

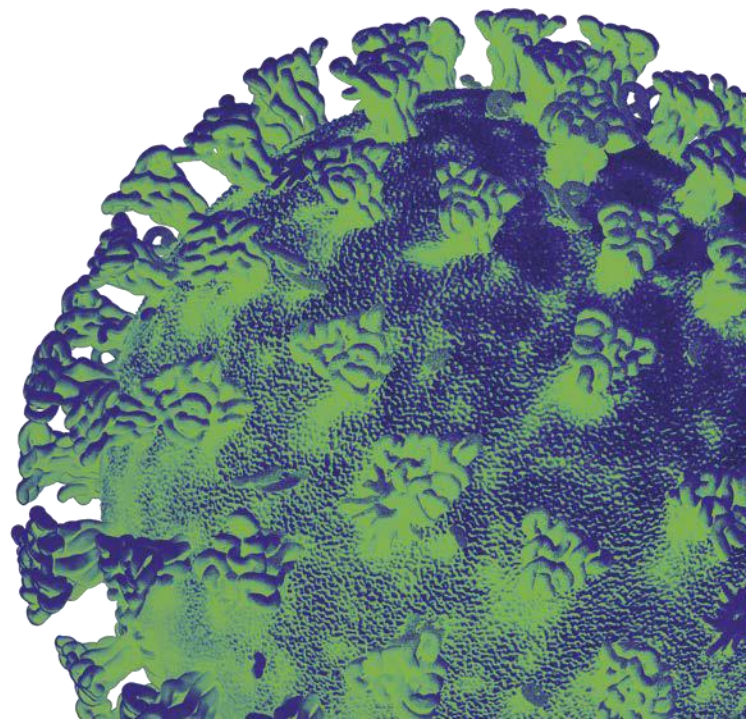
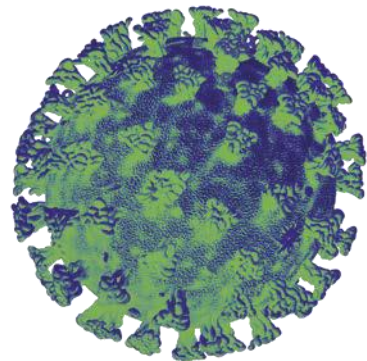
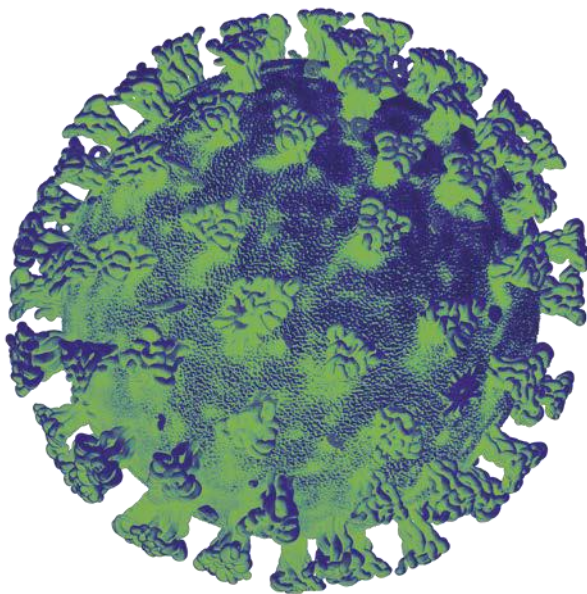


Llywodraeth Cymru
Welsh Government

Technical Advisory Group

Fire Break

19 October 2020



Technical Advisory Cell – Fire Breaks

1. Summary

This paper to policy officials and Ministers highlights that Wales is now in material breach of several of the circuit breakers agreed in the summer. There is high confidence that the others will be breached within the next 2-3 weeks, resulting in significant harm unless action is taken. The Welsh Government aim of protecting both lives and livelihoods requires a balancing of harms, and action is now required to maintain the balance. Evidence of the current situation and emergent trends, as well as recommendations for action, are presented below. The paper recommends a 2-3 week hard fire break to bring R below 1 in order to both lessen the impact and slow the growth of the epidemic in Wales. The recommendations of this paper are consistent with the SAGE papers published on 21 September 2020¹²³. Text from published SAGE papers have been included in this paper to provide a continuous narrative from SAGE to TAC for a Welsh context.

Definitions

Stay at home order (“lockdown”). Closure of all sectors, including leisure and hospitality sectors as well as non-essential retail. Only essential workers permitted to attend workplace. Schools (except for key workers and vulnerable children), colleges and universities shut. Places of worship shut. Contact within other households banned.

Planned, short, stay-at-home order (“fire break”). General stay-at-home order of short duration (e.g. 2-3 weeks). Could be timed around planned school holidays to help mitigate the impact, but not necessarily.

In Wales “**circuit breaker**” is an indicator (e.g. number of ICU beds occupied) that, if it reaches a threshold and is breached, raises an alarm that can lead to a change in policy, or switch to the introduction of measures to reduce disease transmission to prevent overload of the system. Detailed circuit breakers were introduced in Wales in July⁴ using data from key surveillance and NHS systems, and have since been monitored daily. In this case, the “fire break” is the specific action introduced, given that several circuit breakers have been triggered.

2. Wales current situation (TAC)

For the first time in this second wave of infections, the incidence for Wales measured higher than 100 cases per 100,000 people, at 126.8/100,000 for the whole of Wales⁵. The total test positivity for Wales is 11.9%⁶.

¹ <https://www.gov.uk/government/publications/fifty-eighth-sage-meeting-on-covid-19-21-september-2020>

² <https://www.gov.uk/government/publications/summary-of-the-effectiveness-and-harms-of-different-non-pharmaceutical-interventions-16-september-2020>

³ <https://www.gov.uk/government/publications/npis-table-17-september-2020>

⁴ <https://gov.wales/sites/default/files/publications/2020-07/technical-advisory-cell-circuit-breakers-early-warning-indicators.pdf>

⁵ Public Health Wales, rolling 7 day average incidence from 11-17 October 2020

⁶ Public Health Wales 19/10/2020 Local Authority positivity range 4.1%-18.9%

All Welsh Local Authorities (LAs) are above 50 cases per 100,000 of the population, with the exception of Ceredigion, Pembrokeshire and Powys (28, 33 and 48 cases per 100,000, respectively). There is a similar picture for positivity, where all LAs are above 5% positivity, apart from Pembrokeshire (3.7%)⁷.

As reported by Public Health Wales, incidence has increased across all age groups, and is highest in those aged under 50. Figure 1 below shows the increasing proportion of cases (shown in darker red) now seen in older age groups. Figure 2 shows the increase in cases in older adults (60+) over time. There has been a clear pattern from around the world of incidence rising first in young people, before spreading into older age groups. No country has managed to contain their epidemic within lower risk age groups. This is a result of there being substantial interaction between older people and all other age groups, as demonstrated by studies of contact patterns⁸.

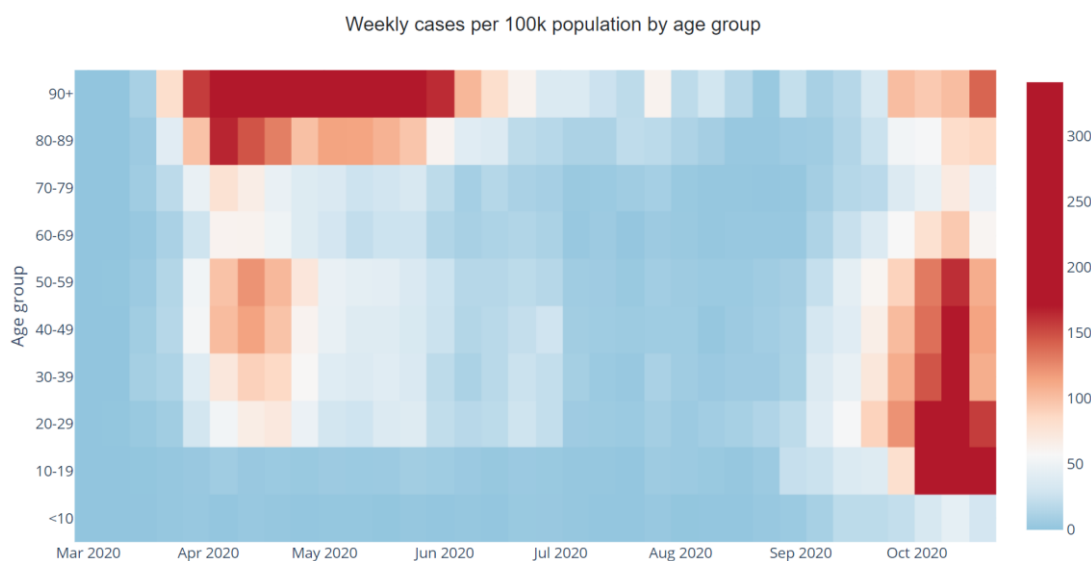


Figure 1. Weekly cases per 100,000 by age group (NHS Wales)⁹.

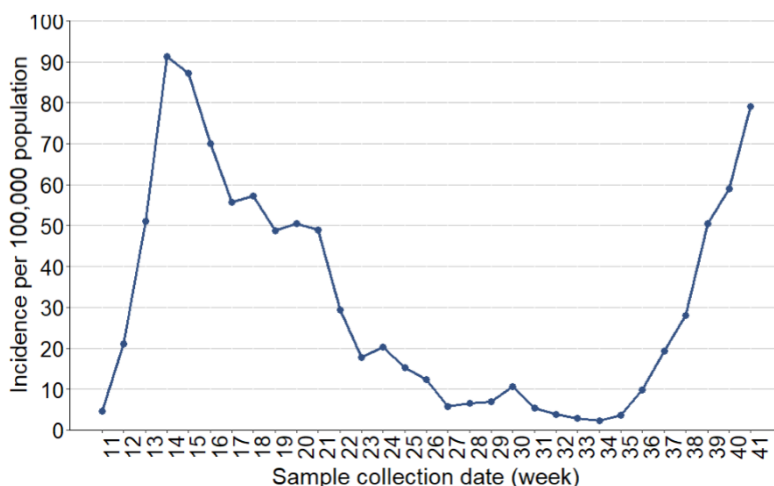


Figure 2. Confirmed COVID-19 episode1 incidence per 100,000 population in individuals aged 60 and over, by sample collection week (PHW, CDSC 16/10/20)

⁷ Public Health Wales. Breakdown of COVID-19 cases in Wales by Local Authority, as at 1pm 17/10/2020. 7-day incidence period reported: 09/10/2020 to 15/10/2020

⁸ SAGE 48: SPI-M-O Statement on population segmentation by age group

⁹ <https://wales-gov-dashboard.armakuni.co.uk/>

The growth rate is estimated to be 4% per day¹⁰. Our estimate of total infections¹¹, is 2,544 per day (90% confidence interval: 347 to 4,761). Figure 3 shows increasing numbers of people admitted to hospital that are either suspected or confirmed as having Covid-19. The purple line represents the total number over a rolling 7 day average, whilst the fainter grey lines show the actual figures at that time.



Figure 3. Hospital bed occupancy of suspected and confirmed COVID-19 positive patients (7 day rolling average) (NWIS 16/10/20)¹²

We are currently tracking to our Reasonable Worst Case (RWC) that projects around 18,000 hospitalisations and 6,000 deaths due to Covid-19 over the winter period¹³. By comparison, since the beginning of the pandemic there have been around 5,300 hospital cases, around 1,800 of which may have been hospital acquired, and around 2,600 deaths from Covid-19.

3. Circuit breaker indicators¹⁴ (TAC)

Circuit breakers are monitored closely in order to provide an indication if sensitive markers of community transmission or hospital activity have been breached. Two indicators for community transmission and one for hospital activity have been breached

Transmission

- Circuit breaker one: The upper limit of the range of R values for Wales reaches or exceed 1.5, current estimated value from PHW **1.20** (95 % confidence interval 1.17 – 1.23). SPI-M consensus 1.1-1.4. PHW estimate breached last week, SMI-M consensus not breached but has been previously.
- Circuit breaker two: > 40 Cases per 100k, current estimated value **126.8** per 100,000, breached since 17 September 2020.
- Circuit breaker three: Positivity rate > 5%, current estimated value **11.9%**, breached since 27 September 2020.

¹⁰ SAGE Subgroup SPI-M estimate, with 90% confidence interval of between 2%-7%

¹¹ derived from case incidence from the testing programme and numbers of admissions to hospital and ICU

¹² <https://wales-gov-dashboard.armakuni.co.uk/>

¹³ <https://gov.wales/sites/default/files/publications/2020-09/technical-advisory-group-new-worst-case-scenario-for-winter.pdf>

¹⁴ <https://gov.wales/sites/default/files/publications/2020-07/technical-advisory-cell-circuit-breakers-early-warning-indicators.pdf>

- *Two circuit breaker indicators related to transmission have been breached for more than 7 days – suggesting that the number of cases is likely to be uncontrolled and the number of cases is likely to continue growing exponentially.*

Hospital occupancy

- Circuit breaker four: Total hospital bed occupancy for confirmed COVID-19 patients reaches or exceeds 500, currently **488** and increasing rapidly (45% increase from last week), not breached
- Circuit breaker five: If the critical care occupancy for confirmed COVID-19 patients reaches or exceeds 70, currently **40** and increasing (38% increase from last week), not breached.
- Circuit breaker six: The total critical care bed occupancy (for COVID and non COVID patients) is above 150, currently **153** but decreasing slightly, breached since 30 September.
- Supporting indicators on number of patients on mechanical ventilators and Continuous Positive Airway Pressure (CPAP) have increased to 117 and 37 respectively.
- *These indicators suggest that whilst the number of COVID cases in hospital are not exceeding indicators, when combined with elevated levels of non-COVID critical care occupancy there is an insufficient number of critical care beds and/or staff to sustain a large COVID outbreak, in addition to existing non-COVID treatments.*

4. Effect of current restrictions (TAC)

There is a high confidence that the local restrictions currently in place across many local authorities in Wales has led to a significant slowdown in the current wave of the pandemic. The case incidence and positivity have been suppressed in some, though not all, Local Authority areas throughout most of September.

The behavioural analysis from the WHO on pandemic fatigue¹⁵, as well as behavioural surveys¹⁶ and mobility data¹⁷ show that compliance with the restrictions in place is waning. In particular, since the R number has not been reduced below 1 by the current package of interventions, growth of infections is still ultimately following an exponential course. This obvious continued growth causes anxiety and mistrust in the current NPIs, and reduces the effectiveness of local area restrictions, leading to a vicious circle of reduction in adherence.

Wastewater sampling, case incidence analysis and insights from genomic sequencing of the virus show that there is now high confidence that there is a relatively heterogeneous seeding of the virus across the country. Seeding from areas of high incidence in the North West of England has penetrated as far as the Llyn Peninsula.

¹⁵ <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/2020/pandemic-fatigue-reinvigorating-the-public-to-prevent-covid-19,-september-2020-produced-by-who/europe>

¹⁶ See for example https://b6bdcb03-332c-4ff9-8b9d-28f9c957493a.filesusr.com/ugd/3d9db5_636933e8191d4783866c474fab3ca23c.pdf

¹⁷ https://gov.wales/sites/default/files/publications/2020-10/advice-summary-9-october-2020_0.pdf

Exponential growth of the epidemic means that very large numbers of infections are accrued over a short period of time (weeks) once the population is heterogeneously seeded with infection. Even with the R number 1.1 and 1.4, it means that case rates are growing steadily every week.

5. Balance of harms (TAC)

Both intervening and not intervening will cause harm: long and short-term harms, direct and indirect harms, economic harms, social and psychological harms and health harms. There could be a disproportionate impact on many different groups of people and it will be vital to mitigate against as many of the harms as possible.

From a health protection perspective of managing COVID-19 in Wales there is compelling evidence for reducing transmission of the virus as far as possible by preventing household, workplace and social contacts that drive continued infection.

From an economic perspective, preventing transmission is less important than maintaining an effective workforce and infrastructure. Limiting the size of a pandemic related recession will save lives in the future as mortality is closely related to income and life chances.¹⁸ While pandemic harms are non-linear (as the virus is either under control or exponential), economic harms are also non-linear as normally viable businesses going bust means a loss of organisational capital. Preventing economic harms requires a degree of certainty around timing, and a transmission rate low enough to enable some opening of all commercial sectors. Maintenance of businesses and support for workers must be affordable during any interventions to reduce the transmission of the virus.

Behavioural insights show that many measures will only work if the public are engaged, agree and understand that Covid-19 is a serious health threat that must be managed; there should be a clear, simple set of rules and messages with achievable actions and goals. Messages and rules should be fair and applicable to all, and should reinforce why people are being asked to make significant sacrifices.

There is a reasonable likelihood that if we do not act now, we will need to take further, more expensive and longer action in the future to achieve a similar reduction. The scale of the negative impact on the NHS in Wales is growing by the day. There is a high confidence that cases and hospital admissions in Wales is leading to a deterioration in our capacity to treat non-Covid-related physical and mental health issues.

6. Package of short-term interventions (SAGE)

SAGE recommended that a package of interventions would need to be adopted to prevent this exponential rise in cases. Single interventions are unlikely to be able to reduce incidence. If schools are to remain open, then a wide range of other measures will be required. As noted by SAGE, though the role of children in transmission is limited, opening

¹⁸https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918738/S0650_Direct_and_Indirect_Impacts_of_COVID-19_on_Excess_Deaths_and_Morbidity.pdf

or closing schools would be expected to have an impact on community transmission (e.g. by changing the activities of a large number of adults).

The shortlist of non-pharmaceutical interventions that should be considered for immediate introduction include:

Advice to work from home for all those that can (data show that rates of working from home are continuing to decline, from 38% of those in employment at the start of June, to 23% in early October (Office for National statistics¹⁹)).

- *Banning all contact within the home with members of other households (except members of a support bubble). Household transmission remains the most widely recorded setting of transmission. PHE reports secondary attack rates of around 40-50% within households, confirming the key role the household plays in transmission.*
- *Closure of all bars, restaurants, cafes, indoor gyms, and personal services (e.g. hairdressers) (Outside the household, preliminary analysis of a recent case-control study by PHE suggests that working in health and social care remains a risk factor, as is working in close personal services and hospitality. Activities associated with increased risk amongst cases include frequenting entertainment venues e.g. bars and restaurants. Outbreaks associated with restaurants and bars have also been recorded, both in the UK and elsewhere).*
- *All university and college teaching to be online unless absolutely essential. (As forecast transmission amongst young adults is having considerable impact on the epidemic, doubling times are lower in this age group. There is a risk of exporting infection from universities to households with older adults)*

Reduction in prevalence is achieved by reducing the connectedness of the population. Transmission within households is efficient, so reducing the connectedness requires reducing interactions between households that occur via contacts made in education, work and social/leisure activities. The effectiveness of the individual interventions listed below should be measured in terms of their impact on connectedness between households.

Evidence for the effectiveness and harms related to individual interventions is difficult to ascertain as packages of interventions are usually implemented together and the level of adherence may be heterogeneous and poorly quantified. Lower levels of adherence to interventions will erode their effectiveness.

7. Impact of national interventions and scale of individual measures (SAGE).

The lockdown imposed in late March (and the changes in behaviour that preceded this) had a high level of uptake and resulted in a rapid reduction in the reproduction number (R), from about 2.5-3.0 to about 0.5-0.7. That is a reduction in R of about 2, or a reduction in

¹⁹<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/bulletins/coronavirusandthesocialimpactsongreatbritain/16october2020#main-point>

transmission of 75%. The national lockdown can be thought of as a combination of many different measures – from closing schools and universities, to closing pubs, restaurants, gyms and close-contact services, restricting all contact with other households and mandating that all but essential workers work from home. All of these measures came in simultaneously, and the sum of each of their effects reduced the reproduction number by about 2. Hence, each measure alone is likely to have a relatively small effect. That is, a large number of these individual measures is necessary to be in place to keep R to below 1.

A “fire break”, in which a package of stringent non-pharmaceutical interventions is reintroduced for 2-3 weeks should act to reduce R below 1. Over a fortnight’s “break”, two weeks of growth could be exchanged for two weeks of decay in transmission, assuming good adherence to measures, and no additional increase in contacts before or after the break. If this were as strict and well-adhered to as the restrictions in late May, this could put the epidemic back by approximately 28 days or more. **The amount of “time gained” is highly dependent on how quickly the epidemic is growing – the faster the growth or stricter the measures introduced, the more time gained.**

If regulations and behaviour then returned to pre-circuit break levels, there would be a return to exponential growth, but from a significantly lower level than would have been the case without the break. The deleterious impact would be maximised if they coincided with school holidays. Multiple circuit-breaks might be necessary to maintain low levels of incidence.

8. Estimated impacts on Rt (SAGE)

Working from home: Moderate impact (high confidence). Typically, over a third of contacts are made at work, often long duration and highly clustered. Modelling suggests that homeworking would have a significant effect on transmission. Reduction in Rt of 0.2-0.4 if all who can work from home do so. In Wales 30% currently working from home so reduction may be lower than modelled value. There is evidence from PHE reports on role of workplaces in transmission. Transmission risk in workplace settings will vary significantly with the particular environment, activities and worker behaviours.

Stopping contacts between households: Moderate impact (medium confidence): Stopping all contacts between different households in the home might reduce Rt by ~0.1-0.2. Bubbling of single occupancy households has little effect (SPI-M result)

Closure of bars, pubs, cafés and restaurants. Moderate impact (medium confidence). Potential reduction in Rt of 0.1-0.2, though precise estimation very difficult. Environmental risk in bars, pubs etc is likely to be higher than many other indoor settings due to close proximity of people, long duration of exposure, no wearing of face coverings by customers, loud talking that can generate more aerosols. Some venues are poorly ventilated, especially in winter. Consumption of alcohol impacts on behaviour.

Closure of indoor gyms, leisure centres, fitness etc: Low to moderate impact (moderate confidence) Potential reduction in Rt of up to 0.1, though precise estimation very difficult. Some evidence from outbreak data e.g. in Korea associated with fitness class.

Environmental risks linked to high touch surfaces in gyms, higher aerosol generation and breathing rates due to aerobic activity.

Closure of places of worship / community centres Low to moderate impact (moderate confidence) Potential reduction in Rt of up to 0.1, though precise estimation very difficult. Strong association with places of worship including significant outbreaks linked to religious community in South Korea, cases in churches in Singapore, and Germany (despite social distancing). Environmental risks vary depending on the building. Small venues higher risk than large spaces as the volume mitigates aerosol transmission. Some ceremonies involve touch surfaces and proximity for short duration (e.g. communion).

Restrictions on outdoor gatherings, including prohibiting large events: Low impact. Small reduction in transmission, benefit of UV sunlight decay of virus may be lower in winter, although still good ventilation (potential reduction in Rt likely to be <0.05).

Non-essential retail: Low impact (low-moderate confidence) SPI-M commission from 30 March 2020 included opening non-essential retail. Very minimal impact on Rt values. Some limited evidence of transmission from China. Short duration and ability to distance in most settings and face coverings are likely to mitigate well.

Closure of close-contact personal services (hairdressing, beauty therapy etc.) Low impact (low confidence). Each event is likely to be high risk as it involves prolonged, close, face-to-face contact. However, use of these services is relatively infrequent, so the overall impact on R is more limited. Potential reduction in Rt of up to 0.05, though precise estimation very difficult. Appropriate PPE can mitigate risk - CDC evidence suggests masks were effective at stopping transmission in a hair dressing salon but some evidence of infection transmission among hairdressers in the UK. Contact tracing generally easy (if complied with). Many places are already careful with hygiene.

Mass school closure to prevent community transmission: Moderate impact.

(moderate confidence) Closing all schools associated with a reduction in Rt of 0.2-~0.5. Closure of secondary schools may be more effective (reduction in R of ~0.35) as link more households, higher numbers of contacts within schools and transmission to/from younger children may be more limited. Overall, low confidence, as unclear how much schools may contribute to community transmission.

Moderate impact (high confidence). Outbreaks occur in universities, given their size and the degree of close contact typical through shared living arrangements and while socialising and contact time. Closing universities associated with a potential reduction of Rt of ~0.3 (0.2-0.5). Mitigations short of closure should include strong steer towards online learning for all but essential practical activities. **Any closure of university or mass migration of HE students to their family household could lead to significant secondary infections in older adults (high confidence)**

Closure of Further Education: Moderate impact (moderate confidence). Less data than from schools, though students are older and thus more likely to be infectious. Cryptic

transmission from asymptomatic individuals likely. FE is highly networked linking households, FE setting and workplaces, but this tends to be local.

9. Using Swansea Reasonable Worst Case (RWC) Model to estimate impacts of firebreak.

The Swansea University generated Reasonable Worst Case model has been interrogated to generate estimate of impacts on health and NHS provision for a two and three week fire break. The table and graph below shows the effect on deaths with a current Rt at 1.4, followed by a fire break of two or three weeks (Rt 0.9) followed by an Rt of 1.4.

| | Modelled estimate of deaths | | |
|------------------------------|-----------------------------|---------|---------|
| | No Change | 2 weeks | 3 weeks |
| 12 October - 31 Dec | 2,500 | 1,540 | 1,200 |
| 12 October - 31 March | 4,890 | 4,140 | 3,770 |

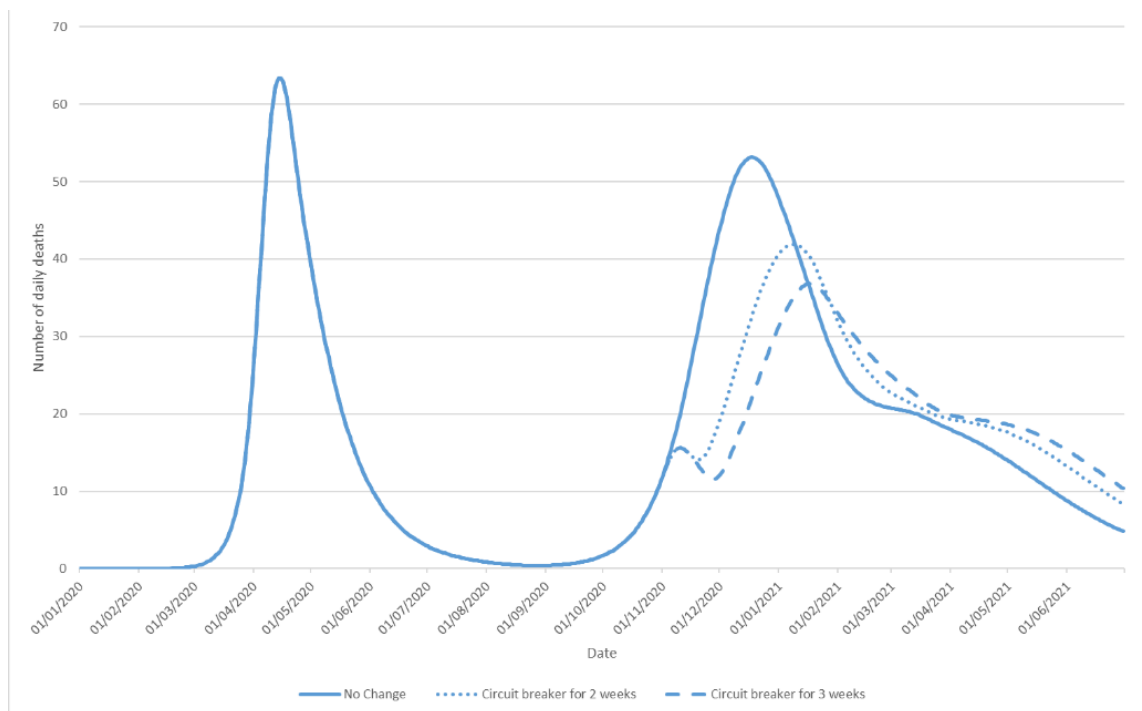
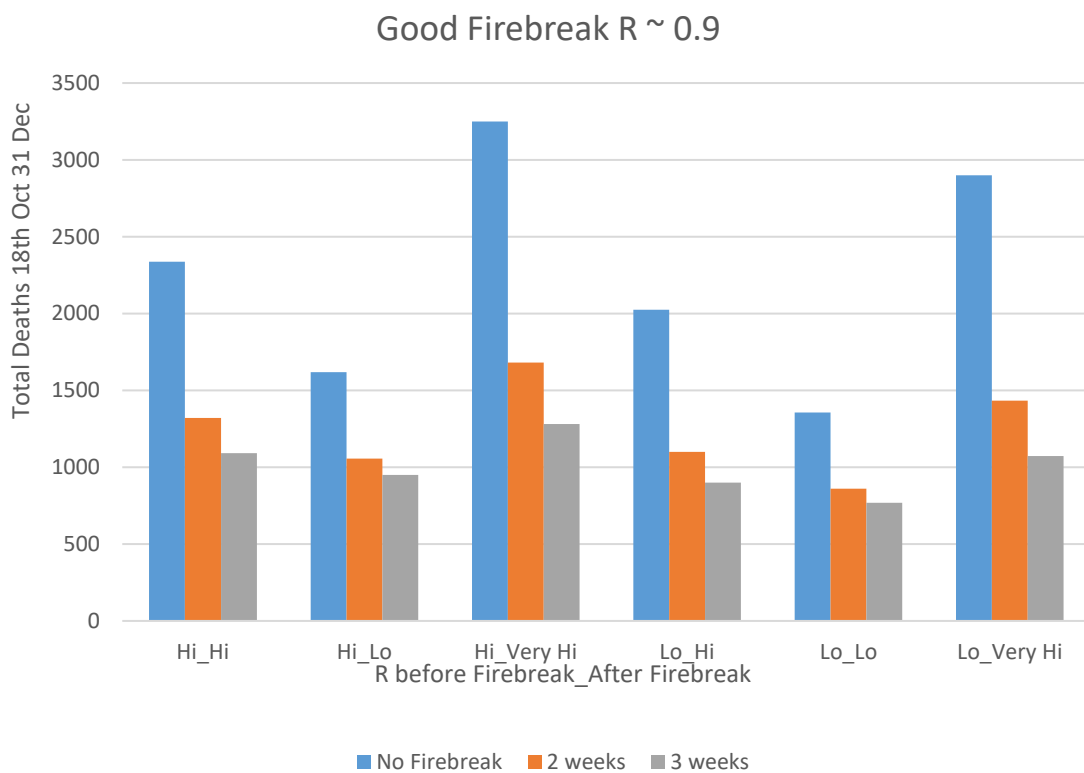


Figure 4. Modelled impact on mortality due to COVID19 for Wales, from January 2020 - June 2021

Using Swansea RWC Model to estimate impacts of firebreak (until 31 Dec 2020).



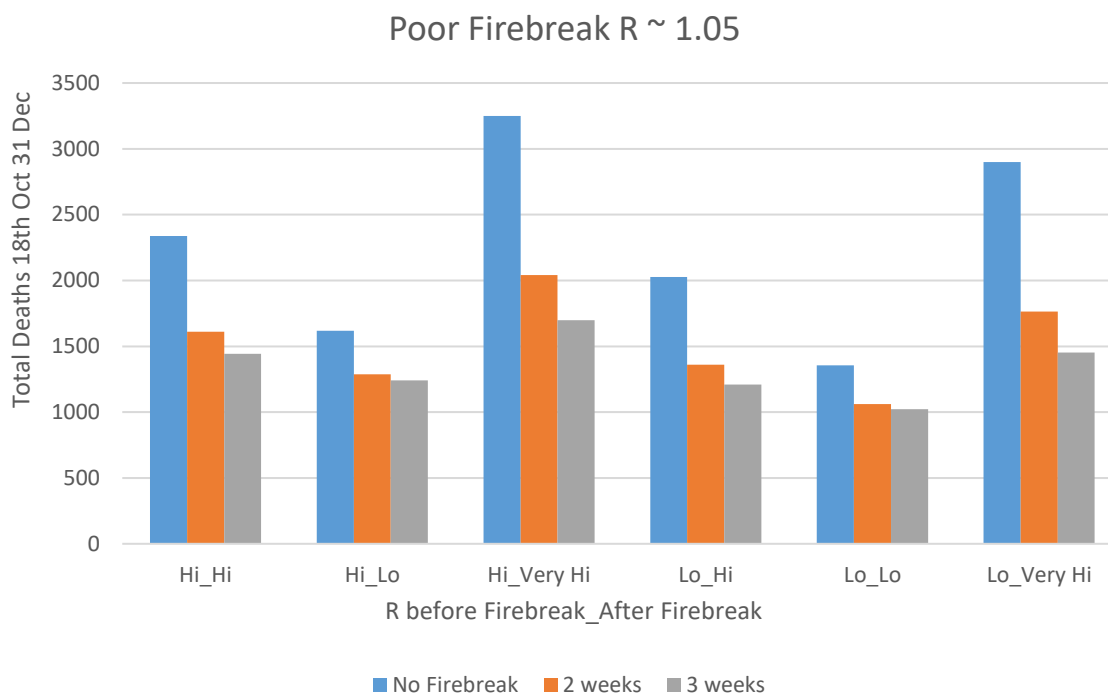


Figure 5. Modelling of Good ($R_t=0.9$), Very Good ($R_t=0.8$) and Poor ($R_t=1.05$) Fire Break of 0, 2 and 3 weeks duration with either a high or low entry R_t (1.45 or 1.35 respectively) and sustained low, high or very high exit period (1.2, 1.4 and 1.6 respectively).

The impact on R_t during a firebreak will depend on the package of interventions chosen, inclusion of more interventions will, in theory, have a greater reduction of R_t . Figure 5 above shows a very good (0.8), good (0.9) and a poor (1.05) R_t for the period of the fire break. The figure shows cumulative deaths as a function of either high (1.45) or low (1.35) R_t entering into a firebreak with a low (1.2) high (1.4) and very high (1.6) R_t after the firebreak. A very good firebreak (R_t 0.8) for 2 to 3 weeks followed by low R_t (1.2) would lead to significantly fewer deaths (950,830) than either a poor firebreak (R_t 1.05) followed by low R_t (1290, 1240 deaths) or no firebreak followed by a low R_t (1620). Deaths are estimated to 31 December 2020.

10. Recommendation

Considering the current situation and the evidence from SAGE²⁰ and TAG, it is recommended that a two-phase approach is used. The first phase is a “fire-break” – a swift and short-term period of simple, extreme restrictions across the whole of Wales that would significantly reduce the prevalence of the virus in Wales. This would ease the pressure on the NHS and offer some time for a reset of behaviours and implementation of new healthcare pathways, health protection approaches or other interventions that require a run-up. Doing it over half term would reduce financial and social harms. At least two weeks would be needed. If schools were to remain open, it would reduce short- and long-term

²⁰ <https://www.gov.uk/government/organisations/scientific-advisory-group-for-emergencies>

harm, but most other workplaces would need to be closed and social visiting restricted in order to reduce overall contacts and break the chains of transmission.

The firebreak will have to reduce the national R (latest between 1.1 – 1.4) to below 0.9. This implies that R will need to be reduced in all areas of Wales, which requires a national approach rather than the current locally driven approach through Local Health Protection Areas (LPHAs)

The second phase is a new, simpler, national approach to behaviours and restrictions. Simpler messaging and regulations are expected to be easier to understand and comply with. Some existing restrictions may be removed if they are shown to be less effective or more harmful than originally expected, such as the Local Authority travel boundary restrictions. However, there would need to be sustainable changes in behaviour in many areas of life in order for R_t to remain as near to 1 as possible.

11. Conclusion

Without intervention, continued increase of cases of Covid-19 in Wales, in hospitals and in ICU will be too high for the NHS to sustain. In order to balance the four harms effectively, TAC recommends urgent consideration and execution of a hard national fire break to massively reduce transmission for a period of weeks, reduce the number of cases to a sustainable level and then a set of sustainable, national interventions to keep R_t around 1 while maximising social, economic and health benefits.