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Point of View

Workforce Survival: Tracking Potential COVID-19 Exposure Amid Socioeconomic Activities Using Automatic Log-Keeping Apps

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Editor's Note: *The journal does not endorse any products but, given the pandemic, we wanted to ignite the conversation that all nations need to have.*

The pandemic COVID-19 outbreak in 2020 refreshed the world's conception of a plague and caused a worldwide public health emergency. Compared to SARS (severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome), COVID-19 is now described by an extensively long and potentially symptomless incubation period of 14 days or longer,[1,2] ease of epidemic spread,[3] and lack of a known effective cure.[4] These characteristics make human travel and contact highly undesirable.

Helpful Quarantining Efforts Against COVID-19

It is precisely for these reasons that the Chinese government banned travel between cities, villages, and even residential areas; prolonged the spring festival vacation; shut down workplaces; and stopped gatherings, even to the extent of postponing the Two Sessions – the most symbolic annual political event of the country. These non-pharmaceutical interventions indicate the seriousness of the epidemic, and have received encouraging preliminary results.[5]

Dilemma – To Work or Not to Work

However, no country can afford the ''ideal paradigm'' – everybody remains isolated at home with extremely limited travel or human contact. Prolonged standstill of industries and economics may hurt the world just as badly. Travel and consequently human contact are impossible to avoid completely as society resumes its momentum. On February 23, 2020 the Chinese national government stressed the coordination of COVID-19 control and socioeconomic development, and ordered the resumption of work and production in an orderly manner. However, this is a heroic effort that is far from easily accomplished, as demonstrated by repeated incidences of transmission clusters of hundreds at workplaces,[6] even before most companies and factories reopened for business.

We have examined a number of transmission cluster cases in China,[6] where patients reportedly visited public places during the incubation period, or were believed to have become infected from public places. Because of the incredibly large population each person potentially came into contact with (and the next person in turn) during the long incubation period, ranging from dozens to more than 20,000 people being backtracked in any given incident,[7,8] an exceptionally large number of people have been identified with risk and ordered to self-quarantine. In such an ocean-boiling process, more important than the implementation process is, in fact, the backtracking search for close contacts – Who has been where and potentially in proximity with whom at what time? After 14 days, clues fade along with memories.

With an increasing number of countries reporting rising numbers of infections and state emergencies,[9–12] the aforementioned dilemma between COVID-19 epidemic control and socioeconomic activities begs for serious attention and solution. Impossible as it appears, this backtracking task is inevitable in order for sufficient public health measures to be taken in a dynamic background of travel and contact, against an easily spread, long-incubating virus such as COVID-19. The impossible must be made possible.

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Suggestion of a Log-Keeping App

We hereby propose the wide adoption of digital tools that make automatic travel log and contact diary keeping possible, potentially as an App on people's mobile phones. The log can then be checked later for and only for public health and safety purposes, if newly emerged infection cases indicate the need to revisit recent travels and contacts made by a particular individual at certain times and places.

In its simplest form, the App automatically collects location information via a time stamp at certain intervals (eg, every 2 minutes). In addition, if a specific event is particularly worthy of remarks (eg, exchanging materials with A, sitting in a meeting or the canteen next to B without a face mask, queueing too closely in front of C, stopping briefly at a crowded supermarket), such information also may be manually added to the log. This way, even trivial details are no longer beyond recollection.

At a more social level, such Apps may be adopted by employers, universities, and/or residential areas, so that authorized administrators can see desensitized (ie, anonymous) dynamics of relevant employees or residents, who identify with their affiliation with prior registration. Meanwhile, the App also may embrace a wide range of useful public health portals, such as COVID-19-relevant news, guidance, face mask request, online consultation, or it may simply remind users to clean their hands and sanitize the phone. An impressive example is already available in China where, by reading from a central database, a helpful ''epidemic map'' may easily mark confirmed infection cases near the user's own location.

The technology involved is not magic. Rather, a more important question to settle before such Apps may be promoted as a public health measure at any significant scale would be the issue of privacy. The software must hold user privacy as its upmost principle (potentially endorsed by the government or a renowned software developer), and be used only voluntarily by individuals, and/or organizations with prior authorization. Users should have the right to remain anonymous. Data older than an incubation period (eg, 14 days) should be completely erased upon uninstallation or the user's request. Special measures during special times.

Conclusion

In conclusion, based on elusive epidemic characteristics and the severity of the COVID-19 pandemic, we suggest wide adoption of such mobile-based Apps, combining automatic location stamps and manual event records to enable reliable backtracking. Whether the log is used voluntarily by an individual for her/his own protection, or encouraged or reinforced by organizations or even the government, it will prove useful for anyone when recalling an itinerary from some 2 weeks ago, and more importantly will serve as a powerful tool for public health administration. With the help of big data analytics, activity patterns may even be used to generate split-flow systems, contingency prediction models, and public health alert platforms, to bring about victory in the battle against COVID-19.

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