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PERSPECTIVES

COVID-19: how a self-monitoring checklist can empower early intervention and slow disease progression

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Abstract
The SARS-CoV-2 novel coronavirus pandemic has revealed many scientific, social, and institutional challenges required to improve the health and wellbeing of individuals stricken by this disease. While organizations and governing institutions have risen to the task to concurrently prepare for and respond to this pandemic under conditions of high uncertainty and extreme pressure, another important aspect of this viral infection deserves attention and is not being fully considered, that is early intervention strategies and structured tools for individuals who test positive for the virus and begin developing symptoms. For those whose infection is progressing, we describe the potential benefits of a self-monitoring tool for use in combination with physician directed early medical interventions to slow COVID-19 progression.

Keywords COVID-19 · Risk · Early intervention · Risk response

1 Introduction

To date, there have been more than 110 million COVID-19 cases worldwide culminating in more than 2.4 million deaths (WHO 2021). This global pandemic has strained public health infrastructures around the world and revealed many scientific, social, and institutional challenges required to improve the health and wellbeing of individuals stricken by this disease (Smith and Fraser 2020; Wells et al. 2021). Organizations and governing institutions have risen to the task to concurrently prepare for and respond to this pandemic under conditions of high uncertainty and extreme pressure. Their efforts to enact 'real-time anticipatory responses' to assess COVID-19 risks, model future disease scenarios of potential crisis conditions, and facilitate large-scale organizational responses during this crisis is exemplary (see Hynes et al. 2020; Trump et al. 2020; Wells et al. 2021). Government agencies and news outlets have done a commendable job to enact responsive and effective risk communication by focusing attention on public safety measures, the effects of the pandemic on businesses and the economy, vaccine development and roll-out, as well as the morbidity, hospitalizations, and mortality associated with COVID-19 progression (Abrams and Greenhawt 2020). However, another important aspect of this viral infection deserves attention and is not being fully considered, that is early intervention strategies and structured tools for individuals who test positive for the virus and begin developing symptoms. For those whose infection is progressing, we describe the potential benefits of a self-monitoring tool for use in combination with physician directed early medical interventions to slow COVID-19 progression.

The United States Centers for Disease Control and Prevention (CDC), states if you are sick with COVID-19, "Stay in touch with your doctor" and "Be sure to get care if you have trouble breathing, or have any other emergency warning signs such as persistent pain or pressure in the chest, new confusion, inability to wake or stay awake, bluish lips or face" (CDC 2019a). In addition, the CDC provides clinical guidance for the management of patients with confirmed COVID-19 infection, which alerts clinicians to greater risk of progression after 5 days of no improvement (CDC 2019b).

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However, is this enough to effectively reduce severe outcomes and the demand on the healthcare system?

The public would be better served if coordinated health messaging advised people how to recognize a worsening COVID-19 infection, especially before it develops into an emergency. Common medical practice demonstrates that early intervention of microbial infections results in better outcomes than allowing such infections to progress. To date, there is some information on early intervention regarding COVID infection but few calls for early treatment options (Goyal et al. 2020; Kim et al. 2020; McCullough et al. 2020). More can, and should be done. One promising option would be the creation and widespread dissemination of a structured tool, i.e., a checklist, that will better inform individuals on how to self-monitor their infection when symptoms develop.

Such a checklist should provide simple and direct criteria to COVID-positive individuals regarding when to stay home and nurse their infection versus when signs and symptoms indicate disease progression and warrant specific early interventions prior to the need for emergency medical treatment for life-threatening disease.

This checklist should provide quick and helpful empirical criteria that COVID-positive individuals can use to self-monitor. It should be designed to provide a handful of key signs and symptoms based on empirical data that suggest that the infection is progressing or likely to progress, and outpatient treatment should be provided. For example, the following manifestations could be considered for inclusion on the checklist[1]:

- Fever (100 degrees F or higher) for 3 or more days, with
- Shortness of breath,
- Chest pain, pressure or tightness,
- Oxygen saturation of 94% or less
- Bluish lips or face
- Inability to wake or stay awake

These features in combination with a predisposing condition such as those listed by the CDC (age, cancer, chronic kidney disease, chronic obstructive pulmonary disease, heart conditions such as heart failure, coronary artery disease, or cardiomyopathies, obesity, severe obesity, sickle cell anemia, smoking, and Type 2 diabetes mellitus) would allow for a simple scoring method to identify those at greater risk (CDC 2019c). Such scoring tools have been successfully used for screening and early intervention in a variety of health conditions ranging from malnutrition to asthma and even sexually transmitted infections (Power et al. 2019). The checklist could be self-administered or used in conjunction with healthcare professionals when communicating with infected persons and could be posted as public service announcements to inform the public so better and earlier risk decisions are made. In this scenario, portable pulse oximeters could be made available to checkout at no cost through community resources, such as the public library system or corporate, community and local healthcare entities, to improve at home measures and self-monitoring.

A COVID-19 infected person who fulfills the checklist criteria or has a certain score above a specific threshold would be advised to contact their health provider to receive early intervention. These treatments would require evidence-based findings but could involve inexpensive approaches including readily available nutraceuticals (e.g., vitamin D) (Mercola et al. 2020; Di Renzo et al. 2020) or drugs such as antimicrobial and anti-inflammatory agents (Firth and Prathapan 2020; Oldenburg and Doan 2020; Padhy et al. 2020), oxygen supplementation (Long et al. 2021), and personal monitoring devices like pulse oximeters (McCullough et al. 2020). Through such simple and early interventions we may mitigate some disease progressions that would otherwise result in hospitalization and even death.

We are now amidst the vaccine roll-out and concurrently experiencing the spread of viral variants that bring into question the long-lasting efficacy of the vaccine. Secondary risk perceptions of vaccines (Cummings et al. 2020) may also prompt increased vaccine hesitancy thus contributing to continued incidence and prevalence of infection over coming months if not years, especially in resource poor regions. Thus, 'early diagnosis and early intervention' will remain topics worthy of discussion and warrant our clinician-scientists attention. For those focused on this issue, it remains critically important to ask questions like '*what factors suggest disease progression*', '*can the public be made more aware of these features*', and '*what early interventional treatments could benefit the public the most*'?

While a structured tool certainly would have helped during 2020, now is a good time to add a simple and practical checklist that represents a key pivot to our management of COVID-19. As we continue to evolve our risk messaging to incorporate our best understanding of this disease and treatment, a simple checklist may help hundreds of thousands of people receive earlier intervention, improve outcomes, and improve the resilience of our public health infrastructure.

[1] Such a tool requires obligatory accuracy, validity, and reliability analyses

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