation. |
| **Fatality rate for people requiring invasive ventilation in critical care** | No number included in planning assumptions | 50% (does not vary by age) |
| **Fatality rate for hospitalised people** | No number included in planning assumptions | 12% of hospitalised people. Age distribution:<br><br>| Age Band | Fatality rate for hospitalised people |<br>|---|---|<br>| 0 – 9 | 3.64% |<br>| 10 – 19 | 3.64% |<br>| 20 – 29 | 3.64% |<br>| 30 – 39 | 3.64% |<br>| 40 – 49 | 3.77% |<br>| 50 – 59 | 7.07% |<br>| 60 – 69 | 9.83% |<br>| 70 – 79 | 16.36% |<br>| 80+ | 20.00% | |
| **Average length of stay in hospital** | 6 days standard. 10 days ICU. | 8 days for people not requiring ventilation. 16 days for people requiring ventilation (of which 10 days are under ventilation). **Based on bed usage for viral pneumonia from last 3 years.** |
| **Excess deaths (calculated using the IFR and IAR)** | 820,000 (to the nearest 10,000) | 520,000 (to the nearest 10,000) |
| **Clinical Countermeasures** | • Antivirals (AV)<br>• Antibiotics (AB)<br>• Pandemic specific vaccine (PSV) | None |

| Vaccine Development | It is likely to take at least six months after a novel virus has been identified and isolated for an effective pandemic influenza vaccine to become available from manufacturers. | None likely to be available in a UK epidemic |
|---|---|---|

*Figure 1 Covid-19 Reasonable Worst-Case planning scenario: Proportion of new cases per week in an unmitigated epidemic*



| Week, relative to peak | -12 to -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 to 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of total cases (%) | <0.1 | 0.1 | 0.2 | 0.5 | 1.4 | 3.4 | 7.6 | 13.2 | 17.1 | 18.6 | 16.4 | 10.9 | 5.8 | 2.8 | 1.2 | 0.5 | 0.2 | 0.1 | <0.1 |