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Aggressive testing, social-distancing, lock-down: Assessing options for the control of COVID-19

In this work we present an analysis of the two major strategies currently implemented around the world in the fight against COVID-19: Social distancing & shelter-in-place measures to protect the susceptible, and testing & contact-tracing to identify, isolate and treat the infected. The majority of countries have principally relied on the former; we consider the examples of Italy, Canada, the United States and South Korea. For all four countries, we estimate the level of testing which would be required to allow a complete exit from shutdown and a full lifting of social distancing measures, without a resurgence of COVID-19. We find that a "brute-force" approach of untargeted universal testing requires an average testing rate of once every 36 to 48 hours for every individual, depending on the country. If testing is combined with contact tracing, and/or if tests are able to identify latent infection, then an average rate of once every 4 to 5 days is sufficient. We then show that most countries have employed a blend of social-distancing and testing/tracing to get to their current levels of COVID-19 prevalence, some with more success than others.