VIEWPOINT

Making Decisions in a COVID-19 World

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+ Editorial

The coronavirus disease 2019 (COVID-19) pandemic poses difficult interdependent decisions for professionals and the individuals they serve. Professionals must answer questions such as: When should clinics, schools, salons, meat-packing plants, movie theaters, and other entities open? When should they close because of proven, possible, or perceived problems? When should they be reopened?

Individuals must answer complementary questions. When is it safe enough to visit a physician's office, get a dental check-up, shop for clothing, ride the bus, visit an aging or incarcerated relative, or go to the gym? What does it mean that some places are open but not others and in one state, but not in a bordering one? How do individuals make sense of conflicting advice about face masks, fomites, and foodstuffs?

Risk analysis translates technical knowledge into terms that people can use.[1,2] Done to a publication standard, risk analysis requires advanced training and substantial resources.[3] However, even back-of-the-envelope calculations can help individuals make sense of otherwise bewildering choices. Combined with behavioral research, risk analysis can help explain why reasonable people sometimes make different decisions.[4] Why do some people wear face masks and crowd on the beach, while others do not? Do they perceive the risks differently or are they concerned about different risks?

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Decisions involving COVID-19 risks pose 3 questions that the professional community must answer, and then communicate its answers. Making that happen will require both scientific and institutional innovation. People are hungry for answers, and if the professional community does not provide them, others will.

How Much Disease Is in the Community?

The lower the prevalence of disease, the less people need to be concerned. Given today's limited testing, there are only fragmentary prevalence estimates. As a result, individuals cannot know how likely they are to encounter someone shedding virus when they go to the office, store, class, or elsewhere. Health officials view systematic testing as vital for deciding what businesses and other places to open or close.[5] Individuals need that information, too, when navigating their everyday lives. Without it, they may remain needlessly sequestered or be unwittingly exposed to people with COVID-19.

Decision makers need prevalence estimates based on whatever imperfect evidence exists. Deriving these estimates requires technical knowledge of test performance (as measured in published trials); institutional knowledge of how tests are actually conducted and reported; and the analytical ability to make sense of that confused picture. These prevalence estimates need not be perfect, just good enough to allow individuals to make better decisions.

What Is the Risk of Exposure to COVID-19?

What viral prevalence means in terms of viral exposure depends on what people do at the clinic, mall, grocery store, or gym, and what actions the operators of those facilities take to protect people in these settings. These exposures depend on 3 familiar factors: concentration, time, and distance. Exposure is greater the heavier the viral load in a space, the longer people spend there, and the closer they come to sources of the virus.

There are professional societies dedicated to understanding how these exposure factors are expressed as functions of air circulation, temperature, humidity, surface materials, interior barriers, particulate matter, and aerosol properties, among other variables. Members of these societies have vast knowledge of the interactions between physical, biological, and social systems. However, their knowledge has barely found its way into the arenas where people need it to make COVID-19 decisions (eg, office managers who are suddenly concerned about air-exchange rates, families now worried about physical distancing on trails and playgrounds). Exposure research needs to be translated into terms that decision makers can use. Without that knowledge, individuals or groups may respond ineffectively, doing too much or too little.

How Much Can Individuals Do if Exposed to COVID-19?

One haunting aspect of the COVID-19 era is never knowing whether exposure has occurred. Limiting the health effects of possible exposures poses 3 challenges: not becoming ill, not causing others to become ill, and not experiencing severe illness (or death) from COVID-19. The first challenge involves practices individuals can use to protect themselves, such as washing hands and disinfecting surfaces. The second involves practices such as avoiding vulnerable family members and wearing face masks to protect others. The third involves some element of good fortune, such as having

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a robust immune system, no serious underlying health conditions, and access to good health care.

Here, too, technical knowledge needs to be translated into decision-relevant terms. That translation must include quantitative estimates of how protective various measures are reflecting realistic assumptions about how well those measures are executed (eg, fitting and wearing face masks). That translation also must include candid assessments of the quality of existing evidence and the prospects for better evidence, when people who might postpone potential exposures while waiting for a safer world. These estimates must be then combined with estimates for prevalence and exposure to calculate overall risk. No individual or professional can estimate overall risks on their own. Everyone needs help in having evidence translated into decision-relevant terms.

Making Science Useful for COVID-19 Decisions

Many dedicated scientists are working on problems related to COVID-19. However, scientists do not normally address decision makers' needs directly. Scientists focus on specific topics in research that may be scattered over diverse publication outlets. Scientists claim authority that most nonscientists cannot independently evaluate. Scientists may offer no quantitative estimates or only general ones, requiring extrapolation to specific circumstances. Scientists might not collaborate with scientists from other disciplines who have complementary knowledge.

Making science useful to decision makers requires collaboration made possible by boundary organizations[5] dedicated to connecting worlds that need one another, but do not naturally interact. In this case, those are the worlds of scientists and decision makers. The boundary organizations linking them must address 3 issues.

First, authoritative syntheses are needed to summarize existing research. The current flood of peer-reviewed studies, case reports, and preprints related to COVID-19 defies comprehension for all but a few specialists. The National Academies of Sciences, Engineering, and Medicine (NASEM) have long set the standard for technically informed, rigorously reviewed, independent research syntheses. NASEM's COVID-19 committee substantially shortened the normal cycle time in producing reports on crisis standards of care, bioaerosol spread, physical distancing, and other topics.[6] A boundary organization is needed, such as NASEM or a similarly constituted body, to produce research syntheses on critical topics, updating them as needed, with quantitative risk estimates and not just vague statements like "infection from inanimate objects is unlikely."

Second, risk analyses are needed to apply that knowledge. However solid the science on basic physical, biological, and behavioral processes, applying it requires knowledge of specific settings. How do air and people circulate? What objects and surfaces do people and viruses touch? How sustainable are physical barriers and behavioral practices? Risk analysts derive such estimates by consulting with scientists who know the processes and decision makers who know the settings.[3] Boundary organizations are needed to bring the relevant parties together in each sector (medicine, sports, schools, movie production, etc) to produce estimates informed by the science and by people who know how that sector works.

Third, effective risk communications are necessary to share those analyses. There are no universally informed experts for COVID-19 decisions. Both scientific specialists and practical decision makers need risk communications that provide them with concise, comprehensible summaries of knowledge outside their expertise and experience. Creating such communications involves 4 steps: identify the knowledge critical to decisions; assess decision makers' current knowledge; develop messages closing important gaps; and test those messages.[7] That process draws on behavioral science research for conveying unintuitive topics (eg, how diseases spread exponentially, how particles disperse, how tests produce imperfect results). That process draws also on behavioral science methods for testing to ensure that the messages are interpreted as intended. Otherwise, experts may communicate clumsily and then blame their audience for the confusion that the experts have caused.

Conclusions

Risk decisions are never about 1 risk alone. With COVID-19, these decisions may involve trade-offs between risks and benefits (eg, from returning to work, family, or travel) or trade-offs between risks (eg, flying vs driving). Individuals who perceive risks similarly may prefer different trade-offs in personal decisions and public policies.

COVID-19 has prompted a breathtaking mobilization of scientists whose work might inform the decisions of individuals and professionals, if they only had that information in a usable form. Equally innovative institutional creativity is needed to make that happen. Without ready access to the science, decision makers will continue to address similar problems inefficiently and ineffectively. Creating the needed boundary organizations requires respectful consultation, so that all parties are heard. Once created, those organizations need a platform for integrating knowledge from diverse sources, like that offered by risk analysis, and a method for enabling individuals and experts to hear one another, like that offered by risk communication research.

ARTICLE INFORMATION

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