

Test and contact tracing: two wings to get rid of COVID-19 pandemic, until we get the vaccine

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The most important COVID-19 diagnostic test, RT-PCR, detects the presence of the SARS-CoV-2 genome in the upper respiratory tract. Extensively performing the COVID-19 RT-PCR test is one of the key indicators of success in controlling the newly emerged pandemic. Meanwhile, according to the worldometers webpage, Iran with about 49,000 tests per million people, ranked 114th in the world (August, 2020) (1).

Extensive testing alone is not enough for the control of the COVID-19 pandemic; a much more important indicator called "contact tracing" and its subsequent safety measures must be accompanied to control this unbridled virus. Testing and contact tracing are the two wings of flight to get out of this crisis. If the test is performed but the patient's previous communications are not being traced and subsequent safety precautions are not being taken, we are wasting the costs of the tests. While

widespread, accessible, free of charge, public, and active RT-PCR testing, is quite cost-effective if being accompanied by contact tracing of positive samples (2).

The US Centers for Disease Control and Prevention (CDC) has listed the percentage of traced cases within 24 hours and the percentage of health care workers who traced at least one contact, as criteria for contact tracing programs (3). A stochastic transmission model showed that if we consider the R_0 as 2.5, we can quickly achieve complete control by tracing 70% of cases, although it is potentially feasible if only one percent of the transmissions occur before symptoms onset which demonstrates the importance of extensive active testing. This study revealed that the most important determinant in pandemic control is the delay between the onset of symptoms and isolation (4).

Moreover, by using patient contact tracing data, valuable information can be obtained about where most transmissions occur at the community level. This information is not only useful for policymakers to impose targeted restrictions, such as on specific gatherings or businesses without a compulsive universal lockdown, but also helps individuals to decide how safe is whatever they want to do and wherever they want to go. In addition to the number of traced contacts, tracing speed, and locations, where people had been exposed, are also important. The speed and completeness of contact tracing are the keys to success in transmission control (5). For example, a modeling study found that by optimizing the tests and contact tracing coverage, and also reducing tracing delays, the transmission could be prevented by 80%⁶ and community-wide transmission could rapidly be limited. But in practice, the success of health care workers in transmission control is less than this. In New Jersey, as an example, public health workers were only able to follow up 44% of new cases in 24 hours, and almost half of them refused to report their contacts (6).

Another study showed that extensive and active testing had only a 2% reduction in transmission rate, compared with 64% if manual contact tracing and household quarantine were performed for all suspected contacts of the patients (7). It is important to conduct all contact tracings by phone as much as possible, so the non-cooperation resulting from stigma will be minimized. In different US states, as well as in Iran, contact tracing is mostly done by phone call. Of course, in cases where it is impossible to communicate by phone call, contact tracing should be done face to face, considering the patient's confidentiality. For keeping the patient privacy, contacts should only be informed about the possibility of their exposure to a patient with COVID-19 infection. The identity of the patient who may have exposed them to the virus should not be revealed (8).

Contact tracing is depending on 3 ifs: 1- the index case of COVID-19 address is known, 2-the RT-PCR positive individuals for COVID-19 have the phone number or address of all their previous contacts or the list of the attendees of the events (e.g. names and addresses of passengers of a flight or gathering where the COVID-19 positive case was attended) is available, 3- they provide it to the health care system.

In tracing a positive person for COVID-19, we are more likely to come across one of these scenarios: a party, a gathering, a restaurant, a flight, and so on. By tracing people and identifying these critical transmission points, we can do active testing for COVID-19 RT-PCR, recommend the self-isolation or quarantine to all individuals at the gathering, or improve the ill-structured places they had contacted, to prevent these spread multipliers and their associated costs. According to the Washington D.C. department of health, two types of contact tracing data are important; the number of contacts reached out to within 48 hours and percent of new cases arises from people who are in quarantine. The goal for cases that arise this way is 60 percent. If most of the new cases (patients with RT-PCR positive test results) arise from people who have already been identified as a known contact who are in quarantine; it can be said that community-level transmission has been surrounded and is under the control of the health care system. But if most of the new cases with COVID-19 positive tests are completely unknown to the health care system, it means that the transition in the community is widespread and out of control. In this case, more efforts should be made to reduce transmission at the community level and the need for improving contact tracing is inevitable (5).

Contact tracing and RT-PCR testing are not adequate for cutting the chain of infection transmission. Health care providers should make sure about the ability of the exposed individuals to stay at home, maintain

physical distance from others, and have access to food and medications. In this regard preparing infrastructures for housing and social services for supporting the individuals at home quarantine should be taken into account.

In the current situation, we ignore the main source of infection of a COVID-19 positive person which is most likely an active source of transmission to others. This COVID-19 viral source is increasingly and logarithmically spreading the virus. This logarithmic expansion is inducing far greater costs than setting up extensive RT-PCR testing and contact tracing network by imposing an out-of-capacity burden on the health care system, threatening the lives of human resources and health care providers, and damaging productivity and economic activity.

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