

Risk and COVID-19

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With thanks to Mark Woolhouse, Aziz Sheikh & Stephen Reicher

Introduction

1. This paper provides advice on:
 - Covid-19 risks;
 - Tools to measure risk from COVID-19; and
 - The Principles of risk communication.

COVID-19 Risks

2. Most risk analyses report *relative risk* (as hazard ratio, odds ratio or other metric). These are the metrics that indicate which categories are most or least at risk of a specified outcome.
3. We are also concerned with *absolute risk*, which is less commonly reported. A relative risk of 2 increases absolute risk by an infinitesimal amount if the baseline risk is 1-in-a-million, but is very important if the baseline is 10%.
4. There is no such thing as zero risk.
5. The prevalence, incidence and R number most frequently used to characterise the COVID-19 epidemic are of limited use in informing a given individual about their personal risk.

Types of risk

6. **Risk to the individual**, infection leading to:
 - illness
 - hospitalisation
 - death
7. **Risk to contacts** of the individual, especially members of the same household, often family members. Vulnerable contacts (see 'Tools to measure risk') are a particular concern, so risk to contacts is a key issue for shielders.
8. **Risk to the community** by contributing to wider transmission, i.e. raising R.

9. **Collateral risks:**

- Risk of having to self-isolate (for some this may be a bigger concern than the infection itself)
- Risk of contacts being asked to self-quarantine
- Risk of community being put back into lockdown

10. An individual's response to these multiple types of risk will be influenced by personal circumstances, personal preferences and personal perceptions of the risks.

Risk and perceptions

11. **Outdoor contacts versus indoor contacts.** Multiple studies report very substantially lower risk of COVID-19 transmission outdoors^{1;2}.

12. Nonetheless, media repeatedly highlight crowded outdoor environments such as beaches in the context of risky behaviour. To date, there have been no reports linking a COVID-19 outbreak to a beach.

13. **Elderly and frail.** The risk of dying due to COVID-19 rises rapidly from 45 years old upwards and is at least 20x higher for over 70s than 45-70s (ONS data).

14. COVID-19 mortality is more skewed to the elderly than all-cause mortality (Figure 1), meaning that severe COVID-19 could fairly be characterised as a disease of old age. This is a very unusual risk profile for an infectious disease (other than SARS).

15. **Children versus adults.** There is a growing body of evidence that children are:

- at decreased risk of infection³;
- of becoming ill⁴; and
- of transmitting COVID-19^{5;6}.

16. The relative risk of death due to COVID-19 is currently estimated as at least 10,000x higher for the over 70s than the under 15s (ONS data).

17. Early GovUK advice (SPI-B minutes 23/03/20) was to portray COVID-19 as a risk to all age groups. This was highly inaccurate but is likely to have had a lasting impact on public perception.

¹ <https://www.medrxiv.org/content/10.1101/2020.04.04.20053058v1.full.pdf>

² <https://www.medrxiv.org/content/10.1101/2020.02.28.20029272v2.full.pdf>

³ <https://www.nature.com/articles/s41591-020-0962-9>

⁴ <https://onlinelibrary.wiley.com/doi/full/10.1111/apa.15371>

⁵ (http://ncirs.org.au/sites/default/files/2020-04/NCIRS%20NSW%20Schools%20COVID_Summary_FINAL%20public_26%20April%202020.pdf)

⁶ <https://www.rcpch.ac.uk/resources/covid-19-research-evidence-summaries#epidemiology>

18. Absolute risk of adverse outcome of COVID-19 infection (e.g. hospitalisation, death) is related to the current incidence of infection. Incidence of infection in Scotland continues to fall.
19. **Absolute risk by age.** Absolute risks by age in Scotland in late June are indicated in the Box. The absolute risk to children has been extremely low throughout the epidemic. The absolute risk to the over 70s today remains higher than was the absolute risk to children at the height of the epidemic.
20. Though there are detectable differences in risk between the under 5s, 5-15s and 15-20s the absolute risk is very low (and substantially less than for adults) for all three age groups (ONS data).
21. Poor understanding of COVID-19 risks could lead to poor decision-making by individuals, institutions and public health agencies.

BOX: Absolute risk of death due to COVID-19 in Scotland as of 28/06/20 (estimated approximate values)

~25 people [range 12.5-50*] in Scotland will acquire a severe COVID-19 infection today
~5 of those people [range 2.5-10*] will die [cf. ~150 from all causes]

Risk of dying from infection acquired today is (approximately):

1 in 200,000 per day for an over 70 year old	[=4 deaths]
1 in 4 million per day for a 15-70 year old	[=1 deaths]
<1 in 1 billion per day for an under 15 year old	[=0 deaths]

[cf. average daily risk of being struck by lightning is >1 in 1 billion per day; risk of dying from an accident in the home is 1 in 4 million per day - RoSPA]

*500-1000 new infections per day mid June 2020; 2.5-5% hospitalisation rate; 0.5-1% case fatality rate

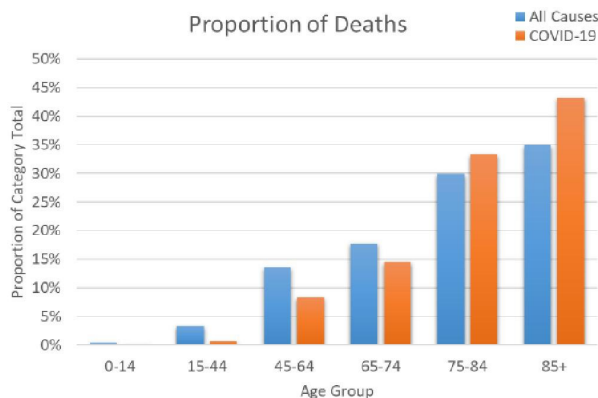


Figure 1. Comparison of all-cause mortality and COVID-19 mortality by age for Scotland (data from HPS).

Key message

22. COVID-19 risks are highly heterogeneous and are poorly understood by the general public, stakeholders such as schoolteachers and possibly by policy-makers.

Outstanding questions

23. There are a number of outstanding questions:

- Would people prefer to manage their own COVID-19 risks?
- What advice and information would they need to manage the risk effectively and responsibly?
- How can individuals mitigate their own risk? E.g.
 - behavioural modification
 - effective use of PPE
 - access to testing on request
- What would be the consequences of individual risk management to the R number, incidence and death rate?

TOOLS TO MEASURE RISK FROM COVID-19

24. This section summarises the rationale for and progress with creating evidence-based tools to assess risks associated with COVID-19, and consider potential implications for Scotland.

Context

25. The UK and Scottish Governments currently classify individuals on the basis of their risk of developing severe outcomes from COVID-19 into the following three groups:

- Clinically extremely vulnerable groups who should be 'shielding'
- Clinically vulnerable groups
- Others.

26. These groups were initially defined based on expert clinical consensus; there has however been some iteration in the light of emerging evidence.

27. Shielding remains controversial with people/charities expressing considerable concern about errors in categorisation, and major practical and social challenges with implementation.

28. There is additional confusion in Scotland following recent announced changes in England i.e. relaxation of some of the shielding rules from 6 July 2020 and a planned pause to shielding from 1 August 2020⁷.
29. Previous shielding advice⁸ had been extended in Scotland until at least 31 July 2020. This has now been significantly changed by an announcement on 8 July and with changes announced on 27 July^{9;10}.
30. Neither the UK Government nor Scottish Government's previous assessment frameworks included key emerging risk factors such as occupation, deprivation or ethnicity. The detail behind the 8 July announcement remains to be assessed.
31. The BMA has called for mandatory risk assessments of all doctors¹¹.
32. There is a widely perceived need to develop evidence-based tools to inform future deliberations on assessing and managing risk of severe outcomes from COVID-19 for both the general population and high risk occupational groups.

QCovid risk prediction algorithm for the general population

33. NERVTAG has commissioned a University of Oxford led team to produce an evidence-based risk assessment algorithm (QCovid) to identify risk of being hospitalised or dying from COVID-19 over a 90-day time horizon in the general population^{12;13}.
34. This QCovid algorithm is initially intended for use by GPs and their teams and possibly also other healthcare professionals.
35. It is likely that this will in due course be available for use by the public. This would be a welcome development, particularly as individuals are asked to take on greater responsibility for assessing their personal risks and taking appropriate measures to minimise these risks.
36. Following discussions amongst the CMOs group the plan is to deploy broadly the same QCovid algorithm, if possible, across the 4 UK nations.

⁷ <https://www.gov.uk/government/publications/guidance-on-shielding-and-protecting-extremely-vulnerable-persons-from-covid-19/guidance-on-shielding-and-protecting-extremely-vulnerable-persons-from-covid-19>

⁸ <https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/coronavirus-covid-19/coronavirus-covid-19-shielding>

⁹ <https://www.gov.scot/news/next-steps-for-people-shielding/>

¹⁰ <https://www.gov.scot/publications/covid-shielding/pages/changes-to-shielding-advice/>

¹¹ <https://www.bma.org.uk/advice-and-support/covid-19/your-health/covid-19-risk-assessment>

¹² <https://www.ox.ac.uk/news/2020-06-22-oxford-leads-development-risk-prediction-model-more-tailored-covid-19-shielding>

¹³ <https://www.medrxiv.org/content/10.1101/2020.06.28.20141986v1>

37. This QCovid risk algorithm has now been developed and validated for use in England; it is as yet unclear when this will be released.
38. Work is poised to start on validating QCovid for Scotland using the EAVE II platform housed at PHS. The key rate-limiting step for this validation work is release of the relevant code list by NHS Digital.
39. QCovid will result in new categories of individuals being added to the clinically extremely vulnerable group, including those with learning disabilities (e.g. Down's syndrome), some categories of neurological disorders (e.g. epilepsy) and a greater proportion of those from ethnic minority backgrounds being classified as being at high risk.
40. Key strengths of this QCovid algorithm include it building on a suite of existing QRisk algorithms that are widely used in clinical practice, its large sample size (6.4m patients), the inclusion of a much broader array of risk factors than previously studied, and plans to validate it for the devolved nations.
41. Key limitations of this algorithm include the lack of inclusion of occupation or local/national data on the incidence of COVID-19 or Rt. There is also at present an inability to factor in the effects of shielding measures with the implication that the algorithm cannot therefore be currently used to exclude individuals from the shielded category.
42. It is unclear how the algorithm will be used by the UK Government to categorise people and the advice/support, particularly considering plans to suspend shielding in England from 1 August 2020.

Welsh COVID-19 Workforce Risk Assessment Tool

43. The Welsh Ministerial Advisory Group has produced a tool to risk stratify health and social care professionals on the basis of factors such as age, ethnicity and co-morbidities¹⁴.
44. The tool is available for self-completion from the Learning@Wales national e-learning platform or from here¹⁵.
45. In essence, the tool categorises health and social care professionals into 3 risk groups: low; high and very high risk and in addition advises on implications for work – for example, all those scoring 7 or above (out of 10) are advised to discuss with their line managers the need to work from home or engage in non-patient facing work.

¹⁴ <https://gov.wales/covid-19-workforce-risk-assessment-tool>

¹⁵ <https://design.developmentoverview.com/pwa/nhsdemo2/>

Potential implications for Scotland

46. There is need for greater clarity as to how risk will be assessed, managed and communicated for the general population after 31 July 2020.
47. There is a need to develop and communicate a plan, both to clinicians and the public, about how the QCovid risk algorithm will be deployed across Scotland. This will ideally be done in concert with the other UK nations.
48. There is a need to develop an approach to risk stratifying health and social care professionals (and other high-risk professions) to minimise the risks posed by COVID-19.

THE PRINCIPLES OF RISK COMMUNICATION

49. There are four key factors involved in the communication of risk: connecting with the audience, explaining the issues, motivating adherence and empowering people to act in the right way¹⁶. Let us consider each in turn.

Connecting

50. The ability to connect with one's audience, and the influence of any communications directed at them, centres on the issue of *trust*. This in turn depends on creating an ingroup relationship with them. The communicator must be seen as 'of us' or at the very least 'for us'. Anything which leads people to see the communicator as an outgroup which is pursuing its own interests is highly corrosive of influence.

51. There are many factors which impact on the creation of an ingroup relationship between authorities and the public. One of the most crucial is 'procedural fairness'. That is, authorities need to treat the public as a trusted partner. This involves treating people with respect, it means being open and transparent with them, and it means creating a dialogue with them that involves both listening and responding.

52. This is one reason why the principle of co-creation (or co-production) is so critical to the development and implementation of any policy. If people are involved and listened to they will be more likely to own a policy as 'ours' (rather than reject it as 'their imposition') and adhere even when they don't entirely agree with it.

53. In the absence of trust, people are likely to turn to other sources of information and are more likely to accept conspiracy theories that undermine the COVID response. What is more the levels of trust in different sources are critical in determining who should communicate. Recent polling suggests that the Scottish Government and FM are well trusted on the pandemic (the FM is trusted by over 70% of Scots and has an overall +60 rating (compared to -40% for the UK PM)¹⁷. Polling from May shows that the most trusted sources on the pandemic (consistently above 80%) are the NHS and scientists/doctors¹⁸.

¹⁶ The material in this section derives from a wide range of sources. Some of the key references include:

Department of Health (no date) *Communicating about risks to public health*. London: Department of Health.

Bonell, C., Michie, S., Reicher, S., West, R., Bear, L., Yardley, L., ... & Rubin, G. J. (2020).

Harnessing behavioural science in public health campaigns to maintain 'social distancing' in response to the COVID-19 pandemic: key principles. *Journal of Epidemiology and Community Health*.

Michie, S., van Stralen, M. M. & West, R. (2011) The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42

Van Bavel, J. J., Baicker, K.,... Reicher, S.D.... & Willier, R.. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, 4, 460-471.

¹⁷ <https://www.drg.global/wp-content/uploads/Sunday-Times-tables-for-publication-060720.pdf>

¹⁸ <https://reutersinstitute.politics.ox.ac.uk/trust-uk-government-and-news-media-covid-19-information-down-concerns-over-misinformation>

Explaining

54. There are three issues involved in explaining risk to the public. The first is the need to provide a global understanding (a 'mental model') of the pandemic. This provides the framework in which people make sense of specific issues, evaluate whether policies make sense to them and decide whether to react to them. On the one hand this means providing a clear overall view of the pandemic, of how infection is transmitted (via droplets/aerosols and from surfaces) and the pandemic response strategy. This allows people to understand why present circumstances are exceptional, how mitigation measures limit transmission and how they all fit together.
55. The second issue has to do with making people understand the precise actions they are asked to take. This means specific messaging with specific behavioural implications. Using generic terms which cover a range of behaviours can be problematic. For instance, there is evidence from JBC polling on 'test and protect' that many people do not understand the term 'self-isolate' and believe that they are doing so by not going to work while still meeting with others.
56. The third issue involves articulating messages with the values the public holds around risk. For instance, people are highly loss averse. People won't take risks that squander a hard-earned gain. So, framing communications in this way (don't take the risk of going out and undermining all we achieved through lockdown) can be highly effective.

Motivating

57. It is often assumed that we motivate people by showing them why actions are in their individual self-interest. However, people often act as group members and it can be just as powerful to motivate them to act in terms of the collective interest. This is particularly important in the present pandemic where individual risk calculations might suggest to many (young healthy people) that they have more to lose than gain by complying. The evidence suggests, however that people acted as members of the community and for the good of the community¹⁹.
58. Another way of putting this is that the effect of any risk communication depends on how one defines who is at risk. Is the pandemic about the risk to 'me' or to 'us'? Is it an 'I' thing or a 'we' thing? The critical implication of the foregoing argument is that we will be more effective in motivating people to comply with COVID restrictions if we frame the pandemic in collective terms²⁰.
59. Collectivising the issue doesn't only affect how we estimate levels of risk but also how we evaluate risk. For instance, I have the right to take risks that affect myself (play dangerous sports, for instance) but not to do things that may harm others

¹⁹ <https://blogs.lse.ac.uk/politicsandpolicy/lockdown-social-norms/>

²⁰ <https://thepsychologist.bps.org.uk/dont-personalise-collectivise>

(drive at excessive speeds). So collectivising makes it less acceptable to act in ways that exposes other members of the community.

60. What is more, in collectivising, we can then draw on group norms to shape risk behaviours. These take two forms. *Injunctive norms* are about what group members *should* do. Through understanding group identity and drawing on established collective values it is possible to develop situationally appropriate such norms (e.g. 'we look after each-other, we wear masks'). *Descriptive norms* are about what group members actually do. By portraying appropriate behaviours and modelling such behaviours it is possible to shape how people believe they should behave.
61. Finally, when it comes groups, influence is best achieved through ingroup members. This is particularly important when addressing segmented audiences, especially those (such as young men) which are more likely to be alienated from traditional sources of authority. Here, it is critical to use sources which will be seen as understanding group values and priorities and speaking for the group.

Empowering

62. One of the pitfalls in communicating risk – especially if the potential dangers are extreme – is that it leads to dread, anxiety and avoidance. People simply ignore the message. Sometimes, this is used as an argument for hiding threatening information. However, this in turn runs the risk of undermining openness and trust. A more effective response, then is to ensure that information about risk is always accompanied by what people can do to mitigate against it. A sense of coping defends against dread. The important thing is to empower people to deal with the situation, not to frighten them.
63. There is another way in which empowerment is critical. However clear the information and however great the motivation, behaviour will not occur without the resources necessary to carry it out. What is more, unless all sections of the population have access to these resources, there is a danger of creating social division, heightening a sense of inequity and exclusion and thereby undermining the sense of collectivity which, as noted above, is so critical to the pandemic response. Thus, for instance, a mandatory policy on masks in particular places (public transport/shops) should be accompanied by the provision of masks either to households or else to be given out in the relevant spaces. Equally, a policy on self-isolation or on local 'lockdowns' should be accompanied by a policy on providing the various resources (accommodation, income, food) necessary to make this possible without loss. A failure to do so will undermine compliance and increase general resist.