REVIEW ARTICLE

Lessons Learned from the Allocation of Diagnostic Testing as a Scarce Resource in the COVID-19 Pandemic

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While scarce resource allocation has been discussed due to the demands the COVID-19 pandemic has placed on the healthcare system, diagnostic testing has not been conceptualized as a scarce resource. SARS-CoV-2 diagnostic testing was limited in the early phases of the pandemic, narrowing access to priority groups recommended by the Centers for Disease Control and Prevention (CDC). The early lack of testing led to the utilization of community mitigation strategies as primary prevention. The resulting work and school closures came at a serious economic and educational cost, particularly for underserved populations. Testing guidelines have contributed to inequities in how the pandemic has affected vulnerable populations, including people experiencing homelessness, inmates, and frontline essential workers. Testing should be ethically allocated to maximize population benefits, minimize harms, and mitigate the inequities the pandemic has highlighted. This discussion on the ethical implications of rationing diagnostic testing as a scarce resource will hopefully inform guidelines in future pandemics.

Keywords

COVID-19 • diagnostic testing • rationing • scarce resource • allocation • ethics

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Introduction

During the early stages of the COVID-19 pandemic, the debate surrounding the rationing of scarce resources such as medical supplies and personnel faced new urgency. However, the consideration of diagnostic testing as a scarce resource received less attention. Early in the COVID-19 pandemic, the United States faced delays in the widespread distribution of SARS-CoV-2 diagnostic tests due to a manufacturing problem in upscaling the Centers for Disease Control and Prevention (CDC) test and a delay in the approval of private tests.[1] These hurdles to disseminating a reliable test made the allocation of diagnostic testing a crucial question of justice.[1]

To conserve SARS-CoV-2 diagnostic testing in the early stages of the pandemic, strict community mitigation strategies were the primary preventative approach. These strategies have had a serious economic and educational cost: closing indoor business settings has caused losses of over $16 trillion,[2] and closing schools has set 24.2 million children back in their educational progress.[3] Although diagnostic testing is rarely addressed in community mitigation guidelines, it has become an invaluable resource for the early identification and prevention of outbreaks that would allow faster reopening of facilities.

Allocation of diagnostic testing is usually informed by what therapies can be offered to patients.[4] Because no course-altering treatment is widely available for COVID-19, diagnostic test results do not dramatically impact the clinical treatment of an individual patient. Therefore, testing should be ethically allocated as a scarce resource to maximize population benefits and minimize harms. The diagnostic testing guidelines, especially early in the pandemic, have contributed to inequities in how the pandemic has affected vulnerable populations.

Here, we outline changes in testing guidelines that have impacted the economy, decreased access to education, and exacerbated inequalities throughout the pandemic. We present arguments about the ethical distribution of diagnostic testing as a scarce resource. As pandemics occur with increasing frequency,[5] we hope this discussion can lay the framework for the allocation of diagnostic testing in the future.

Current Diagnostic Testing Guidelines

Diagnostic testing guidelines have evolved throughout the pandemic, most notably with regard to health professional evaluation, profession-specific guidelines, and vaccination status. By April 2021, the CDC testing guidelines had outlined recommendations based on symptoms, close contact with someone with confirmed COVID-19, and activities that lead to higher risk of exposure.[6] The CDC had initially required evaluation by a healthcare professional prior to receiving a test, which raised questions of equitable access for uninsured or underinsured individuals. However, the guidelines later directed individuals to their local health departments, and individuals could request a test without a healthcare professional referral. In terms of exposure, CDC guidelines evolved to recommend testing for individuals who had been in close contact (within 6 feet for 15 or more minutes in a 24-hour period) with someone with confirmed COVID-19 and for individuals with high-risk exposure, defined as activities during which individuals could not physically distance, such as in travel, large gatherings, or smaller gatherings in indoor settings. Another substantial change in guidelines was the removal of profession-specific guidelines for healthcare workers, first responders, critical infrastructure workers, or those who live or work in nursing homes.[7] Although these groups

were prioritized for testing, earlier guidelines left final recommendations up to the discretion of the employers. This lack of standardization did not adequately account for the risk of infection these populations faced. As diagnostic testing became more widely available, there was less need to identify priority groups, and the CDC no longer provided profession-specific guidelines. Perhaps the most formative change in testing guidelines occurred due to the widespread distribution of the vaccine: as of this writing, the guidelines stated those who were fully vaccinated with no new symptoms and those who had tested positive in the last 3 months with no new symptoms did not require testing after a high-risk or confirmed exposure to COVID-19.

Economic Impact of Testing Guidelines

Given the initial limited availability of testing that would otherwise facilitate contact tracing, strict community mitigation strategies were implemented by most states, including discontinuation of in-person school and stay-at-home orders for non-essential workers.[8] These strategies have had major economic effects, including the highest number of unemployment claims ever filed in a week.[9] The stringent community mitigation strategies have led to an unprecedented need to balance the health risks of the SARS-CoV-2 virus with the financial well-being of society. The scarcity of diagnostic tests initially challenged states' ability to safely loosen restrictions on non-essential work and other activities. Increased testing availability has now allowed for faster identification of COVID-19 positive employees, which likely has led to effective containment of potential outbreaks. If employers have assurance that outbreaks can be properly contained and appropriate precautions take place, there is precedence for relaxation of shelter-in-place mandates: non-essential workers could return to their workplace while maintaining 6 feet of distance and following face-covering recommendations. Hence, the equitable allocation of testing needs to consider clinical and socioeconomic needs, both of which impact health.

Educational Impact of Testing Guidelines

Community mitigation strategies without broad availability of testing led to the closure of schools, which affected over 1 billion students worldwide as of September 2020.[10] While an in-class education experience provides a better environment for maintaining attention[11] and a richer social environment,[12] gathering in classrooms or dormitories puts students at risk for spreading COVID-19. Although school systems have offered online educational experiences,[13] these pose barriers, including rising student debt, decreased access to education due to a lack of resources, increased food insecurity for students who benefit from lunch programs, difficulty for teachers providing disability services, and decreased access to childcare.[14,15] Schools have also offered modified in-class experiences with precautions including plastic barriers, classroom occupation limitations, and face-covering policies that may help mitigate but do not always prevent outbreaks. One option to ensure the safety of classroom education would be universal in-school testing: timely identification of those with COVID-19 would contain and prevent outbreaks. Although the CDC did not allocate testing specifically for teachers and students,[6] policy concerning vaccine distribution later recognized the implications of delayed education and virtual learning for students: in December 2020, teachers were included in the high-priority group 1b for vaccination in an effort to safely reopen schools.[16]

Inequity Caused by Testing Guidelines

The priority groups in testing guidelines highlight several inequities faced by vulnerable populations and essential workers. Due to stringent community mitigation strategies, diagnostic testing was prioritized for hospitalized patients and healthcare workers early in the pandemic.[17] Although the guidelines expanded to include nursing home residents and workers, they failed to address other vulnerable populations, including people experiencing homelessness and inmates who also had little ability to self-isolate. Due to preexisting conditions more prevalent in low-income, imprisoned, and elderly populations, many also face a higher mortality risk from COVID-19.

Those working in essential businesses outside of healthcare, such as food supply, had less access to testing. These frontline essential workers are often lower income and faced the loss of their jobs if they were unable to work in high-risk in-person settings.[18] These unfavorable conditions for inmates, people experiencing homelessness, the elderly, and essential business workers have led to outbreaks in some settings and protests in others.[19] Furthermore, counties with predominantly Black residents have had over triple the infection rate and 6 times the mortality rates from COVID-19 compared to counties with predominantly White residents.[20] The disproportionate number of African Americans contracting and dying from COVID-19 may be influenced by many factors, including increased rates of comorbidities, limited access to healthcare, food and job insecurity, and financial status.[21] The renewed attention to institutionalized racism in our nation only highlights a compelling need to further mitigate these inequities in testing guidelines.

Individuals have also leveraged their wealth or status to obtain testing: in 2020, after a single NBA player tested positive for COVID-19, the entire asymptomatic team was tested through a private laboratory.[22] The media has highlighted concerns that celebrities and wealthy individuals have more access to testing outside the CDC's recommendations.[23] These examples of impaired and preferential access to testing highlight the need for policy responses that prioritize those at higher risk from a health and financial standpoint. Appropriate guidelines should ensure that the allocation of testing improves, rather than worsens, equity.

Conclusion

Diagnostic testing outcomes for diseases typically inform appropriate treatment, but the lack of course-altering treatments for SARS-CoV-2 fundamentally changes the ethical rationale behind using diagnostic testing. Given that community mitigation strategies are issued on a state-by-state basis, the allocation of diagnostic testing needs to balance the clinical, public health, and economic bases for testing. As the risk of the disease burden on individuals and the healthcare system decreases, the prioritization of diagnostic testing should be utilized to mitigate the effect on the economy and classrooms. This fine balance is difficult to achieve while ensuring equity. Although initial SARS-CoV-2 diagnostic testing guidelines raised several ethical questions and highlighted inequities in vulnerable populations, increasing availability of diagnostic testing and new policy regarding distribution of vaccines have been used to redistribute testing resources. This discussion is a starting point for a continued conversation about the ethical implications of rationing testing as a scarce resource and will hopefully inform future guidelines in the setting of limited diagnostic testing.

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