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Risk of misdiagnosis and delayed diagnosis with COVID-19: A Syndemic Approach

Abstract: Misdiagnosis and delayed diagnosis are common problems in healthcare and are typically related to patient, provider, and socioeconomic factors. A syndemics model of COVID-19 is used to analyze the synergistic relationship between diseases and influences that impact patients' living conditions and health. NPs can use this approach to promote patient safety and equitable healthcare.

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Morbidity and mortality from COVID-19 have rapidly risen especially among Black, Indigenous, and People of Color (BIPOC).¹ According to the CDC, as of January 2021, there have been 20,558,489 cases of COVID-19 and 350,664 total deaths from the disease in the US.¹ The need to make a timely and accurate diagnosis is critical. The diagnostic process in primary care is complex and challenging, and this is especially true when clinicians are

faced with a new and evolving disease that can contribute to confusion and increase risk of mistakes. Diagnostic errors, which include missed, delayed, and incorrect diagnoses, are defined as failures to establish a timely explanation of the patient's health problems or communicate that explanation to the patient.² Estimates suggest that 12 million Americans or 1 in 20 adults suffer an error each year in primary care alone with 33% of these causing serious damage or death.³

Keywords: cognitive biases, COVID-19, delayed diagnosis, healthcare disparities, heuristics, misdiagnosis, socioeconomic factors, syndemic

One approach to preventing these errors is to view the diagnostic process through a syndemic perspective, which takes into account the effect of social, economic, and political factors on patient populations.^{4,5}

■ Syndemics and diagnosis: a biosocial model of health

When providers view diseases solely within the framework of biological systems and individual behaviors without considering the impact of socioeconomic factors on patients' health, they often miss confounding causes of illnesses that can lead to misdiagnosis, delayed diagnosis, and inadequate treatment.^{4,5} For example, diseases such as diabetes, heart disease, asthma, and obesity often cluster together in low-income neighborhoods that are characterized by homelessness, overcrowding, poor air quality, and food insecurity.⁴ These environmental factors can exacerbate illnesses and create obstacles to treatment.⁴ Syndemics is a model that takes all of these variables into account by evaluating the synergistic interaction between diseases and health conditions that are affected by the social, economic, and political conditions in which patients are living.⁵

Merrill Singer, an anthropologist, developed the syndemics framework in the 1990s to explain the interplay between substance abuse, violence, and AIDS (SAVA).^{5,6} Singer was able to identify structural factors such as poor housing, lack of social support, stigma, and poverty, all of which contributed to the vicious cycle of SAVA that exacerbated disease severity.^{5,6} This approach is distinct from the strictly medical concept of the synergistic role of comorbidities related to specific disease interactions. For instance, patients who are infected with both HIV and tuberculosis will often have accelerated progression of both diseases due to coinfection.⁵ A syndemic framework differs by taking into account the interactions of these comorbidities within the broader context of substance use, violence, and structural factors. This understanding has led to interventions that are directed at both the biology and the social components associated with AIDS, which have ultimately led to improved diagnosis, prevention, and treatment of patients living with HIV.^{5,6}

■ A syndemic approach to COVID-19

COVID-19 can be viewed as a syndemic because it demonstrates the combined impact of disease and social and healthcare inequities on BIPOC.^{7,8} When exposed to the same virus, mortality in some locations is more than twice as high in Black, Latinx, and Indigenous

populations as compared with the White population.⁸ Recent COVID-19 mortality figures demonstrate that the death rate for Black Americans is 2.3 times higher than the rate for Latinx individuals, 2.4 times higher than the rate for Asians, and 2.6 times higher than the rate for White Americans.^{7,8} In the US, Black Americans make up 13% of the population but have suffered 27% of the deaths related to COVID-19.⁹ These differences follow a significant socioeconomic gradient when morbidity and mortality are further aggravated by racial/ethnic health disparities due to poor healthcare access and quality, food and housing insecurities, lower wage jobs, and transportation issues.^{7,8} These individuals are also more likely to be essential workers, which increases their exposure to the virus.^{7,8}

People living with HIV are also at increased risk of delayed diagnosis and complications from COVID-19 due to HIV along with common comorbidities such as diabetes, hypertension, substance use disorders, and mental health issues.¹⁰ Younger patients are vulnerable because they are less likely to be diagnosed, more likely to be immunocompromised, and less likely to access and remain in care (37% viral suppression is seen in those ages 25-34).¹⁰ In addition, social factors such as violence, discrimination, isolation, poor access to care, and housing issues exacerbate these conditions.¹⁰

■ Factors interfering with diagnosis

The key to utilizing a syndemic framework to improve diagnosis of COVID-19 is to identify and address the structural factors that affect patients' health rather than solely focusing on individual behavior and biological factors.^{4,6} It is also important to understand how these systems can affect the actions of patients and providers within the healthcare system.^{4,5} A knowledge of the complex interactions of these systems can ultimately improve the diagnostic process.^{4,6}

Structural and socioeconomic factors.

The powerful influence of political, economic, and social structures creates healthcare inequities that affect the distribution of both healthcare risks and resources.^{4,6} Disparities caused by structural racism create economic and social conditions that make BIPOC more vulnerable to COVID-19.^{4,7-9} A recent study demonstrated that nearly a quarter of Black Americans and Hispanics (24%) are employed in service industries compared with 16% of White Americans, and that they often face the tough decision of weighing the risk of

disease exposure against the threat of losing their jobs.¹¹ Among those who continue to work, many are unable to take sick leave or work from home, and they often rely on public transportation.⁸⁻¹¹ While many are considered essential workers because their work is critical to the daily functioning of the economy, they often contend with low wages and loss of health insurance, which leads to financial stress.¹²⁻¹⁴ According to a recent survey, more than half of Latinx respondents and nearly half of Black participants reported experiencing economic hardships versus 21% of White respondents.^{12,13} The most common stressors included depletion of personal savings and inability to pay for necessities such as rent, food, and medications.¹² In another recent study of patients with significant comorbidities or age 65 or older, 64.5% of Latinx adults and 56.5% of Black Americans reported having at least one family member working outside of the home versus 46.6% of White Americans, which placed them at increased risk of contracting COVID-19.¹⁵

Housing issues are another source of stress for communities of color. Data indicate that BIPOC make up over half (56%) of the population in urban areas where 90% of COVID-19 cases are concentrated, and many live in housing where overcrowding and limited bathroom facilities make physical and social distancing impossible.^{9,11,13,14} Homelessness is another challenge as demonstrated by a recent study of 2,729 patients with COVID-19 where nearly one half were Black, approximately one third were Latinx, and one in six were experiencing homelessness.¹⁶ Poor air quality, increased environmental exposures, and targeted marketing of unhealthy substances in a setting with limited access to fresh and affordable foods also contribute to risk of COVID-19.^{17,18} These social inequalities add up to healthcare vulnerabilities among BIPOC that create an environment of increased risk which, when combined with limited access to healthcare, sets the stage for delayed and missed diagnosis.^{4,8,10}

Barriers to healthcare are common in communities of color because there are fewer testing sites, specialists, and hospitals than in White communities.^{9,12,14} Recent studies demonstrate that despite the fact that BIPOC seek testing more frequently than White Americans, they are less likely to be tested.¹⁴ Furthermore, when they present with concerning symptoms such as cough and fever, Black individuals are less likely than White individuals with the same symptoms to be tested.^{14,19} Once they do get tested, BIPOC are more likely to test

positive and to require a higher level of care in a setting with fewer treatment facilities.^{11,14,19} Patients who are caring for themselves at home are often unable to self-isolate, which leads to an increased risk of transmission to others sharing living spaces.^{8,9,11} The virus can then spread rapidly and often undetected in the community when a high incidence of false-negative tests occurs, and ineffective tracing and communication of results lead to poor coordination of services and disjointed care.^{9,14}

The synergistic interaction between healthcare risks and inadequate resources leads to devastating outcomes when individuals face socioeconomic disparities that render them more susceptible to COVID-19 at the same time that they face limited access to healthcare.^{8,9,11,14} The end result is that their chances of becoming infected with COVID-19 are exponentially increased while their likelihood of timely diagnosis and treatment are similarly decreased.^{9,11,14}

Patient-related factors.

When providers focus on individual behaviors rather than taking into account the healthcare disparities that affect patients' responses to illness, implicit bias and discrimination are more likely to occur and can interfere with accurate diagnosis due to a lack of understanding and poor communication.^{7,14,20} In a study of patients seeking healthcare, 32% of Black Americans reported experiencing racial discrimination.²¹ Patients who experience bias are more likely to take care of symptoms at home and to rely on the advice of friends and family due to a mistrust of medical care providers.²⁰ Even when patients do seek care, distrust can interfere with honest communication about exposures and key symptoms that are critical to making a diagnosis of COVID-19.²⁰

Patients who are uninsured, undocumented, and/or distrusting of the healthcare system due to either discrimination or fear of infection may delay care until they are critically ill.^{7-9,11,20} A recent survey noted that Latinx people were twice as likely and Black Americans were three times as likely as White Americans to lose their insurance during the pandemic.¹⁴ Low-wage essential workers, and those who are unable to work from home may also avoid testing due to fears that positive results could jeopardize their employment status.^{7-9,11} These patients may never be formally diagnosed and/or their late presentation may make treatment less effective. Patients may also forego treatment

due to fear of cost and a lack of knowledge regarding resources to help uninsured individuals.¹¹

When socioeconomic barriers to care intersect with host factors such as the high disease burden experienced by BIPOC, individuals are more prone to complications from COVID-19.^{7,9,11,14} Black Americans and Latinx are more likely than White Americans to have chronic illnesses such as diabetes, obesity, heart disease, lung disease, and to be immunocompromised due to poorly controlled HIV/AIDS.^{7,11,14} The coexistence of these chronic illnesses can further complicate diagnosis when overlapping symptoms lead to unusual disease presentations and confusion.^{6,22} Finally, when patients with comorbidities cancel elective procedures, defer screening studies, and postpone follow-up appointments for both chronic and acute care, they risk late or missed diagnoses that are often associated with these chronic illnesses.²²

Provider-related factors.

The pandemic presents several challenges for providers evaluating patients for COVID-19. When faced with a high volume of complex patients who require rapid assessment, clinicians may deal with time pressure by relying on mental shortcuts or cognitive strategies known as heuristics to facilitate decision-making.^{2,22-24} While these are extremely useful for saving time, heuristics can also lead to cognitive biases.^{2,22-24} When dealing with patients presenting with COVID-19 symptoms, clinicians may utilize common heuristics such as anchoring (locking onto first diagnosis), availability (focusing on common/recent diagnoses), and premature closure (accepting diagnosis before confirmation).^{20,22} For instance, when pressured for time, providers may be less likely to perform a comprehensive history and physical, which are critical to forming an adequate differential diagnosis.²² Insufficient information along with the need to settle on a diagnosis quickly can put clinicians at risk for premature closure.²² The use of telemedicine and issues related to insufficient personal protective equipment contribute to unintended errors and premature closures when key clinical findings are overlooked due to limited patient contact.^{2,22} Anchoring can occur when clinicians working in areas with a high incidence of COVID-19, and therefore at risk for an availability bias, miss or delay non-COVID-19 diagnoses because it was assumed to be COVID-19.^{2,22} Conversely, in areas with low COVID-19 rates, COVID-19 symptoms may incorrectly

be attributed to other illnesses, especially when they are atypical.²² While these heuristics are not unique to COVID-19, they may occur more frequently due to the stresses associated with a rapidly evolving pandemic that is marked by uncertainty and high morbidity and mortality.

Strategies to improve diagnosis Structural and socioeconomic.

In a position paper on commitment to addressing healthcare disparities during COVID-19, the American Association of Nurse Practitioners (AANP) affirms its commitment to “empowering all NPs to advance high-quality, equitable care while addressing healthcare disparities through practice, education, advocacy, research and leadership (PEARL).”²⁵ In a related advocacy paper, AANP recommends specific measures to reduce these inequities.²⁶ The organization suggests improving access to healthcare in underserved areas through extending full practice authority to NPs, the development of a task force to identify issues along with solutions, and the formation of a system to collect demographics in order to prioritize resource placement.²⁶ A recent National Academy of Medicine (NAM) panel also highlights the need for nurses as “the most trusted among health professionals” to take a leadership role in addressing health inequities that have been intensified by the pandemic.²⁷ NAM recommendations include diversifying the nursing force to mirror the population as a means of building trust, providing education about healthcare inequities, and encouraging nurses to advocate for programs to build community resources.²⁷ The CDC has developed similar guiding principles directed at reducing COVID-19 disparities through achieving healthcare equity.²⁸ They recommend expanding the evidence base through research, collecting relevant demographic data to direct programs based on need, providing support to essential workers, and the development of a culturally and linguistically tailored COVID-19 multidisciplinary team.²⁸

These strategies offer several advantages for improving diagnosis through structural changes. First, NPs with full practice authority will be able to independently provide primary care in underserved areas including diagnosis of COVID-19 in addition to managing chronic illnesses.²⁶ Secondly, evaluating COVID-19 patient characteristics can be used to pinpoint areas for resource allocation.^{11,16,26-28} These programs could incorporate

free mobile COVID-19 testing and tracking systems that include linkage to social services.^{11,16-18} Thirdly, task forces can lobby for support to provide paid sick leave, unemployment benefits, adequate compensation for low-wage service workers, and assistance with health-care coverage.²⁶⁻²⁹ They can invest in multidisciplinary teams trained to engage with community leaders in order to provide education, networking, and collaboration with healthcare systems.²⁷⁻²⁹ Teams can educate communities about COVID-19 while at the same time eliciting information from the community about their concerns and suggestions.²⁷⁻²⁹ Finally, research that establishes evidence-based protocols for the diagnosis of patients with COVID-19 can offer a standard of care that will reduce the likelihood of errors.²⁷⁻²⁹ Priorities should be placed on developing programs that reimburse patient-focused care models that offer adequate time for diagnosis.^{2,20,22,29}

Patient care.

A strong patient-provider relationship has been associated with a lower risk of COVID-19 infection and higher rates of testing.¹³ When patients lack a primary source of care, they are often unaware of testing options and are less likely to seek help.^{11,13} Studies have shown that patient-provider relationships that foster effective communication and trust are key to helping patients manage uncertainty while also keeping them engaged in care.^{12,13} In a recent survey, 8 out of 10 patients reported that their healthcare providers had done a “good” or “very good” job of handling the pandemic and that they were satisfied with their care.¹² These patients are more likely to seek care, discuss symptoms, and complete testing, which facilitates accurate and timely diagnosis.¹²

Another recommended approach to improving patient-provider relationships and reduce bias is by increasing ethnic and racial diversity in the healthcare team.^{14,27,28} Currently, Latinx and Black individuals account for 18% and 12% of the general population but only constitute 6% and 5% of physicians, respectively.¹⁴ Education, training, and scholarship programs that support a diverse healthcare provider network can help patients engage in care.^{14,26-29}

Investing in community health workers (CHWs) is another way of bridging the gap created by reduced access to care, limited resources, and high stress levels associated with the pandemic.³⁰ As members of the community, CHWs are experts in helping patients

navigate healthcare systems, and in linking patients with clinical and community-based services.³⁰ During the pandemic, they have been critical in helping patients address social determinants such as housing, employment, food, and immigration issues while at the same time connecting socially isolated patients with health-care services.³⁰ Locating grant support to help patients obtain cell phones with apps that offer tracking and information on COVID-19 symptoms can help patients monitor their health in addition to offering consistent communication.^{29,30}

After patients are engaged in care, experts recommend including them as active partners in the diagnostic process as an additional safety measure.^{2,24,29,30} Empowering patients as allies can lead to improved symptom monitoring, tracking of diagnostic study results, and evaluating response to treatment.^{2,29,30} This enables patients to become more proactive in advocating for their health, which is especially important during the pandemic when gaps in care are common and often lead to delayed diagnosis.^{2,29,30}


Multidisciplinary treatment approach.

There has never been a more important time than during the pandemic to employ a multidisciplinary team to evaluate the rapidly changing data regarding diagnosis of COVID-19 and in doing so, implement clinical teamwork in diagnosis.^{2,29} Practices are using teams of experts for developing informational call lines, diagnostic and treatment protocols, and computer templates with checklists and decision prompts to help providers manage patients with COVID-19-type symptoms.^{2,24,29} Infectious disease, population health, and primary care experts collaborate on diagnostic algorithms, disease tracking, and outcome measures, all of which reduce a reliance on heuristics in diagnostic decision-making.^{2,29} Nurses, social workers, and CHWs can assist with patient outreach, healthcare navigation, and linkage to resources to deal with socioeconomic stressors.^{2,29} Information technology further supports the diagnostic process through patient follow-up and tracking, posting statistics in daily dashboards, and facilitating diagnostic feedback to clinicians on patient outcomes.²⁹ Daily huddles that include the receptionists, nurses, medical technicians, behavioral health specialists, and providers are essential for reviewing specific patients, adhering to a standard of care, and for discussing any clinical issues.^{2,29}

Many practices also offer expert advice to providers at the point of care on how to handle patients who

present with confusing symptoms in order to determine what types of testing might or might not be recommended.²⁹ Experts from relevant disciplines can also provide ongoing education through weekly meetings, mailings, and brief daily updates to help providers implement current guidelines for diagnosis and treatment.^{24,29} Clinical huddles and case reviews offer an opportunity for providers to share both successes and failures that have occurred during the diagnostic process. Frequent and open communication is a means of building trust through transparency as well as a supportive environment for processing diagnostic errors as learning opportunities.^{2,24,29} This process ultimately promotes a culture of safety that is key to learning from mistakes in order to prevent recurrences.^{2,24,29}

Summary

In order to improve diagnosis and facilitate treatment during the pandemic, it is critical to go beyond the concept of individual responsibility by integrating a knowledge of structural racism and healthcare disparities into an understanding of human behaviors and healthcare outcomes. Due to their attention to comprehensive primary care that is patient-focused and culturally sensitive, NPs are in a unique position to reduce risks of delayed and missed diagnoses among patients with COVID-19. This can be accomplished by promoting accuracy in diagnosis within a syndemic framework and a culture of patient safety that is just and equitable for all people—something that NPs are highly skilled at achieving. 

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