PRIME MINISTER

Coronavirus: summary of strategic and tactical approach to the epidemic

I'm attaching Chris Whitty's paper on the strategic and tactical approach to the epidemic, which was tabled for today (Sunday) but too late for you to read ahead of the meeting. It's worth a quick skim through this ahead of further discussions tomorrow – we've covered a fair bit of it in various conversations but it helpfully brings the whole approach together.

IMRAN SHAFI
22/03/20

I would NOT distribute this paper but circulate to the cabinet

Coronavirus: summary of strategic and tactical approach to the epidemic.

1) Coronavirus (COVID-19) will cause significant increased mortality and ill-health in the UK and globally. **Our strategic aim is to minimise mortality over the course of the epidemic**. Excess mortality will come from a number of causes and there is a **tactical approach to address each**.

    a) The most obvious is *direct mortality* from people dying of the virus despite best medical care.
    b) A second major *indirect cause of mortality* is from the NHS emergency services being overwhelmed and therefore providing significantly less effective care both for those with coronavirus and for those with other medical emergencies.
    c) A third cause of mortality and more commonly increased ill-health will be the *postponement* of important but non-urgent medical care and public health programs such as screening whilst the NHS is diverting resources to manage the epidemic.
    d) There is a strong correlation between economic disadvantage and ill-health and in the long-term any prolonged *increase in poverty* due to our countermeasures will feed through to poor physical and mental health outcomes.

2) From the start of this epidemic the aim has been to contain the virus, delay its spread and the initial peak, undertake the research to ensure we can combat it effectively in the medium and long-term, and mitigate the effects of the initial wave of the epidemic. The initial case finding and isolation of early cases which was part of the contain as well as delay strategy helped slow down seeding in the UK pushing the peak out from the winter season. Full containment became impossible once the outbreak became globally pandemic.

3) The overall **direct** mortality rate from coronavirus infection is relatively low (1% or less of those infected is likely with optimal treatment), and even in the most high-risk groups the majority will recover. A very large number of people who are likely to be infected means however there is the potential for a very large absolute number of deaths over a short

period of time. There may be a higher or much higher proportion of people infected without symptoms (asymptomatic) than currently assumed, in which case overall mortality rates would be lower but absolute numbers are still likely to be substantial.

4) The principal actions to reduce **direct** mortality are

   a) Reduce the total number of people acquiring the virus. Pulling the peak of the epidemic down means there is not an overshoot where more people become infected than would occur naturally without mitigation (social distancing measures).
   b) Try to ensure that those who are most at risk of mortality are least likely to catch it through enhanced social distancing and shielding of the most at risk. This needs to take account of the fact social isolation comes with a cost to mental and physical health.
   c) Protect the NHS capacity to maintain low and high level respiratory support through the peak of the epidemic so this is available to Covid patients (see indirect causes of mortality below).
   d) Undertake research into existing drugs and combinations which can help to reduce mortality rates in the sickest patients (short to medium term).
   e) Undertake research into novel treatments to reduce mortality (medium to long-term).
   f) Undertake research into a vaccine which would protect the most vulnerable (long-term, success is not guaranteed).
   g) Minimise transmission in hospitals to already sick patients (nosocomial infection- includes PPE).

5) The principal actions to reduce **indirect mortality** from coronavirus and other medical emergencies due to the NHS being overwhelmed are:

   Reduce demand and length of stay.

   a) Through general social action and social distancing *reduce the height of the peak* to a level the NHS can cope. This requires getting the effective reproductive number R to 1 or below or exponential growth will continue. The biggest levers are the actions the government has announced over the last two weeks, including individual and household isolation and recommending against all unnecessary social interactions including closing pubs, clubs, leisure activities, schools etc. If current measures are sufficient to get R to 1 or below it is likely

the NHS will cope; if they are not, it will not. Modelling implies that if population adherence is good current actions are sufficient; without adequate adherence exponential growth will continue albeit at a much slower rate and the NHS critical care facilities will eventually be overwhelmed.

b) Achieving extra social isolation for more vulnerable groups as these are more likely to convert into hospital admissions as well as deaths (similar to 4b).
c) Use drugs to treat coronavirus which reduce bed stay even if they do not reduce mortality (research being conducted).
d) Reduce preventable pressures in the NHS, eg through vaccination (pneumococcal and flu).

Increase staff levels (supply):

e) Actions to protect NHS staff from infection (PPE).
f) Rapid scale up of antigen testing of NHS staff who have to self-isolate so that they can return to the workforce quickly if they do not have the infection, or will be assured that they are not likely to get it again if they do.
g) Repeated antibody (serology) test of NHS staff so that those who are likely to have at least temporary immunity are identified - still at research/development stage.
h) Increasing NHS workforce temporarily by bringing those working in other areas or recently retired.

Increase supply of available beds and kit.

i) Postponing all nonurgent healthcare and solving delayed discharge to expand bed and staff capacity.
j) Expanding ventilator and other respiratory capacity since this is the principle part of the system which will be overwhelmed by coronavirus. ITU bed capacity is a good proxy.
k) Acquiring additional capacity from outside the NHS including the private sector.
l) Spread the load around the country depending on local hotspots.

6) Reducing the impact of **postponement** of important but nonurgent healthcare, and public health **preventive measures**.

a) Either do not close down services where this will not materially help coronavirus effort or, more commonly, reinstate them rapidly when it

is clear they are not contributing in a major way. The further services are away from respiratory support the less likely they are to be directly affected. Elective surgical care *will* be affected because theatre and recovery rooms are needed for ventilation support surge capacity.

b) Shorten the period over which the epidemic runs. There is a tension between the need to reduce indirect deaths laid out in 5) above which benefit from spreading coronavirus admissions over the longest possible period, and the need to return services to normal.
c) Promote public health measures which do not involve health staff, such as exercise.

7) Reduce the impact of **poverty and loss of jobs** which will lead to long-term poor health outcomes.

a) Economic support for jobs and people in the short term.
b) Lift any social distancing restrictions which prove to be ineffective in a phased way. Requires more data.
c) Shorten the period of the epidemic.

8) Metrics for the next stage.

The aim of the next stage is to get R to or below 1 so that exponential growth stops, at a level where expanded ICU and respiratory support can cope. For this the essential metrics are:

a) Doubling time of cases, ICU cases and deaths.
b) The R force of transmission.
c) ICU bed capacity and projected capacity as the epidemic progresses.

Once this is stabilised the epidemic moves to a different stage.

9) **How will it end?** All epidemics come to an end, or have their effect significantly reduced, either through natural means or human intervention. Medical science has proved highly effective at combating multiple infections, and this will be no different. At this early stage of the epidemic we cannot be sure how, or how soon, we will have effective medical countermeasures. We will continue to learn from the international experience. There are three likely exits, which are not mutually exclusive, and one which will not be happening with this virus.

a) *Natural end to the epidemic*. The epidemic infects a sufficiently large portion of the population that the epidemic wave burns out (sometimes called herd immunity). Is likely then to return in smaller waves particularly in the winter months.
-If there is a very large proportion of the population infected asymptomatically this might be occurring relatively quickly and with small numbers of deaths, but this cannot be assumed. Proportion infected asymptomatically is a key unknown.
-If a natural ending of the epidemic is the exit, but with a small proportion of people infected asymptomatically (so the current 1% overall mortality figure remains roughly right), social distancing will need to be maintained for a prolonged period to reduce the peak to prevent direct and indirect deaths and even with optimal management death numbers will be high by the end of the epidemic.
-If this is the endpoint individuals who have had coronavirus will gradually be able to renter normal life once they can be detected by serology, allowing for a gradual resumption of normality.

b) Effective *treatments* are developed which mean the mortality rate drops very substantially. The epidemic would probably still follow its natural path and peak but with much lower loss of life, and less pressure on ITU care. Treatment is for example what turned around the outlook for the HIV pandemic. It is likely we will get slightly or moderately effective treatment soon by repurposing older drugs (weeks to months), and may get highly effective newer treatment in the medium term.

c) *A vaccine*. There are many candidates, but no guarantee any will work. If they do they will not be likely to be available at scale for at least 18 months. Vaccines could either be for the whole population or (more likely) to protect the most vulnerable.

d) *Eradication / disease disappears*. This is highly unlikely for this virus; it is too widespread just to disappear (SARS), and would not be possible to eradicate.

CHRIS

I take from this talk to
rely on avoid large casualties
in the medium term if we
develop drugs

10) This is a global pandemic, so UK actions cannot be seen in isolation.

a) Full suppression in the UK without widespread immunity through natural infection or vaccine if there is active transmission elsewhere will lead to reintroduction. The endgame should be seen as global as well as local.
b) Global as well as UK research will contribute to our understanding and countermeasures and the endgame. The UK is however a leader in the field of combatting infectious diseases.