SAGE return for C19 STRATEGY | SEQUENCING OF SOCIAL DISTANCING BSIs

In preparation for Cabinet Office review of existing Behavioural and Social Interventions, SAGE has been requested to provide an assessment of how the options below would impact on the reproduction rate (R) and the infection rate, and any other considerations that SAGE considers relevant to inform this decision.

Updated assessment of the current reproduction rate R:

The reproduction number, R, is defined as how many people on average are infected by any one person. R varies in time and is dependent on many factors. Due to the lag in behavioural change mapping to epidemiological data, there may be a lag in changes to R. SAGE's consensus is that the overall reproduction number, R, is under 1. However emerging evidence of an overall epidemic driven by three interlocking epidemics (community, hospitals and care homes), accompanied by diverse methods and data sources for estimating R, lead to a wide range of estimated values.

The SAGE meeting held on 5 May 2020 concluded: This number is driven by transmission in the community, hospitals and care homes. The rate of decline of R is slowing as a result of this. As of now, R in the UK is influences by transmission from care homes and hospitals. Estimates of R in the community range from 0.5-0.9, and there is a high degree of confidence in this. Behavioural data suggests that R in the community (taking out transmissions from health and care workers) could be at the lower end of the range. There is a lower degree of confidence in R in care homes due to limited data. SAGE reiterated that urgent steps should be taken to reduce transmission and within and between health care settings, care homes and the wider community.

	Overall	Community	Hospitals	Care Homes
Best assessment of current reproduction rate (R)*	0.6-0.9	0.5-0.9	0.1-0.5	Not possible to assess

**UK-wide estimate as of: 04/05/20, calculated based on data from NHS, PHE and CO-CIN*

Nation / Region	Range of estimates for overall R (as of 04/05/20)
East of England	0.6-1.1
London	0.5-1.0
Midlands	0.5-1.0
North East and Yorkshire	0.6-1.0
North West	0.6-1.0
South East	0.5-0.9
South West	0.5-1.0
England	0.5-1.0
Scotland	0.6-1.1
Wales	0.7-0.9
Northern Ireland	0.5-1.0

Estimate of prevalence and incidence of Covid-19 in UK, including uncertainty:

The preliminary ONS estimates of the prevalence of infection, based on data collected between 26th April and 2nd May, is of 179,000 people in England being infected with COVID-19, with a credible interval of 78,000 to 358,000, that is the current prevalence of people who swab positive. Since we would expect people to swab positive for around 10 days, that corresponds to a daily incidence of new infections of approximately 18,000 people.

06 May 2020, SAGE secretariat

The assessment below is based on answering Option A in the Cabinet Office Social Distancing Commission.

The SAGE meeting held on 5 May 2020 concluded:

- **Understanding of the virus and clinical perspectives, illustrated in the design principles, underpins all the advice below.**
- **There is high confidence that the package of measures 1-4 below are unlikely to bring R above 1. There is less confidence about the expected outcome under the later measures (5-10). This is in part because the efficacy of these measures to keep R below 1 depends on an effective operational contact tracing and isolation system. Some measures may push R above 1 even in the presence of an effective contact tracing and isolation system. SAGE's view is that keeping R below 1 will require effective monitoring of Covid-19 prevalence at a fairly local level in addition to the contact tracing and isolation (>80% of contacts isolated within 48h of index case identification).**
- **SAGE advises that the triggers for moving between phases should not be based on a set date but rather upon reaching a pre-defined target incidence of new cases in hospital. There will be more room to make changes if the NHS and care home infection spread is controlled and diminished. The time between introducing the first phase and any subsequent phases must be used to effectively deal with the on-going sub-epidemics around hospitals and care homes. Moving to 2nd phase, measures 5-10, therefore should be based on achieving a pre-defined target incidence of new cases in hospital, not an arbitrary date.**
- **This is a complex set of measures to introduce in one go, which may hamper implementation and evaluation. The full set of measures will lead to changes in many behaviours. If R changes, it will be hard to identify which measure is contributing most to this. It will important to monitor behaviour changes as an early system to detect possible changes in R.**
- **SAGE agreed to do further work to consider the impact of social 'bubbles', bringing together behavioural scientists and modellers.**
- **SAGE advises that any communication must reflect that the package below requires some measures to be adjusted while others will need to be followed more diligently, such as handwashing and physical distancing. Changes to the measures should be framed as 'adjustments' not as a 'relaxation', as this could be misinterpreted by the public as a reduction in the risk of transmission.**
- **People, schools, and businesses will need time to prepare, including guidance and environmental support. This must be developed to occur before and during the implementation of any changes in restrictions or preventive measures and consider the increased complexity of the behaviours and messaging required in these new phases.**

To note:

- **The package of measures below (orange, blue and yellow columns) refers to the package of measures proposed by Cabinet Office, detail in Annex A.**
- **Due to changing details in this commissions and the delay in sending a formal commission, underpinning modelling advice is based on slightly different scenarios**. Phase 1 in the SPI-M consensus statement refers to the measures in the blue column below. Phase 2 in the SPI-M modelling does not directly match across to the yellow column below however the general conclusions are still valid.
- Options B, C, D: Further options are based on variations of these measures; time has not allowed for modelling or behavioural assessment to this level of detail.

Package of measures proposed* ***Refers to measures in annex A**	**Clear guidance on maintaining social distancing in public places, including workplaces and transport** **Extremely vulnerable would be guided to continue shielding**	**1. Work** **2. Schools** **3. Exercise and Leisure** **4. Outdoor workplaces**	**5. Retail** **6. Outdoors sports,** **7. Schools,** **8. Gatherings** **9. Bubbles/Gatherings** **10. Quarantine**
Modelling Assumptions (if any, including any change in modelled adherence)	Not applicable	Modelling was based on the following assumptions, not the specifics of the commission, which was not available. Modelling can give insights into the possible impact of policy changes but cannot precisely predict the future. • 20 %[1] increase in workplace contacts compared to current levels (representing a return to work for those who cannot work from home) • 11% of children attending school (representing vulnerable and key worker children) • No changes made to leisure contacts. • From May 18 highly effective contact tracing in place (reaching 80% of contacts within 48 hours)[2] • In the absence of any data on the efficacy of changed practices at work, school and leisure, models assumed the same rate of transmission per contact as pertained at the start of the epidemic. • Transmission from personal care retail has not been explicitly modelled, e.g. professions that have close contact with many different contacts, and for an extended period.	Modelling was based on the following assumptions, not the specifics of the commission, which was not available at the time. Modelling can give insights into the possible impact of policy changes but cannot precisely predict the future • A further 10 %[1] increase in workplace contacts compared to May 11th (representing some retail) • 25% (transition years) OR 50% (primary schools) of children attending schools • 10% increase in leisure contacts from current levels • From May 18 highly effective contact tracing in place (reaching 80% of contacts within 48 hours) • In the absence of any data on the efficacy of changed practises at work, school and leisure models assumed the same rate of transmission per contact as pertained at the start of the epidemic. • Transmission from personal care retail has not been explicitly modelled, e.g. professions that have close contact with many different contacts, and for an extended period. • No modelling has been done of proposed changes concerning gatherings.

[1] Footnote added for release: This should read a percentage point increase for workplace contacts, rather than %, in line with the accompanying paper "SPI-M-O: Consensus view on the potential relaxing of social distancing measures"
[2] Footnote added for release: "From May 18" applies to the assumption in place for one of the contributing modelling groups; other groups assume contact tracing is in place for the overall phase.

Impact on R	Unquantifiable impact on R of clear guidance on social distancing. Little overall impact on R for shielding, but this will lead to a significant reduction in mortality in this group.	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, although with some regional variation. Impact depends on transmission within health and social care settings and export of infections to the wider community through workers in those settings.	Divergence in modelling results. Some groups found both scenarios could keep R below 1 overall, possibly with R greater than or equal to 1 in some regions. One group thought that returning transition years in schools would allow R to remain below 1, but R would be slightly higher than 1 if all primary schools children returned. Very effective contact tracing and isolation is needed.
How to measure impact of these measures	• Proportion of hospital admissions from people who are shielding or should be shielding. • Objective measures of observable behaviour • Public and Community Involvement and Engagement (PCIE) for rapid views on problems/solutions • Surveys of attitudes and behaviour	• Hard to detect any impact between 11 May and Early June. ONS swabbing survey, KCL Zoe app, and LSHTM contact surveys should detect any increase in transmission or behaviour, if large enough. • Objective measures of observable behaviour • PCIE for rapid views on problems/solutions • Surveys of attitudes and behaviour • Need measures in place for at least 4 weeks to see impact	• Swabbing of all cases • Swabbing surveys • Contact surveys • Data from contact tracing • Absenteeism data • New COVID + hospital inpatients and other epidemiological data • Other data such as from Google will show changes in movement. But will be hard to use this to imply changes in transmission • Objective measures of observable behaviour • PCIE for rapid views on problems/solutions • Surveys of attitudes and behaviour • Identification and surveillance of sentinel places and occupations
Behavioural considerations of measures and sequence	Environmental support is needed in addition to guidance, i.e. redesign of public spaces to allow social distancing, environmental prompts and support for handwashing, cleaning shared surfaces etc. Precise, detailed, evidence-based guidance using behaviour change techniques are needed for optimal adherence in each context. Social influence and organisational policies are important for initiating and maintaining adherence. This must be developed to occur before and during the implementation of any changes in restrictions or preventive measures and take into account the increased complexity of the behaviours and messaging required in these new phases. Experimental evidence from BIT shows that people were ~30% more willing to resume going to work, send children to school, and use public transport in June if (i) the environment presented lower risk, & (ii) safety measures were in place for these activities Messaging should avoid the notion that people can 'relax' (this is about 'adjusting' not relaxing or easing restrictions). Issues of inequity are growing (BAME deaths, deaths amongst the poor) and these need to be addressed as a priority. For shielded groups, it is vital to provide sufficient practical and social support for long-term wellbeing, and to monitor and support adherence. Schools: The ability of early years and some special educational needs and disabilities (SEND) children to adhere to social distancing and hygiene guidance will be lower than the ability of older students to adhere.	If possible, we recommend 3&4 are introduced first to build confidence, and test and demonstrate ability to resume activity safely. 1&2: It is unclear what "encourage" means. Absence from the workplace or schools among those currently eligible to attend is likely due to multiple factors, many of which will not be influenced by messaging alone. 1&2: Robust infection control measures and transparent monitoring (and testing) to ensure safety will support attendance. 1: Financial disincentives may dissuade people from returning to work from furlough. 2: Children should not be labelled as "vulnerable" as this is likely stigmatising and reducing school attendance. Communication with parents, teachers and students will be important to provide information about (decreased) transmission risks and measures to control infection within schools. Co-designing preventive measures with the teaching profession and community members will promote both infection control and confidence. Any school return should consider uneven impact on children unable to return (e.g. due to shielding). 3: Clarity is required for this measure that was absent during lockdown. A simple rule should promote adherence and equity e.g. 'any outdoor activity that can be carried out without infection risk due to physical proximity or contact is permitted in the open air.' 4: To prevent overcrowding and facilitate equity in usage while outdoor activity is the only activity permitted outside the home, access should be provided to as much green space as possible (e.g. countryside, unused playing fields).	This is a complex set of measures to introduce in one go, which may hamper implementation and evaluation. People, schools and businesses will need time to prepare. The full set of measures will lead to changes in many behaviours. If R changes, it will be hard to identify which measure is contributing most to this. It is likely possible that ability to implement and enforce social distancing and other hygiene interventions will be unequal and may be limited in some schools, possibly correlating with existing measures of school functioning and stress (e.g. Ofsted rating). The set of behaviours required and therefore the messaging required to support these are more complex than the simple 'stay home' message of the current phase. Government communication teams and other organisations need time to prepare and launch campaigns to convey the specific behaviours that are / are not allowed and how to adhere. Interventions may need to go beyond mass media communications to support capacity, opportunity and motivation for behaviours. Good communication, and listening to public concerns, will be vital. Behavioural science could support the formative research, strategy development and evaluation for a campaign. 9. In terms of sequencing, bubbles/gatherings may be most important for psychological health – together with outdoor meetings which are important for equity and mental health for those without a bubble partner. SAGE has not yet explored this issue in any detail but could do so, with input from behavioural scientists. 6: Work needs to be done to define behaviours that are allowed and not allowed. Which sports? Organised or spontaneous? Played by whom? Amateur or professional? Participant and spectator rules? Important to

	Schools: Children with learning disabilities may require specific messaging and more behavioural direction about social distancing across all age-groups. Messaging to teachers to ensure social distancing at front of class. Messaging about routine hygiene to all. Schools: Messaging should be developed for and in partnership with parents and students. This highlights the need for the development of a survey or portal capable of identifying concerns and issues from the bottom-up.		consider equity so more 'expensive' but socially distanced sports are not seen to be treated more leniently. 8/9: Community feedback is required. Any adjustment made which is seen to prevent specific BAME or religious communities from gathering in ways meaningful to them will be seen as discriminatory. Equally, allowing gatherings for certain groups and purposes but not others will also create problems of perceived inequity. 10: Will this be for all arrivals or will it be a risked-based decision based on countries visited? Difficult to monitor the latter. Consider the impact on the UK foreign nationals (9% of the total population) (House of Commons Library, 2020). Many have been unable to visit their families or loved ones abroad for several months because of the COVID-19 outbreaks. A risk is that quarantining people arriving from abroad conveys a message that the risk of infection within the UK is much lower and may undermine adherence to infection control. If quarantine facilities are made available for high risk people from outside the UK, they should also be offered for high risk people in the UK (e.g. confirmed cases unable to isolate effectively from household members). 7: Important to understand the influence on other contacts beyond school on the infection rate in schools (e.g. travel to school, return of carers to work). 7: Take up may be undermined by the targeting of some year groups but not others raising questions of risk and undermining return to school becoming normative. Communication to teachers, parents, and students re the risk of infection, ability to control infection important and to co-design interventions and measures to improve adherence. 7: Must consider the potential uneven impacts on students who are unable to attend because of health vulnerabilities. 7. Rota systems (e.g. 1 or 2 week(s) on/1 or 2 week(s) off may require additional guidance for businesses to enable parents/carers to engage with the school patterns. Consider grouping households with students in different age groups/schools to better enable this.
Estimated combined behavioural impact of measures on adherence	Important to check whether use of some measures (e.g. mask wearing) positively or negatively impacts on use of others (e.g. social distancing). There is potential for all measures to remind people of the need for infection control, but also potential to provide false reassurance and insufficient attention to the most effective measures.	Valuable first step in testing and demonstrating ability to resume activity safely which should reinforce adherence/confidence.	If all resumed at the same time risks signalling that infection risk is over and adherence to safe behaviour could drop. Phasing in gradually starting with those with least effect on R will allow time to check which can be done safely and avoid having to reverse if R increases.
Considerations on enforceability of measures		As grounds for leaving the home becomes possible, police enforcement for being outside becomes less justifiable. For example, permitting multiple trips outdoors for leisure makes it makes it impossible to impose a fine for 'non-essential' activity. This is not necessarily a problem where motivation to adhere and social distance norms remain high.	As grounds for leaving the home becomes possible, police enforcement for being outside becomes less justifiable. With bubbles allowed, small gatherings will be both lawful and inevitable. This is not necessarily a problem where motivation to adhere and social distancing norms remain

			high and it is likely that only the most flagrant breaches of social distancing rules could be policed. Schools: We have not considered enforceability. We suggest an additional commission to do so. Making school attendance normative will likely improve attendance. However, enforcement is not necessarily the most effective way to go about creating this norm.

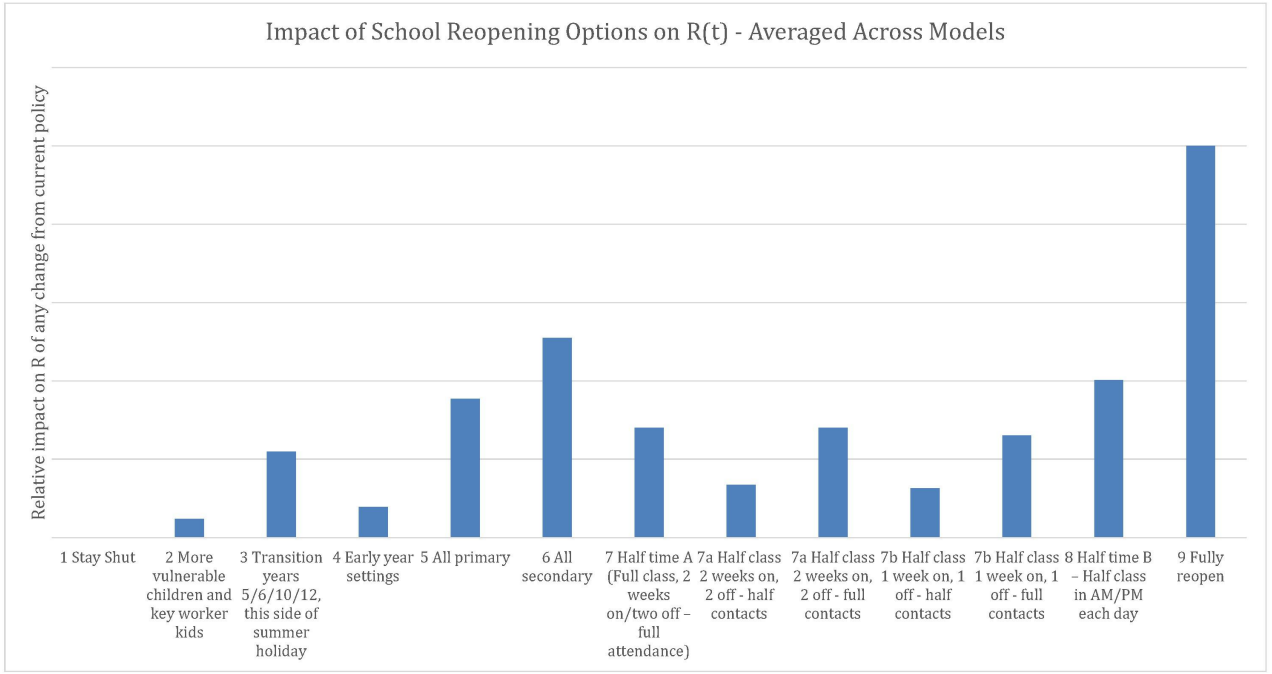
Cabinet Office have asked SAGE to provide advice on how a rota system for schools would impact transmission:

SAGE has considered the issue of re-opening schools based on inputs from across the epidemiological, behavioural and clinical sciences. Options for partial and full reopening of schools have been modelled and SAGE has agreed a rank order of their impact on R with moderate confidence. The output of this work including methodology, assumptions and broader considerations were considered at the 31st meeting of SAGE. The following gives a summary for the purposes of this return.

The impact of school reopening on covid-19 transmission is dependent on many factors, most particularly on the susceptibility of children to infection, disease, and transmission on which there is not yet robust evidence. Evidence that younger children (up to 11-13) are less susceptible to clinical disease is relatively strong; but evidence that children overall are less susceptible to infection or transmission is relatively weak. Modelling of options for school reopening using different models and different data sets concludes that the following are the key drivers in terms of impact on covid-19 transmission: age of children; numbers of children going back to school; and systems to break the size of the network (rota systems and the extent to which fewer children in school will reduce the number of contacts).

For a variety of reasons SAGE concludes that overall re-opening options relating to younger children are lower risk than those related to older children and that 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). SAGE further advises that effective measures should be in place to monitor the effects of any change in schools, and to respond to cases within schools. Behavioural science factors are also critical to the implementation of any schools re-opening policy.

View on rota system



SAGE considered modelling to assess the relative impact on R across a range of six **rota** scenarios. The different rota options were in addition to five further scenarios considered for re-opening schools. Their impact on R was modelled against a baseline of the situation at present. Whilst the estimated absolute effect[3] of each option on R varied significantly based on the type of model, data inputs and assumptions used by each group, the models provided a broad consensus around the relative ranking of impact of the different options. This ranking has been agreed by SAGE with moderate confidence. It is important to note that this is a **relative comparison of options,** not an absolute assessment of their impact. For example, the consensus across models estimates that option 6 (all secondary students) would have **half** the level of impact on R of fully reopening all schools.

The ranking endorsed by SAGE shows that rotas may be a good way to stop extensive transmission chains in schools**.** When this effect in schools is embedded into the wider community, the impact is less strong, but still has some value in reducing overall R. However, it was noted that modelling of the rota scenarios were the least robust across all options. SAGE also noted that from an epidemiological perspective options for re-opening schools on a rota basis would be difficult to deliver alongside the offer to vulnerable children and critical worker children – as any children from these groups who were in school full-time would in all likelihood become vectors across the different cohorts in the rota, thereby diminishing the benefits of splitting the cohort in this way.

From a behavioural science perspective, SAGE noted that rotas are likely to be the most effective strategy to make school attendance normative. Options where children alternate in and out of school on a weekly basis were perceived to be potentially preferable developmentally for young children compared to two week rotas.

[3] Footnote added for release: This should read "magnitude of the effect", and not "absolute effect", in line with the original SAGE paper. The paper did not estimate the absolute impact on transmission rate from options for school opening.

ANNEX A FOR INFORMATION ONLY: ORIGINAL COMMISSION FROM CABINET OFFICE

C19 STRATEGY | SEQUENCING OF SOCIAL DISTANCING NPIs

Ministers will be conducting a review of the existing set of social distancing non-pharmaceutical interventions in w/c 4 May. The review should be informed by the best scientific assessment of the options. In preparation for this review, SAGE is requested to provide an assessment of how the options below would impact on reproduction rate (R) and the infection rate, and any other considerations that SAGE considers relevant to inform this decision.

SAGE is also asked to provide an updated assessment of the current reproduction rate and level of transmission broken down by: the community, care homes, and hospitals; along with an assessment of how R in care homes is impacting R in the community. Where possible, please include regional variations.

Option A:
From 11 May

1. **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.

2. **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.

3. **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).

4. **Outdoor workplaces:** Opening some additional outdoor workplaces e.g. outdoor markets and garden centres.

From early June

5. **Retail:** Reopening all retail - including personal care.
6. **Outdoor sports:** Reopening outdoor sports that allow social distancing.
7. **Schools:** Return primary schools and early years with maximum 'safer spaces' measures in place.
8. **Gatherings:** Permit small weddings (<10 people) and larger funerals.
9. **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.
10. **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.

Across the Options, SAGE is asked to assess the impact of (i) a high level of up-tick for already eligible people returning to work and school in May; and (ii) a 10% reduction in compliance with other existing measures.

All the options above would be accompanied by

11. **Guidance on maintaining social distancing**: clear guidance on maintaining social distancing in public places, including workplaces and transport (including potential for strongly advising masks on public transport).
12. **Shielding:** Households including those with the clinically extremely vulnerable would be guided to continue shielding (including, for example, children staying off school).

06 May 2020, SAGE secretariat

Option B:

As Option A, with the following measures brought forward/ added:

- **Retail (5 above):** Opening retail from mid May.

- **Schools (7 above):** Opening up early years provision from mid May & bringing years 10 and 12 back in early June.

- **Gatherings (8 & 9)**: Enabling 'bubbling' and gatherings and/ or leisure in late May.

Option C:

As Option A, with the following measures moved back/ adapted:

- **Retail (5 above):** Opening only a quarter or a half of retail from early June (and personal care retail in mid-June), with other retail following later.

- **Schools (7 above):** Only returning Reception and Year 6 (rather than all primary years) in June.

Option D:

As Option A, with the following measures moved back:

- **Schools (7 above):** Only returning Reception and year 6 in June.

- **Retail (5 above):** Phased reopening starting in July.

- **Items 6, 8, 9 above:** Not permitted before July

SAGE's view is also requested on returning schools on a rota (one week on/ one week off) system.

SAGE is also asked to provide an updated assessment of the current reproduction rate and level of transmission broken down by: the community, care homes, and hospitals; along with an assessment of how R in care homes is impacting R in the community. Where possible, please include regional variations.

Across the Options, SAGE is asked to assess the impact of (i) a high level of up-tick for already eligible people returning to work and school in May; and (ii) a 10% reduction in compliance with other existing measures.

All the options above would be accompanied by clear guidance on maintaining social distancing in public places, including workplaces and transport (including potential for strongly advising masks on public transport). Households including those with the clinically extremely vulnerable would be guided to continue shielding (including, for example, children staying off school).

A return is requested on Tuesday 5 May.

06 May 2020, SAGE secretariat