

Note on Joint Biosecurity Centre (JBC) and potential flows

JBC Goal

The Joint Biosecurity Centre will enable HMG to take rapid, effective action to suppress very localised 'flare ups' of COVID-19 through targeted Non-Pharmaceutical Interventions (NPIs). The organisation will need to be established for sustained delivery by 1 June 2020.

Key Outcomes

- A COVID-19 alert scale that transparently communicates to the public the alert level and criteria for action;
- Live data streams and wide-ranging analysis that provides evidence on the nature and location of the problem and monitors effectiveness of response;
- Smooth decision-making process, consulting Ministers and Chief Medical Officer as proportionate to the scale of the intervention, against an agreed 'playbook' of options; and
- The rapid implementation and action on the ground by the right actors at the time.

JBC Programme Office

1. If JBC is successful, effective locally targeted action will become a valuable control mechanism and allow blanket national NPI measures to be relaxed to some degree.
2. Adopting a set of epidemiological objectives will guide JBC in developing the data analysis and operational processes needed to deliver success. The scaling of epidemiological targets is in many ways a policy decision around the UK strategy and acceptable levels of incidence however the following proposed epidemiological objectives set out the types of objectives JBC should focus on and propose a baseline set of targets or success tracking metrics.
 - Decreasing daily incidence of symptomatic cases in all regions¹ across the UK until the target acceptable incidence is reached, then incidence kept below that target. This target is yet to be specified and needs to be spelt out. We suggest 1000 new symptomatic swab +ve cases per day in the UK.
 - Proportion of sporadic cases testing positive is greater than 10%
 - The speed and targeting of locally applied control measures restricts outbreaks in a single setting to no more than 10 cases.
 - The number of "mystery cases" cases for whom the source of infection is not known to JBC represents no more than X% of daily swab +ve cases.
(Note that achieving high performance on the objective above is likely to require a particular focus on detecting and controlling transmission amongst people who find services hard to access and in areas of high population density and index of deprivation.)

JBC functions will include:

¹ Likely to be something quite large like NHS regions

- Monitoring the numbers and pattern of cases and outbreaks of Covid-19 nationally and locally in England and the Devolved Administrations.
- Analysing those numbers and patterns to identify situations with the potential to breach the epidemiological objectives.
- Deciding what responses are required.
- Overseeing the response to those cases and outbreaks. Most response actions will be determined by local teams, following a playbook and using decision support tools developed by JBC, and/or delivered through the operation of the test, trace and isolate service. The JBC will need assurance that appropriate response actions are being taken and will need; a) the ability to support local actors, b) capability to integrate local actions with any actions requiring national decision making, and c) mechanisms to escalate when needed.
- Proactively assessing further actions and advising on their implementation may be required to maintain control of Covid-19 (ie keep R under 1 and the numbers down) in different settings where transmission occurs.
- Establishing the criteria for national alert levels 1-5 for Covid-19 and advising the CMO on the appropriate alert level that should be in place at any time.

Data and Sitreps

3. To achieve these functions JBC needs daily data feeds on:
 - Numbers of confirmed cases by geography. Having case data tied to Lower Layer Super Output Area (LSOA, or DZ in Scotland) will allow case data to map against known or suspected risk factors (e.g. deprivation, demography) which vary substantially at this scale, whilst still allowing case data to be aggregated up to Upper Tier Local Authority (UTLA, ~150 across England) areas or in line with Local Resilience Forum boundaries (~45 across England) – the most likely geographic scales for local decision making bodies.
 - Numbers of test negative suspected cases by geography. [Noting that this will be biased by other activities such as healthcare worker screening.]
 - Numbers of outbreaks (with one or more confirmed case) reported to PHE from local settings schools, workplaces, care homes, hospitals, prisons etc.
 - Number of suspected outbreaks of respiratory disease (not yet confirmed) reported to PHE from local settings schools, workplaces, care homes, hospitals, prisons etc.
 - Soft intelligence from or through local PHE centres on cases or clusters of suspected disease that may indicate enhanced transmission (eg places of worship, pubs, restaurants, leisure facilities), hostels, or particularly vulnerable groups and transport systems.)
 - Adherence and public sentiment
 - The international situation and the attendant level of risk to the UK that results from any problems abroad.
4. JBC will also need an analysis function with senior statistician input, and the ability to generate more in depth case investigation and follow up. These functions and abilities would:
 - Developing exceedance reporting baselines

- Calculating infection rates by local area (to identify links to neighbourhoods with high population density, etc)
 - Calculating the proportion of positive tests by local area – higher rates of positivity are often the first sign of an increasing incidence
 - Investigating other common factors in sets of cases – age group, sex, etc.
 - this may come from enhanced surveillance questions administered to all/some confirmed cases. Additional systems will be needed as it is not routine to report things like schools and workplaces on case reports. Additional data collection could include work, travel and demographic factors and needs to be flexible and responsive.
 - Investigating and following up of outbreaks to ensure rapid testing and initiate control measures prior to confirmation (case confirmation, case finding, etc etc)
 - Ensuring all cases identified via many reporting routes are being followed up
5. These data feeds will come from the range of data sources feeding into the JBC. The data will feed into a daily sitrep which will:
 - a. provides clarity on geographic spread
 - b. identify lead and lag indicators and contextual indicators
 - c. consider actions in place and whether they are having the impacts expected.
 6. Consideration will need to be given to which data feed and indicators need to be updated daily and which less frequently, to provide a clear understanding of the daily position nationally, by geography, by sector and internationally.
 7. A draft daily sitrep should be started as soon as possible - which can be further developed over the coming 2 weeks before launching more formally on 1 June. Sitreps will need to be national and also at a geographic scale useful to local decision makers.

Cases characterisation and actions

8. Outbreak control normally identifies three or more types of case: possible cases; probable cases; confirmed cases. Control action is usually taken on probable, epidemiologically linked and confirmed cases. Cases are discarded if either clinically incompatible and/or tested negative
9. We suggest the following definitions:
 - a. **Confirmed** - test positive may include asymptomatic cases
 - b. **Epidemiologically linked cases** - COVID-consistent symptoms but awaiting test or test -ve where the individual has been in contact with at least one other person who has tested +ve

- c. **Probable** - COVID-compatible symptoms but not tested or test - ve. No link to definite or highly probable cases but additional clinical or epidemiological factors that make COVID a more likely diagnosis.
- d. **Possible** - compatible symptoms but no clinical or epidemiological factors to suggest COVID.(more likely to be in contain-type phase) These should be rapidly tested.
- e. **Discarded** – cases that are not clinically compatible, that test negative and have no epidemiological factors

Factors that increase risk of exposure

- Membership of a community known to be more susceptible.
- Visited an area (local or international) where COVID is known to be circulating, during the incubation period.
- Attendance at mass gathering events, where substantial mixing occurs between individuals potentially travelling from areas where COVID is circulating.
- Work in hospital, healthcare or care sector

Factors favouring the diagnosis of COVID over other causes:

- Age: the likelihood of a suspected case being confirmed is higher among adolescent and young adults. Other causes of respiratory illness are relatively more common in infants and toddlers, and the elderly

10. The following actions are proposed for case types:

- a. **Confirmed** cases lead to isolation of the case, tracing of contacts (agreed definition of contacts) and isolation of contacts for 14 days, as per the test, trace and isolate programme.
- b. **Epidemiologically linked** cases, including those as part of a cluster (ie a probable outbreak), should also be contacted trace on the basis of symptoms. (Asymptomatic contacts of cases are only contact traced if confirmed.) *[Note this is not currently considered within the test, trace and isolate programme.]*
- c. **Probable** cases: the current view is that we isolate the individual and contact trace only after the test is positive or after 48 hours if the test is delayed longer than 48 hours, as per test, trace and isolate.
- d. **Possible** cases need testing to exclude infection and discard but testing is less urgent.

Compliance with testing may not be complete in certain populations and JBC will need to ensure follow up on these where it is important

11. We suggest when more than one case is confirmed in a confined setting, the following actions should be considered - case finding, infection control advice, awareness raising, warn and exclude those at higher risk, limit flow in and out of setting.

12. The JBC playbook and decision support tools for decisions regarding wider control actions by individual businesses /institutions, localities and regional or national decision makers will be critical to ensuring good decisions are made and actions taken rapidly.

[Suggest replacing the highlighted section of the paper with a recommendation that JBC return to SAGE with the draft playbook and decision support tools once these have been produced.]

- NPIs to be taken across specific geographies if the numbers of cases and outbreaks in that community suggests wider and increasing community transmission. Question: what are the triggers that would lead us to conclude that wider and increasing transmission is

likely and NPIs in specific localities should be implemented? Proposed Answer: Identification of an operationally feasible spatial unit for which unit-wide incidence is highly likely to exceed a threshold considered (by the best available model) sufficient to push local R_0 above 1.

- Actions to be taken in different sectors if outbreaks are associated with them. Actions to respond to outbreaks in certain sectors (eg care homes) are well established, others less so. Questions include, for example:
 - Under what circumstances do cases in children or staff in a school lead to other pupils and staff in addition to the immediate contacts being asked/required to isolate for 14 days? ie when is a school partially or fully closed.
 - Under what circumstances is an employer asked to close? Is this when the number of individual cases within a specific time period reaches a particular threshold?
 - Under what circumstances do we ask specific places where people congregate socially to close for a 14 day or longer period?
 - Under what circumstances do we ask/require a whole sector across the country to close for a period?
Note: The thresholds for triggering an NPI could vary according to the risk profile of the people in different places or sectors. For places or sectors deemed to be at high risk of severe disease (e.g. care homes), the threshold to trigger the NPI could be lower than in places where the people are deemed to be at low risk of severe disease (e.g. sports centres).
 - What is the role of steps short of full closure (enhanced cleaning, partial closures, or rota systems to break transmission chains)?
- Actions to be taken at the UK border depending on different international situations.

13. A further issue is public confidence and also incentivising (and not disincentivating) people and businesses to play their part. In some sectors specific actions and approaches to data gathering may also provide incentives and reassurance. We recommend:

- All organisations should be encouraged to report potential outbreaks to JBC, not just schools or businesses. This will require a user-friendly system to allow easy submission of ad hoc reports / expressions of concern from groups that might not routinely be providing data.
- Ways to encourage the reporting of useful data have previously been explored in the context of other campaigns urging public vigilance, for example the “See it, say it, sorted” campaign. Reporting can be encouraged by reducing uncertainty about; how to report suspicions, the processes involved when a report is received, whether a report will be taken seriously, the benefits of reporting (health protection in this case), and whether a report will be a worthwhile use of, in this case, the JBC’s time ⁽¹⁾. Members of the public who have actively contacted public health teams to report their involvement in previous major incidents have reported similar motivators ⁽²⁾. Worries about being seen as a ‘time waster’ also deter patients from reporting potentially troubling symptoms to their clinician ⁽³⁻⁵⁾. JBC should learn from previous successful campaigns to develop public facing information that encourages the reporting of symptoms and the use of systems that feed into JBC’s data. A rapid evidence review of this literature should be commissioned as part of this, and the impact of JBC campaign materials on relevant behaviours should be evaluated.

- A Covid lead in every workplace and organisation will be potentially very valuable for providing sensitive early indicators of outbreaks, but it will be essential to encourage employers and employees to report symptoms even if they are not sure they are coronavirus. The placement of Covid leads within organisational hierarchies requires careful thought for this role to be effective ⁽⁶⁾. They will be reluctant to do this if they are concerned that reporting symptoms or cases will immediately trigger inappropriate or excessive workplace absence or lockdown ^(7,8). This concern can be overcome by establishing a good supportive relationship between workplaces and those responsible for monitoring, and communicating with employers and employees that an appropriate stepped response will be employed ⁽⁹⁾. This means that early reporting of possible symptoms or cases should trigger an intermediate response, including measures such as increased social distancing, cleaning, home working and vigilance for symptoms. This response will be encouraged by being recognised as best practice and as a means of avoiding a more serious outbreak which would trigger a full lockdown, thereby losing the trust of the public and employees and risking HSE penalties.
- Regular, routine testing of staff or children within schools may be disruptive and maintain high levels of anxiety. If a Test, Track and Isolate system is functioning properly, it may be unnecessary. Implementing testing primarily to provide reassurance, rather than for epidemiological or clinical reasons, is not recommended in these circumstances.
- If schools or other organisations provide a routine flow of data to JBC (e.g. absence rate) feedback to the organisation should be provided in return. To maintain trust and to support organisations in communicating with their staff, pupils, customers or members, JBC should focus on providing honest, clear information, for example comparing the current absence rate to a national average for the sector ⁽¹⁰⁻¹²⁾. Information-light platitudes (e.g. “your current absenteeism rate is no cause for concern”) should be avoided ⁽²⁾.
- JBC should pursue a reputation as an organisation that the public can trust. This will require them to be an exemplar in terms of honesty, openness, competence and independence. These principles should be embedded into every level of the organisation and demonstrated to the public from day one. It is important to emphasise this fundamental point. As part of this, the JBC should consider the importance of transparent communication in mitigating uncertainty and hence promoting effective decision making. Trustworthy public guidance is likely to be helpful to businesses deciding to what extent they will incur the cost of re-opening. Furthermore, openness and communication of the uncertainties involved in monitoring the development of the virus can promote trust and public confidence.
- The approach adopted by JBC should consider the different economic and social factors that will shape individuals’ incentives to play their part. A one-size fits all approach may not achieve an optimal societal response. This is because different groups of individuals will bear different costs and benefits of participating. Generous and accessible benefits for those facing income and job losses could encourage reporting. Messaging could be designed with these differences in mind.
- Targets need to be set carefully when decision making is delegated and should provide some overarching guidance of what decisions are intended to achieve. Hospital waiting times targets is a good example of where a well-intentioned target is claimed to have distorted decisions and not improved overall health as the target intended. Prioritising NHS over care homes is another example where the intention to improve overall health outcomes distorted decisions and led to the virus being seeded in care homes so that the intention of the policy was not achieved.

- In previous public health incidents, episodes of mass psychogenic illness ^(13, 14) or increased symptom reporting or requests for testing have occurred as a result of heightened population anxiety or media reporting ⁽¹⁵⁻¹⁷⁾. These will complicate the epidemiological picture, but if poorly handled, mass psychogenic illness can also provoke substantial anxiety, anger and loss of trust in a community ^(e.g. 18). JBC should be alert to the possibility of local episodes of mass psychogenic illness and should quickly discuss suspicions with public health teams to help them resolve the situation quickly.

An alternative argument for the use of penalisation describes the importance of aligning individual incentives with that of society to avoid negative externalities. Negative externalities in the case of the virus arise when individuals do not exercise sufficient care for others because they do not bear the cost of infecting others and are put off bearing the costs to themselves of exercising care. Tools for aligning incentives include regulation and financial penalties, as well as taxation. Penalties could be in the form of fines for individuals who do not obey rules and regulation could be giving shops permission to open only when satisfactory measures are in place. These tools may be impractical to implement or undesirable in some spheres of life.

This view also explores how for example, individuals may be encouraged to engage in social distancing via penalties such as closure orders on venues where social distancing fails to take place (e.g. venues without clear guidance), rather than or in addition to fines on individuals. Employees may be encouraged to re-establish their usual activities if employers' incentives are aligned with those of their employees (for example, through clear guidance and regulation for employers).

Local delivery and resources

14. The local approach is based around local Outbreak Plans produced by each Upper Tier Local Authority which will be announced this week. UTLAs will work with PHE (for local health protection and surveillance) and with local resilience forums, combined authorities and Integrated Care Systems (or STPs). Local activities will be supported through regional networks based on the 9 former government office boundaries.

15. This is also predicated on sufficient local capacity to:

- Analyse and monitor the position in each local geography (assume each UTLA)
- Ensure the testing and contact tracing system is working effectively in each local geography
- Act to take wider control measures with local communities and institutions/sectors within those communities.
- Investigate apparently unlinked cases to identify common risk factors.

In addition (assuming local PHE health protection teams are the basis for this system)

- PHE/NHS staff will need access to dedicated system for testing suspected cases in the community at pace (i.e. collecting the sample rapidly, urgent transport and fast turnaround time).
- There is a need for IT to be integrated for individual case and contact management, communication of results to individual and extraction of surveillance at the national level to feed into the JBC process.

16. The interface between NHS Test and Trace will operate as follows:

- a. Contact tracing individual close contacts: People who had received a positive test result will provide details of the close contacts through NHS Trace by a web and phone service and the contacts will be advised to self-isolate for 14 days.
 - b. Contact tracing and outbreak management for specific settings (care homes, schools, mass gatherings etc): PHE local health protection teams and local authority public health teams will be notified of positive test results that are linked to specific settings and manage contact tracing in these settings as part of the local outbreak management.
17. Given all the above, a daily “battle rhythm” and co-ordination mechanism is required by the JBC, probably at both national and at a more local level, bringing in PHE local teams but in addition to the existing acute desk functions.
18. At a national level, one option is:
- A daily “battle rhythm” to be agreed, eg data feeds from local to national and from national systems update early morning, sitrep to be produced at lunchtime, an oversight meeting of relevant leads (similar to an Outbreak Control Team) early afternoon which agrees the position and decides action, followed by implementation of those actions for review at the next day’s oversight meeting.
 - The daily oversight meeting, if operating as an outbreak control team, would consider the sitrep, the pattern of overall cases nationally and receive intelligence on the local position, the pattern of cases by sector, the international situation, actions that are required, communications including advice on the alert level.
 - We recommend a draft battle rhythm and terms of reference/membership of such an oversight be drawn up and start to operate in shadow form to support the further development of the JBC

Research, learn, improve and leave a legacy

19. A successful JBC will be an unprecedented public health response to an unprecedented challenge. Many of the answers given in this document are, of necessity, provisional. It will be necessary to construct JBC’s work so that those responses can improve with experience and well-structured research. Most of what is known about COVID transmission has been learnt from a world in lockdown and, as new behaviours are allowed, new risks will arise. It will be essential that JBC can learn from changing circumstances and adapt its responses accordingly.
20. With the magnitude of this challenge comes an opportunity to build a new system that will allow better responses to a whole range of public health challenges. If we can build a JBC that has enduring values of clear-sighted ambition, learned responsiveness and comprehensive reach across all of our communities we could claim to have made a good legacy from these difficult times.

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