

Technical Advisory Cell: Summary Brief

5 May 2020

Top line Summary

- R is below 1 and continuing to fall. This implies that there could be some relaxation of measures without causing exponential growth in cases.
- It is likely that some minor easing of current restrictions may be possible in the near future with only a modest impact on R, with R remaining below 1.
- Confidence that necessary monitoring, and track and trace systems are ready to go is critical before decisions are made to relax a number of the current measures.
- SAGE has developed a paper articulating the ethical considerations for releasing lockdown. TAG recommends that this paper is shared with policy colleagues to support the development of options for returning to a new normal.
- SAGE recommends that a small package of measures, including allowing more time outdoors, should be introduced on May 11. TAG has considered the recommendations and will offer a consensus statement. It is satisfied that the measures will not increase the R ratio above 1, except the schools action which is has concerns about.
- SAGE reports that around 33% of current Covid-19 cases are HCW to HCW or patient to community, suggesting a significant asymptomatic spread.
- TAG has a consensus statement on testing in care homes to provide evidence for policymakers. The evidence is in line with the current process of ramping up serial testing for workers, and continuing to test all returning residents, but only testing all residents and carers if there is a new symptomatic outbreak.
- TAG is working with NHS, PHW and WG to develop a set of trigger warnings and critical indicators that will alert officials, ministers, employers and the public to the beginning of another wave of infections.

Infection Rate

- Most recent estimates point to an R_t value of 0.87 for Wales, and a decrease in admissions suggests that R_t is continuing to decrease. Because R_t is below 1, the number of new cases of covid-19 are decreasing. Current estimates of R_t reflect cases from around two weeks ago.
- We are likely to be seeing three different outbreaks at the moment:

- Community where R_t is falling and is likely to be below 1.
 - Hospital/healthcare setting where R_t may be between 0.1 and 0.25 but varies considerably with some hospitals having larger outbreaks.
 - Care homes where typical outbreaks may affect around 10% of staff and 10% of residents.
- The literature is not consistent about what will happen to R_t if interventions are switched on or off, but most studies suggest that lifting lockdown may lead to a rapid increase in R_t , unless other interventions like track and trace are successful.
 - A small increase in R_t above 1 that is maintained over 3 months can make a huge difference to hospital admissions and deaths. Even a small increase in R_t to 1.1 can significantly increase the number of hospital admissions and deaths.

Estimate of prevalence and incidence of Covid-19 in UK

- Preliminary ONS estimates of the prevalence of infection, based on data collected between 26th April and 2nd May, are 179,000 people in England being infected with COVID-19, with a credible interval of 78,000 to 358,000.
- SAGE reported a study of 5000 asymptomatic staff in a hospital, where 4.8% tested positive for Covid-19
- SAGE reported a study of a single genomic line of Covid-19 in the community where the index case was a social worker who had visited all subsequent contacts.
- SAGE estimated that one in three infections is a health or care worker transmission or a patient transmission.

Releasing Lockdown

- SAGE considered the impact of an initial phase of lifting current social distancing measures. The 1st phase, proposed by Cabinet Office to be implemented on 11 May. Note that the exercise and leisure factor will require a change to the Welsh legislation.

Proposed Phase 1 Measures for lifting social distancing

- **Work**- Encourage those permitted to work (who cannot work from home) to do so subject to complying with the new 'safer spaces' guidance – with a moderate level of up-tick in return.
- **Schools**- Encourage more of those children currently permitted to attend schools and childcare to do so – with a moderate level of up-tick in return.
- **Exercise & leisure**: Make clear that people can exercise more than once a day (as already legally permitted) and use outdoor spaces for leisure (observing social distancing).
- **Outdoor workplaces**: Opening some additional outdoor workplaces e.g. outdoor

markets and garden centres.

- It is assumed that guidance on maintaining social distancing would be provided, and that households involving the clinically extremely vulnerable would continue to shield.
- It is considered that this package of measures will have a modest impact on R, with R remaining below 1 and with incidence continuing to fall in most areas.
- It was noted that any changes in adherence rates or behavioural changes could have a much larger impact than specific policies. This suggests that clarity of message on permitted behaviours is critical, particularly for exercise and leisure activities.
- Monitoring the impact of phase 1 measure for lifting of social distancing will be possible via a combination of sources. It is suggested that the measures will need to be in place for 4 weeks to see impact.
- Further phases of measures for lifting of lockdown have also been shared by Cabinet Office for consideration. It is proposed that these measures would be introduced in early June. SAGE did not consider the further phases, but the next is given for information.

Proposed Phase 2 Measures for Lifting Social Distancing

- **Retail:** Reopening all retail - including personal care.
- **Outdoor sports:** Reopening outdoor sports that allow social distancing.
- **Schools:** Return primary schools and early years with maximum 'safer spaces' measures in place.
- **Gatherings:** Permit small weddings (<10 people) and larger funerals.
- **Bubbles/ Gatherings:** Permit households to 'bubble' i.e. with one or two other households **and/or** permit slightly larger outdoor gatherings e.g. up to 4 adults with children, with another household/s (up to 4), observing distancing and guiding that such events should be limited to once a week.
- **Quarantine:** From start of June, requiring all those arriving into the UK (subject to exceptions for those involved in maintaining the flow of critical goods) to self-isolate for a period of 14 days.

- As with the previous phase of measures, it is assumed that guidance on maintaining social distancing would be provided, and that households involving the clinically extremely vulnerable would continue to shield.

- There is currently no consensus on the likely impact on R if phase 2 measures are implemented. However, there was consensus that phase 2 measures would need to be supported by very effective contact tracing approaches.

Transmission in Schoolchildren

- Younger children might be less susceptible to infection (low degree of confidence) but are less susceptible to clinical disease (moderate to high degree of confidence) than adults; there is not enough evidence to determine whether this is also the case for older children.
- It is not clear whether transmissibility by children is lower than in adults, but some variable evidence indicates that this may be the case for younger (up to age 11-13) children (low confidence).
- For a variety of reasons reopening options relating to younger children are lower risk than those related to older children.
- Indirect effects of re-opening schools (regardless of which option is taken) are likely to have a greater impact on transmission than schools themselves (e.g. work-related reopening, behaviour changes)
- TAC agrees with SAGE advice that effective measures should be in place to monitor the effects of any change in schools, and to respond to cases within schools.

NHS Performance

- SPI-M Short-term forecasts considered on 4 May indicate the number of ICU beds occupied by COVID-19 patients are likely to remain approximately static at around 100 ± 80 occupied beds until 16 May.
- Allowing for a further total 70 patients that are either non-COVID or suspected this would indicate the overall ICU capacity in Wales (capacity reported as 390 L3 ICU beds as of 3 May) is unlikely to be exceeded within the near future.
- Hospital reported numbers of COVID-19 patients within Welsh ICU have been declining since 20 April. The rate of decrease on a granular Healthboard basis appears to be slowing with a potential plateau around 75 ± 15 confirmed COVID-19 patients in ICU in Wales.
- The 7-day average daily values for overall case numbers, covid related hospital admissions, covid related ICU admissions, L3 ICU occupancy, covid-related hospital discharges and PHW-reported deaths all indicate the past seven days have improved overall over the previous 7-day period.

- As of 5 May, of the 4,983 occupied beds in NHS Wales (54% of total available), 8% are confirmed Covid-19 patients and a further 4% are suspected and awaiting confirmation.

Adherence to current measures

- Estimates of adherence to current measures is estimated to be between 60% and 70%. There continues to be strong support for the measures in Wales (and in the UK), and most people in Wales continue to follow the social distancing guidelines.
- There are signs that the public may be getting tired of lockdown and may be starting to reduce their compliance. The most recent survey data shows continuing compliance, but with signs that is falling.
- The mobility data at a UK level shows increases in movement, whilst the Google mobility data for Wales is more mixed (but only covers up to 17th of April).
- As Wales has an older population it may benefit slightly from older people being more compliant with the measures, however that may be offset by Wales having a higher percentage of key workers. The results from a weekly survey of 500 individuals in Wales shows a slight decline of compliance on previous weeks, however it is too early to say if there is weakening compliance.

Research

- There are currently 1199 Welsh patients recruited to COVID-19 urgent public health studies (8 total UPH studies open and recruiting in Wales).

Genomics

- There are as many individual lineages in Wales now as there are in England, so there are more seeding points than there were initially.

Therapeutics

- Officials have been invited to join the UK Serology and Diagnostics Taskforce. Clare Rowlands (WG) and Robin Howe (PHW) have been nominated to represent Wales.
- The US trial on Remdesivir headline results suggest a statistically signal of efficacy that was not seen in a smaller Chinese trial. Full results from the US trial are not yet available. It has also been noted that there are challenges in manufacturing Remdesivir.

Vaccines

- There are around 200 candidate vaccines worldwide, of which approximately 70 are credible and fewer than a dozen might be considered front-runners.
- A UK Vaccines Taskforce has been established. Wales is represented by **NR** **NR** (WG) and Prof Stephen Jolles (Cardiff University).

Test & Trace

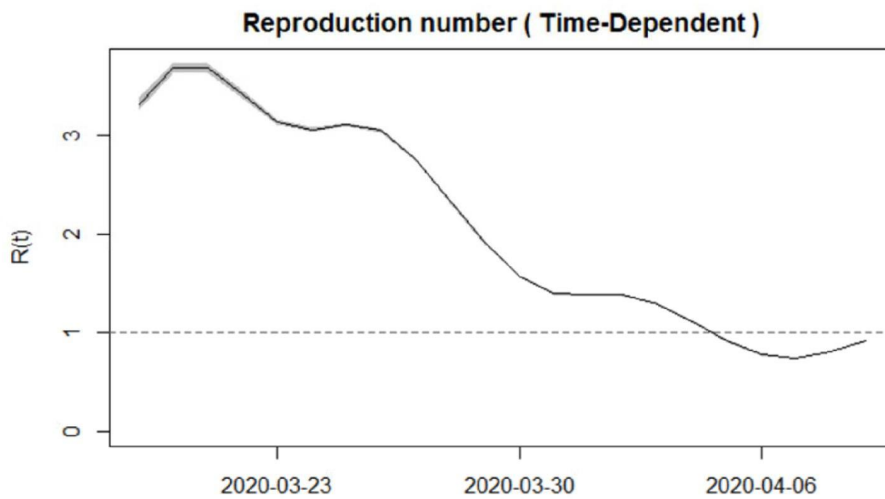
- An additional SAGE meeting dedicated to considerations around test and trace systems was held on 1/5.
- The objectives for a test and trace system should be to isolate as many contacts as possible, as quickly as possible, while minimising false negatives (i.e. isolating individuals unnecessarily because the index case does not have COVID-19)
- It was agreed that at least 80% of contacts of an index case would need to be contacted for a system to be effective. A high level of adherence to requests to isolate is also required for the system to be effective.
- There is high confidence that isolation of contacts of individuals who have COVID-19 within 48 hours is desirable. Further work is required to understand the practicality of this and should be checked against international experience.
- Ideally, testing should be so rapid that contacts of an index case are only asked to isolate on the back of a positive test result in the index case. The aim should be to develop the capability to test index cases in less than 24 hours.
- TAC agrees with SAGE advice that, in the initial phase of the test and trace programme, contacts should be requested to isolate as soon as they are identified (i.e. based on a symptomatic notification), even if the test results for the index case are not yet available. Contacts could be released from isolation if the index case tests negative.
- There is currently insufficient evidence to determine whether the testing of index case contacts would significantly impact the epidemic compared with isolation alone (nor is it clear when to test to avoid false negatives).
- It is considered essential that the testing capability (i.e. <24hr turn-around of index case tests) is reached before the autumn/winter flu season when a large number of those reporting symptoms may not have COVID-19.

Annex 1: Additional Information

Infection Rate

R has decreased in Wales since lockdown. R_t is the reproduction number, the average number of new cases produced from each case. During the peak of the epidemic, R_t was most likely between 2 and 3.5. R_0 is the reproduction number in a population where everyone is susceptible, which in the case covid-19 means at the beginning of the outbreak because there is evidence of a level of immunity after having the virus— for the UK, R_0 has been estimated as 2.8.

Figure 1: The change in the reproduction rate over time



A small increase in R_t above 1 that is maintained over 3 months can make a huge difference to hospital admissions and deaths. Even a small increase in R_t to 1.1 can significantly increase the number of hospital admissions and deaths.

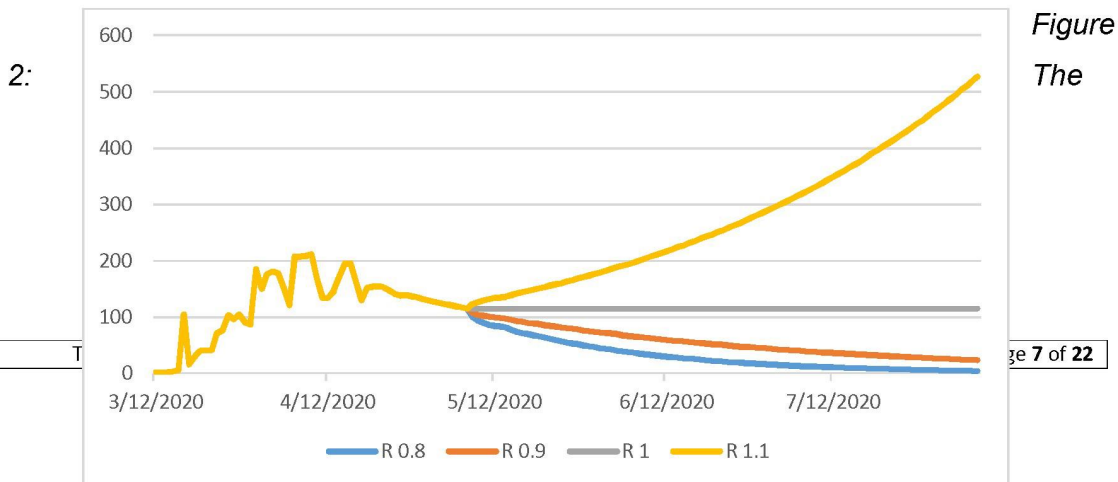


Figure
The

number of daily admissions to hospital for different values of R_t

Figure 3: changes in cases/admissions/deaths based on R

R_t value	Confirmed cases	Hospital admissions	Deaths
$R_t = 0.8$	5,138	2,773	777
$R_t = 0.9$	9,324	5,033	1,416
$R_t = 1.0$	19,599	10,578	2,944
$R_t = 1.1$	47,586	25,685	7,226

Summary of SAGE Papers (SAGE meetings 30, 31, 32)

- SAGE agreed that the single most important metric for understanding the overall impact of pandemic is ***all-cause mortality, age-standardised***, since it accommodates changing definitions of the disease over time and indirect deaths, and it better enables valid international comparisons.
- It was also noted the value of other metrics, including years of life lost and partitioning of contributory factors to all-cause mortality (although data on these won't be available for some months).
- CO-CIN evidence shows improving survival rates for ventilated patients compared to the start of the outbreak.
- There is variation in levels of nosocomial transmission, with a rebound and persistent rise in some NHS organisations.

- There remains significant transmission in care homes, but numbers are plateauing. It will take a few more days before there can be greater confidence that these numbers are stabilising.
- A recent NHS study suggests a positive test rate among asymptomatic healthcare workers of 5-6%.

Infection and transmission in children

- Evidence indicates that the severity of disease in children is lower than in adults (high degree of confidence).
- The susceptibility of younger (up to age 11-13) children to clinical disease is lower than for adults (moderately high degree of confidence). For older children there is not enough evidence to determine whether susceptibility to disease is different to adults.
- The susceptibility of younger (up to age 11-13) children to infection might be lower than for adults (low degree of confidence). For older children there is not enough evidence to determine whether susceptibility to infection is different to adults.
- There is no evidence to suggest that children transmit the virus any more than adults. There are some studies that suggest that younger children may transmit less, but evidence is mixed and provides a low degree of confidence at best.
- These dynamics may vary continuously with age in children. It is also possible that there is discontinuity caused by either biological or behavioural factors, for example factors related to puberty.

Impact of reopening schools

- Options for partial and full reopening of schools have been modelled.
- The estimated absolute effect of each option on R varies significantly based on the model and data used and other assumptions made. The models are particularly sensitive to assumptions around susceptibility and infectivity. Some factors cannot practicably be modelled such as increased hygiene and social distancing within schools.
- Although the overall magnitude of impact varies, the models provide a broad consensus around the relative ranking of impact of different options.
- Those options which involve early years settings have a lower impact than those involving primary schools, which in turn have a lower impact than those involving

secondary schools. This is driven by the numbers of pupils, and the numbers of contacts per pupil.

- The consequences of changes in behaviour or contacts outside of schools as a result of schools reopening (such as changes to adherence to measures and to working patterns) are likely to have a larger effect on R than the effect of the schools themselves. These consequences are complex and highly uncertain. Even a short period of reopening may result in some of these occurring, which may persist even after schools close again for holidays.
- Social distancing has not been factored into the models. It is difficult to put some of these measures into place in practice in schools, particularly with younger children, but some elements may be achievable. Hygiene will continue to be important in schools.
- SAGE advises that effective monitoring and reporting is put in place ahead of any reopening. Serology testing to be carried out at the start of the opening period, and repeated would be useful as part of a monitoring programme.
- SAGE advises that appropriate response plans are put in place to address cases in schools, which may include reactive closures of schools or classes.

Table 1: Options for relaxing school closures provided by DfE

Scenarios	High level policy description (provided by DfE)	Clarifications for modelling
1. Stay shut BASELINE 1	As now, only children of key workers (as currently defined) and vulnerable children attend, with numbers being maintained.	4% of children in early years; 2% from year 1 upwards
2. More vulnerable children and key worker kids	Numbers of children expanded either by encouraging greater attendance from those already eligible or by expanding the numbers of children eligible.	11% of children (Sensitivity explored: heterogeneity – ie. variation in vulnerable/key worker children across schools, with extreme scenario being 11% of schools)
3. Transition years 5/6/10/12, this side of the summer holidays	Focus on bringing back children in key year groups as these pupils are at key education transition points. Assume all children would be in scope less those who have to self-isolate either because considered vulnerable or because they or a family member are ill. Assume that children/young people could largely comply with required social distancing measures.	Simplifying assumption of “normal” levels of capacity etc (Sensitivity explored: classrooms may not be at full capacity if pupils split using empty rooms from other years)
4. Early year settings	All EY settings including registered childminders would be able to resume caring for children.	
5. All primary	All primary schools	
6. All secondary	All secondary schools	
Scenarios	High level policy description (provided by DfE)	Clarifications for modelling
7. Half time A (Full class, 2 weeks on / 2 off – full attendance)	<ul style="list-style-type: none"> Operates in all primary and secondary schools. School cohorts split in two. Half of each school attend for two weeks and then spend two weeks at home, the other half of the school then attend for next two weeks. Workforce also split in two and stick with the same ‘half’ of the school. 	<p>Simplifying assumption that this splits each class in two (and hence each year group). This includes households together where relevant to models</p> <p>(Sensitivities explored:</p> <ul style="list-style-type: none"> – 1 week on, 1 week off (“7b”) • Extreme scenario of all children present for 2 weeks, then all off)
8. Half time B – half days	<ul style="list-style-type: none"> Operates in all primary and secondary schools. School cohort split in two. Half cohort attends in morning and other half attend in afternoon. Workforce split in two with half working in the morning and half working in afternoon. 	As above
9. Fully reopen BASELINE 2	All primary and secondary schools reopen	

COVID-19 Genomics UK (COG-UK) Consortium

- COG-UK has nine active sequencing centres which combined have sequenced a total of 3,202 SARSCoV-2 genomes, which accounts for over one third of the global total.
- Progress is being made on approving and accessing metadata from patient electronic health records and the pipeline for moving samples from NHS labs to sequencing centres.
- Two predominant long-established SARS-CoV-2 lineages (UK5 and UK17) can be distinguished in genome sequences from across the UK.
- A preliminary phylodynamic model of SARS-CoV-2 infection in London has been used to infer that by 29th March ~278K individuals (1.9% of the population of the London metropolitan area) had been infected and that the reproductive number of the virus had reduced from 3.26 to 0.796. This modelling is intended to be repeated and extended to other UK regions.

SPI-M Consensus paper on Rt

- SPI-M-O's consensus is that the overall reproduction number, R_t , is under 1. It is lower in the community than overall. If there are three interlocking epidemics running and seeding each other, then each one has its own R_t (i.e. R_t in the community, hospitals and care homes) and there is one R_t for all 3 epidemics combined (overall R_t).
- Estimates of R_t in the community range from 0.5-0.9. This difference, and the uncertainty in these estimates, are due to the large but unknown number of hospital-acquired cases and infections in health and care workers. As a result, estimates of R_t are highly variable.

Reproduction number

- There are four measures of R_t which are particularly relevant to the current situation: an overall R_t , R_t in the community, R_t in care homes, and R_t in hospitals. Each of these may vary in different parts of the country, communities and subsections of the population. R_t for health and social care workers may also be an important measure to consider.
- Estimates of R_t are sensitive to differences in modelling methodology and can never be precisely determined. SPI-M-O's approach is for different modelling groups to independently estimate R_t to reflect this inherent uncertainty.
- The interacting epidemics in the community, hospitals and care homes are very hard to unpick without information on the route of infection for each case,

resulting in differences between estimates which are based on hospital data or deaths.

- Whilst new hospital admissions have been falling for a while, in recent days the rate of decline has slowed and appears to be flattening in some regions. It is not clear why this is, but it could reflect ongoing hospital transmission.
- SPI-M modelling groups' estimates of Rt in different regions and nations of the UK vary but are consistent in estimating that overall R is below 1. These are summarised in Table 1 and Figure 1 below

Table 1. Estimates of overall UK reproduction number from 6 different groups in SPI-M

Nation / Region	Group1	Group 2	Group 3	Group 4	Group 5	Group 6
East of England	1.03 (0.99-1.08)	1.1 (0.9-1.3)	1.00 (0.93-1.11)	0.58	0.71 (0.62-0.81)	0.80 (0.69-0.89)
London	0.97 (0.94-1)	1 (0.8-1.1)	0.72 (0.67-0.82)	0.49	0.57 (0.67-0.75)	0.65 (0.6-0.7)
Midlands	0.97 (0.94-1)	1 (0.8-1.1)	0.88 (0.85-0.92)	0.50	0.63 (0.48-0.65)	0.71 (0.64-0.77)
North East and Yorkshire	0.95 (0.92-0.98)	0.9 (0.7-1)	1.00 (0.97-1.06)	0.58	0.79 (0.53-0.74)	0.79 (0.67-0.86)
North West	0.90 (0.87-0.93)	1 (0.8-1.2)	0.97 (0.93-1.02)	0.55	0.72 (0.66-0.94)	0.74 (0.64-0.8)
South East	0.80 (0.77-0.84)	0.9 (0.8-1.1)	0.92 (0.88-1.01)	0.53	0.62 (0.62-0.82)	0.76 (0.7-0.82)
South West	0.88 (0.83-0.93)	0.9 (0.6-1.2)	0.95 (0.91-1.01)	0.48	0.69 (0.54-0.7)	0.72 (0.61-0.79)
England	0.97 (0.94-0.99)	1 (0.9-1)		0.53	0.72 (0.59-0.83)	0.72 (0.69-0.76)
Scotland	1.11 (1-1.21)	0.9 (0.7-1.1)		0.62		0.86 (0.76-0.91)
Wales	0.83 (0.71-0.95)	0.8 (0.6-1.1)		0.73		0.87 (0.78-0.93)
Northern Ireland	1.02 (0.84-1.23)			0.46		0.94 (0.87-1.00)

- Hospital-acquired infections are estimated to make up more than 10% of new and newly diagnosed cases of COVID-19 in hospital, with extremely high variation between hospitals. NHS England data show 10-15% of new and newly confirmed hospital cases come from care homes, and it is estimated that a further 2-5% are from health and care workers.
- This implies that a minimum of 25% of new hospital cases are not arriving from the community. This is likely to be an underestimate as it does not include people who acquire COVID-19 in hospital, leave, and are then re-admitted, or people who acquire infection in outpatient departments. Nor does it account for infections spread in the community by healthcare workers.
- Rt in hospital is hard to determine, as it has to be estimated from statistical analysis of hospital admission data, which requires several assumptions to be made about the cutoff point (e.g. number of days) for a case to be hospital-acquired rather than community-acquired. SPI-M-O's consensus view of Rt in hospitals is 0.1-0.5. This implies that hospitals cannot sustain epidemics separately from community spread but is consistent with long drawn out epidemics indistinguishable from a plateau. This may reinforce the need for infection prevention and control (IPC) measures to be top priority in hospitals.
- It is not possible to define Rt in care homes currently as a significant proportion of new cases in those environments are introduced from the community, hospitals,

and possibly other care homes. The trend in deaths in care homes since 10th April has not shown strong evidence of either increasing or decreasing. It is possible that health and care workers may be vectors for transmission between the care sector, the NHS, and the community.

- Rt within the community is therefore lower than in the country overall. SPI-M-O's consensus view is that Rt in the community is well below 1 and likely significantly lower than the overall Rt in the population. The likely range is 0.5-0.9.
- We have independent data sources that informs our estimates of Rt in the community. There is a purpose-designed contact survey (COMix), the KCL ZOE app, and 111/999 calls. These measures support the view that Rt in the community is ~ 0.5

Prevalence and incidence of COVID-19

- The current number of new infections per day remains uncertain. Emerging community swabbing data collected between 26th and 30th April suggested that 179,000 people (confidence interval 78,000 to 358,000) would have swabbed positive with SARS-CoV-2 on 3rd May. However, since an individual would swab positive for about 10 days, a rough estimate of the number of people who newly swabbed positive (i.e. daily incidence) on 3rd May is ~10% of that, so ~18,000.
- Preliminary results from these swabbing surveys support the view that a significant proportion (~30%) of infections in the UK are directly associated with health and social care workers.
- Central estimates from different members of SPI-M-O for the incidence of infection (including those with no symptoms) range from 10,000-40,000 new infections per day. Uncertainty in this range is predominantly due to different assumptions on the proportion of infections which are asymptomatic. Further community swabbing data will go a long way to settling this central uncertainty.

SPI-M Consensus Paper on Potential Relaxing of Social Distancing Measures

Four modelling groups (Bristol, Imperial, London School of Hygiene and Tropical Medicine [LSHTM], and Warwick) studied the impact of potential future changes to social distancing measures. The modelling scenarios are outlined in the table:

	Work contacts	Leisure contacts	Children in school
Phase 1 (from 11th May)	20 percentage point increase on current level	No change to current level	11% total (vulnerable children and children of key workers)
Phase 2 - scenario 1 (from 1st June)	10 percentage point increase on phase 1	10% increase on current levels	25% total (add in transition years)
Phase 2 - scenario 2 (from 1st June)			50% total (add in all primary schools)
Phase 3 (from 1st July)	10 percentage point increase on phase 2	30% increase on current levels	60% total (transition years plus all)

			primary)
Phase 4 (from 15th August)	10 percentage point increase on phase 3	75% increase on current levels	100% (from September)

- These phases were run under two scenarios of either a maximum of 15 contacts per index case or a maximum of 30 contacts per index case, both with highly effective contact tracing which could reach 80% of contacts within 48 hours.
- All of the options would be accompanied by: guidance on social distancing; and continued shielding of households with the clinically extremely vulnerable.

Phase 1

- All groups found that changes in line with phase 1 would make only a modest impact on the current reproduction number, so R remains below 1 and incidence continues to fall in most areas, although with some regional variation.
- The changes in phase 1 are likely to allow R to remain below 1, if adherence rates do not drop. Any changes in adherence rates or behavioural changes could have a much larger impact than specific policies. For example, R would increase if more children going to school resulted in more workplace contacts for their parents.

Phase 2

- There were differences in findings for scenario 2, with results depending on the assumptions made around susceptibility of children to infection and the role in transmission of people who are asymptomatic or pre-symptomatic.
- There was consensus that high quality contact tracing would be needed during this phase in order to keep R below 1.
- Bristol, Warwick and LSHTM's results had little variation between schools re-opening for primary school children and those from transition years. Imperial's results suggested that the latter would result in a larger increase in R, primarily due to there being a greater proportion of parents able to return to work.
- Bristol and Warwick found that, with effective contact tracing, either scenario would be consistent with maintaining $R < 1$. LSHTM found that even with effective contact tracing, in either scenario R would be equal to or greater than 1 in some regions. In those regions, incidence does not fall. Imperial found that scenario 1 would allow R to remain below 1, but scenario 2 would not, although incidence would only slowly increase.
- Assumptions made about the cases currently taking place in hospital settings and care homes has a big impact on any conclusions that can be drawn on the changes made in phase 2.

Phases 3 and 4

- Phases 3 and 4 have not been discussed in detail by SPI-M, however most models showed in a rapid exponential increase in numbers of cases in phase 4.

General conclusions

- High levels of health care acquired infections and cases in care homes makes it very difficult to accurately estimate the current value of R due to community transmission, and therefore the impact of future policy changes on the trajectory of the epidemic.
- Behavioural changes in the levels of adherence rates are critically important, likely more so than the exact policies implemented, in determining whether the reproduction number remains below
- Even with contact tracing in place, there will need to be sustained, deep reductions in contacts outside work and schools to keep the reproduction number below 1
- There is regional variation in both current incidence and current reproduction numbers which will need to be monitored very closely. There will also be more localised variation, which could cause localised outbreaks, even if the reproduction number remains below 1 overall nationally.

NHS Performance

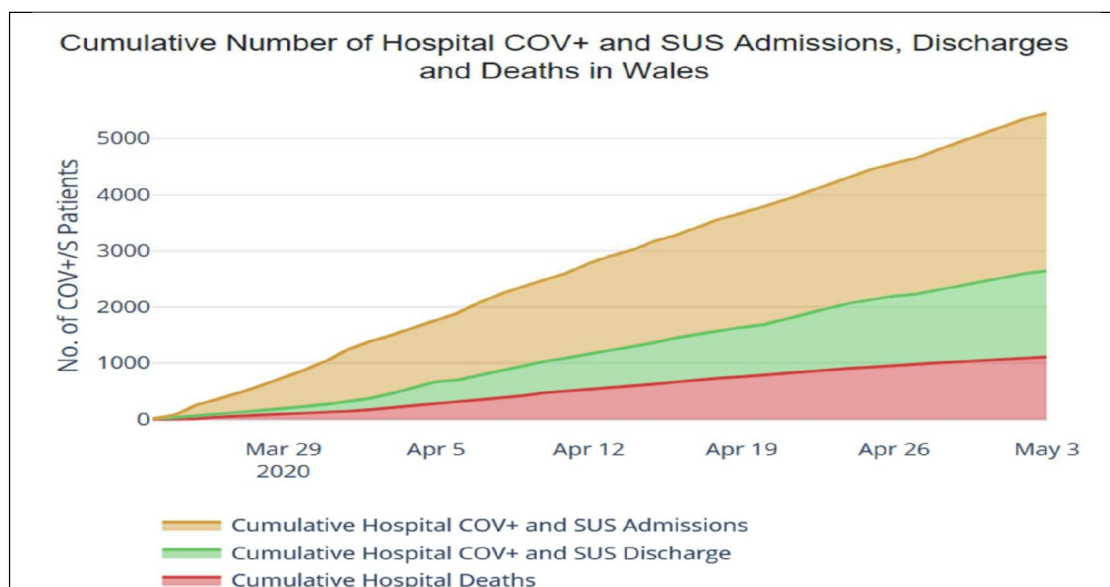


Figure 3: Cumulative numbers of hospital admissions, discharges and deaths in Wales.

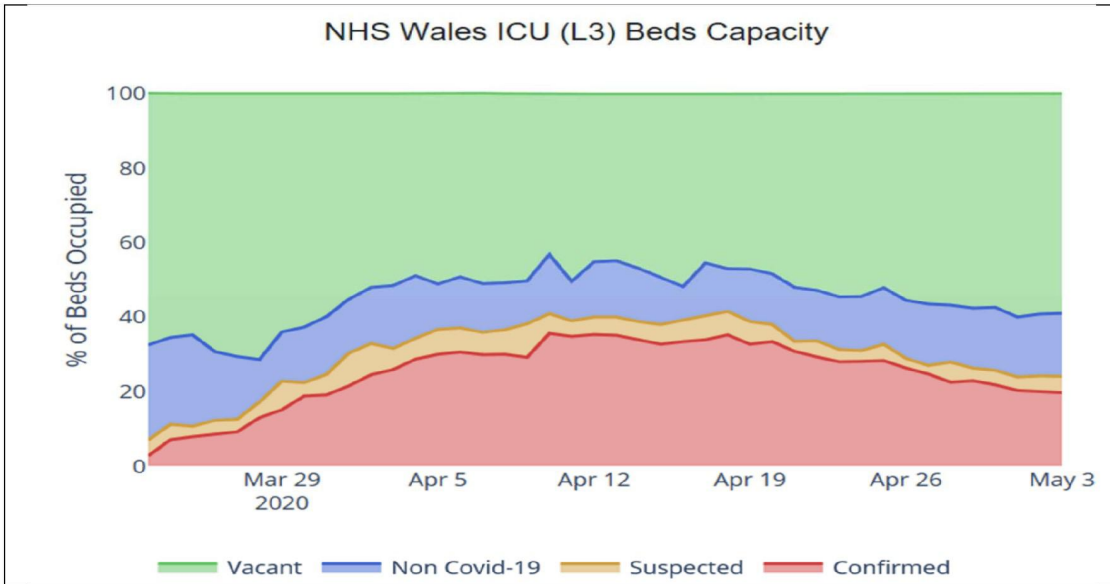


Figure 4: ICU bed capacity in NHS Wales.

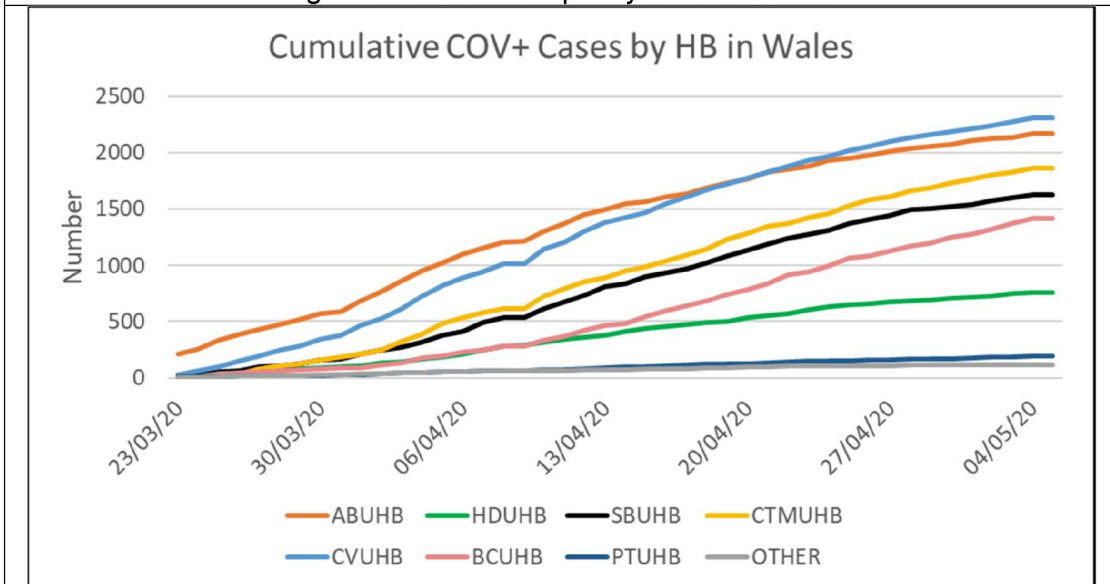


Figure 5: Cumulative COVID-19 cases in Wales as confirmed by PHW.

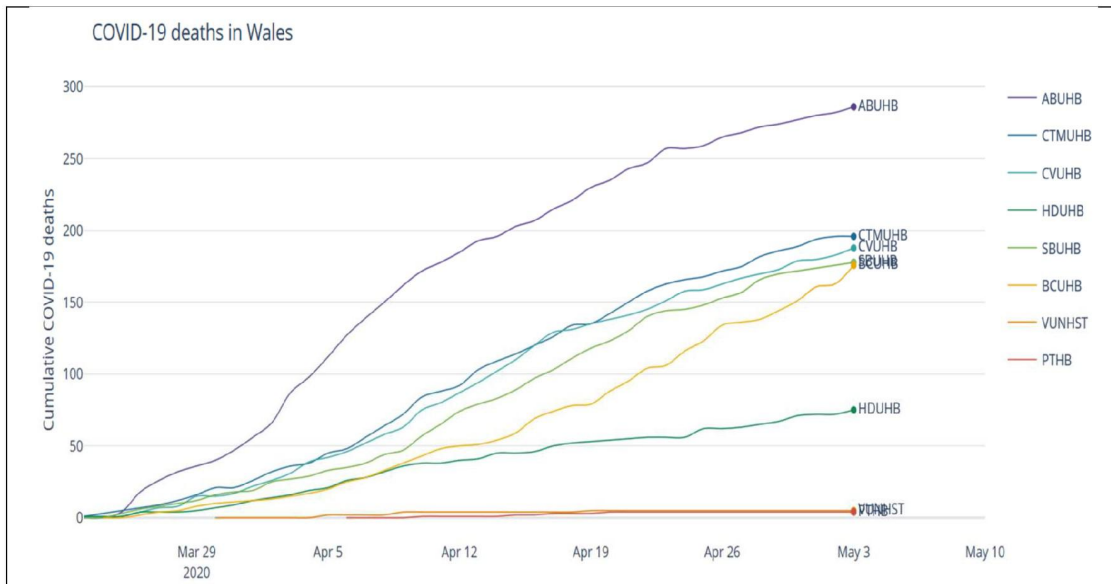


Figure 6: Cumulative COVID-19 deaths in Wales as confirmed by PHW.

REGION	Cases		Deaths	
	Number	Per 100k Pop.	Number	Per 100k Pop.
Confirmed (04/05/20):				
UK	190,584	285.9	28,734	43.1
England	126,346	225.7	25,785	46.1
London	24,988	278.2		
Scotland	12,266	224.9	1,571	28.8
NI	3,836	203.8	381	20.2
Confirmed (05/05/20):				
Wales	10,669	339.9	1,023	32.6
ABUHB	2,028	343		
HDUHB	770	199.7		
SBUHB	1,630	418.6		
CTMUHB	1,891	424.8		
CVUHB	2,331	469.6		
BCUHB	1,468	213.9		
PTHB	194	146.5		

Annex 2: (SAGE Paper 05/05/20)

Ethical and value judgements involved in developing policy for lifting physical distancing measures

Introduction

Difficult decisions will soon need to be made about what constitutes an acceptable/manageable level of COVID-19 infection in the population. The ideal answer to this question is of course zero, which is the ultimate aim. That goal, however, is unlikely to be achieved before decisions need to be made about how and when restrictions on movement and on social gatherings should be eased. Current physical distancing measures are not sustainable because of their impact on other important aspects of social and economic life.

Decisions about how and when to loosen current restrictions will inevitably present an increased risk of infection in the population. Any decision about how to proceed will need to be based on an assessment of the impacts of the range of available options. The United Kingdom's emergence from lockdown needs to be flexible, responsive to evidence, risk-based and intelligent. Testing and contact tracing are likely to be important sources of relevant information for the foreseeable future to inform intelligent physical distancing. Such decisions are most appropriately made by democratically elected members of parliament informed by the best available scientific evidence and the consideration of available scenarios.

The clarification of available scenarios and careful assessment of associated risks and benefits is essential but will not by itself provide answers to the question of what to do. Ultimately, these decisions will involve the making of difficult judgements of value, and choices between competing priorities. In recognition of this fact, **this brief paper sets out some of the key value judgements that are likely to be involved.** It first sets out a number of competing considerations and then proposes a structured approach to the making and justifying of decisions in this space.

Competing considerations

Any decision about lifting current measures will require consideration of a number of competing priorities. These are likely to include the following:

- **Health:** – *minimising the numbers of hospitalisations and deaths; maximising health benefits; and improving access to non-COVID health services such as cancer, mental health, and reproductive medicine*
- **Well-being beyond health:** – *education, employment, and access to open spaces*

- **Economic:** – *increasing employment, maintaining the foundations for flourishing economy, and protecting key industries*
- **Equity:** - *addressing impact on socially disadvantaged groups such as the low paid, those in precarious employment, and others most affected by current measures such as BAME.*
- **Protecting valuable public institutions:** - *NHS, schools, financial institutions, universities, and the arts*
- **Social capital and fabric:** – *social structures, community, relationships, families, and cultural events*
- **Future generations:** – *learning for future health emergencies, research, and minimising future debt*
- **Personal freedom:** - *individual liberty, and the ability to pursue valued goals*

It is important to note that these priorities are overlapping and interdependent, and each contains within it competing commitments.

How to proceed

(a) The importance of reasonable, transparent, accountable process

The values people consider important will vary, as will the relative weight they place on them. There will inevitably be disagreement. Decisions about values will, nonetheless, have to be made. Against this background, it is essential that the process by which such judgements are made is seen to be reasonable, accountable, and transparent. There needs to be openness with the public about the fact that there are difficult judgements to be made and that there are no solutions that do not involve choosing between important values. Particular emphasis needs to be placed on engagement and involvement of diverse publics to ensure a wide range of perspectives and value frameworks.

(b) Fundamental values

Cutting across the list of competing considerations above, the following fundamental values are likely to be significant when making decisions between them.

(i) *Minimising harms*

A key value is the minimisation of harm. Under currently foreseeable circumstances no risk-free options are available. In this context, minimising harm requires decision makers to assess which scenarios will save the most lives or hospitalisations. It also requires consideration of other forms of harm such as those associated with missing out on education, deaths by other causes, and so on. Can decisions be made which enable some degree of opening up whilst also keeping harms low? Key questions are likely to include: are there some work or educational environments where social distancing can be achieved relatively easily? Can effective methods of shielding be used to minimise impact on the most vulnerable, bearing mind that shielding itself can be harmful if it further entrenches isolation or disadvantage. At a societal level a key challenge is going to be about how to judge the relative importance of loss of life and loss of quality of life.

(ii) *Maximising wellbeing*

A second key value emphasises the maximising of wellbeing. In the context of COVID-19, this requires decision-makers to look for policy choices with knock-on benefits e.g. where the opening of schools to benefit children also enables key workers to get to work. Here too it is necessary to remember the importance of both health and non-health benefits - in this example, access to education and employment, and the effective staffing of important services such as hospitals. The maximisation of wellbeing raises a number of intergenerational considerations: opening up schools may mean that those who are more susceptible to COVID-19, many of whom are elderly, are at greater risk.

(iii) *Prioritising the worst off*

Another important value emphasises paying particular attention to the worst off. This value could be interpreted in a number of ways. These might include prioritising the vulnerable in terms of health (the elderly, those with underlying health conditions, frontline health workers, people whose social disadvantage renders them vulnerable to COVID-19). They might also include prioritisation of: the needs of those who work in sectors where jobs are most likely to be lost or in which incomes are low, or those of young people who stand to lose the most life years if they die, or lose important quality of life if they are denied access to education. Another, cross-cutting, version would prioritise the poor, who will most likely be hit hardest by this pandemic and by current measures.

(iv) *Prioritising societal value*

Are there people who are or could be making a particularly important social contribution? Should key workers be prioritised because they are contributing most to society at present? If so, how should decisions about what is a 'key worker' role be decided? Will this change over time as the pandemic recedes? Reciprocity may be important value here i.e. prioritising those who have been putting themselves at

risk to save lives or care for others. Might the same criterion be applied to institutions or other activities by prioritising those that play a particularly important social role?

(v) *Equality*

Another important value is equality i.e. treating everyone equally such that everyone counts as one and no one as more than one. It can be helpful in situations where resource allocation decisions need to be made between people with very similar needs in situations of extreme scarcity. This would suggest adopting something like an approach based on chance e.g. a lottery or a rota. In some situations, this might be the right thing to do e.g. in choosing which days of the week two neighbouring schools are to be allowed to open or using odd/even number plates to decide who can travel into town on a particular day of the week.

(vi) *Personal freedom*

An emphasis on personal freedom would require decisions to focus on creating the conditions under which most people would be able to live their lives as they wished and according to their own values. Two important aspects of this that might potentially come into conflict in ending current measures are liberty and privacy. An example of this might be where effective, intelligent physical distancing requires the use of mobile phone data or other personal information (such as that involved in manual contact tracing). Against a background risk of a dangerous resurgence of COVID-19 this may present a tension between these two important values because: (i) the current lockdown places important constraints on liberty that would not be acceptable outside a public health emergency, and (ii) intelligent physical distancing offers the potential to liberate most people currently under lockdown through uses of data that would not be acceptable under normal circumstances.