

PREVENTING CHRONIC DISEASE

PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY

US Public Health Response to COVID-19 and Chronic Disease: Continuing the Commitment to Improve Population Health



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

About the Journal

Preventing Chronic Disease (PCD) is a peer-reviewed public health journal sponsored by the Centers for Disease Control and Prevention and authored by experts worldwide. PCD was established in 2004 by the National Center for Chronic Disease Prevention and Health Promotion with a mission to promote dialogue among researchers, practitioners, and policy makers worldwide on the integration and application of research findings and practical experience to improve population health.

PCD's vision is to serve as an influential journal in the dissemination of proven and promising public health findings, innovations, and practices with editorial content respected for its integrity and relevance to chronic disease prevention.

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Introduction

Preventing Chronic Disease (PCD) remains committed to its mission of promoting dialogue among researchers, practitioners, and policy makers worldwide on the integration of evaluation, research, and practical experience to improve population health. Publishing articles on critical topics related to chronic disease is one of the ways the journal fulfills that mission, disseminating proven and promising findings, innovations, and practices.

The coronavirus disease 2019 (COVID-19) pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), represents the greatest medical and public health challenge in decades. As a result, medical professionals and public health experts, as well as the general public, are all scrambling to understand and respond to this crisis. We are learning that the effects of COVID-19 on the health and well-being of individuals is greater among those living with underlying conditions such as cardiovascular disease, diabetes, and chronic lung disease. Emerging data also indicate that racial and ethnic groups are at an increased risk of serious illness and death from COVID-19. Persistent social determinants further compound the negative effects that COVID-19 has on people with a chronic condition. Examples of social determinants of health that have brought to light these disparities in health outcomes include unstable housing, limited access to nutritious food, inadequate transportation, and low socioeconomic status.

PCD has recently received an influx of manuscripts related to COVID-19. In addition to expediting peer review of these manuscripts, PCD is putting together a special supplement that will consist of 16 commentaries generated by individuals working on the front lines of the pandemic. They share expertise on the bidirectional relationship between chronic disease and COVID-19, its impact on population health in the United States and around the world, and early thinking on emerging public health approaches to address COVID-19 and chronic disease. These authors represent an impressive mix of expertise in public health, medicine, infectious disease, health disparities, health equity, community engagement, community organization, nursing, pharmacy, oral public health, health communication, health system change, environmental health, geographic information system, geospatial analyses, and more.

We hope this special supplement contributes to ongoing efforts during this pandemic to provide reliable, peer-reviewed research and proven practices to improve health outcomes worldwide for both COVID-19 and chronic disease. The topics featured below represent areas in which future submissions would be of great interest to the journal, and PCD will continue to release timely peer-reviewed articles on COVID-19 as new information comes available.

Leonard Jack, Jr, PhD, MSc

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COMMENTARY

Engaging With Communities — Lessons (Re)Learned From COVID-19

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PEER REVIEWED

Summary

What is already known on this topic?

Responding to pandemics requires engagement with marginalized communities.

What is added by this report?

Responding to coronavirus disease 2019 (COVID-19) has demonstrated that effective responses involve partnerships that use a health equity lens, build on community strengths, and use data and community engagement to respond, build trust, and advocate for health for all. Specific steps for effective partnerships are outlined, based on previous recommendations and refined by current examples.

What are the implications for public health practice?

Community partnerships are critical elements of public health, and can be built through intentional, stepwise engagement with marginalized communities and wider partners.

Abstract

Coronavirus disease 2019 (COVID-19) has underscored long-standing societal differences in the drivers of health and demonstrated the value of applying a health equity lens to engage at-risk communities, communicate with them effectively, share data, and partner with them for program implementation, dissemination, and evaluation. Examples of engagement — across diverse communities and with community organizations; tribes; state and local health departments; hospitals; and universities — highlight the opportunity to apply lessons from COVID-19 for sustained changes

in how public health and its partners work collectively to prevent disease and promote health, especially with our most vulnerable communities.

Introduction

Long before the coronavirus disease 2019 (COVID-19) pandemic began, there was widespread recognition of persistent disparities in health outcomes in the United States by race, ethnicity, gender identity, and sexual orientation, as well as awareness that such disparities are symptoms of deeper inequities and racial discrimination across multiple systems and structures. COVID-19 exacerbated these disparities, with Black, Latino, American Indian, and Pacific Islander individuals and their communities having age-adjusted mortality rates 2 or 3 times greater than that of White residents (1). Concerningly, COVID-19's impact on the lesbian, gay, bisexual, transgender, and queer (LGBTQ) community is largely unknown (2).

Although analysis continues to be hampered by inconsistent collection and reporting of data on race, ethnicity, gender identity, and sexual orientation, possible explanations of COVID-19 disparities include the impracticality or even impossibility of following advice such as physical distancing and self-isolation among those who live in crowded conditions, work in service jobs, cannot telework, or have no sick leave (3). Additional factors affecting some racial/ethnic groups include limited testing availability and mistrust of accessing testing in some racial/ethnic communities once testing is offered (4); the need for communications in languages other than English; failure to provide protective equipment to essential workers, who are often from specific racial/ethnic groups; and closures of work places that disproportionately impact some racial/ethnic communities, leaving increasingly large numbers without employer-sponsored health insurance (1,5,6). LGBTQ Americans report difficulty accessing needed treatments, and most are concerned about the combined risks of COVID-19 and HIV (7). These factors are compounded among the homeless or those



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who are incarcerated (8). Social stigma and racism are factors as well. Black men are reportedly less likely than White men to wear face coverings out of fear of police harassment and violence (9). In addition, Black men who violate stay-at-home orders in 3 of the most populous jurisdictions in Ohio (Toledo, Columbus, and Cincinnati) are 4 times more likely than White men to be charged for violating the orders (10). Finally, a long-term mistrust of government, research, and health care institutions, built on decades to centuries of neglect and abuse, including but far from restricted to the Tuskegee syphilis study (11), make it less likely that some racial/ethnic communities and historically marginalized communities will trust public health messaging by these bodies, or will believe that they will receive equal access to testing, treatment, and vaccines (12).

Despite and often because of these realities, communities, local health departments, and partners across the country with histories of collaboration were able to rapidly react to the challenges of COVID-19. By using community-engaged/participatory research and programmatic coalitions to showcase and bolster the resiliencies within communities and across partnerships, they were able to respond to immediate and critical needs. Here are a few early examples:

- In Chicago, the Homelessness and Health Response Group for Equity coalesced multiple working groups into a coalition of more than 100 members, including hospitals, federally qualified health centers (FQHCs), city officials, shelter operators, housing advocates, and others. Meeting every morning, they established dedicated quarantine and isolation sites for people with unsafe home environments in which to self-isolate; acquired and distributed tens of thousands of pieces of donated personal protective equipment to group settings across the city; crafted evidence-based guidance for varied settings; administered tests to thousands of individuals; created housing for those who were healthy yet at high risk so as to shield them from ongoing outbreaks; and established clinical linkages for shelters and with FQHCs to provide outreach and health checks for high-risk groups (13).
- The University of California, San Francisco (UCSF), leveraged expanded test processing at UCSF and partnered with community organizations to test all residents of a densely populated portion of San Francisco's Mission District as well as the small, rural town of Bolinas. This community-wide testing effort began as a grassroots initiative in Bolinas, driven by residents who partnered with UCSF scientists, state and county public health departments, and the local Coastal Health Alliance, to ensure community engagement and support (14).
- The Navajo Nation, among other tribes, is facing some of the worst rates of COVID-19 in the United States. The tribe has long-standing health inequities attributable to persistent federal neglect, a high prevalence of chronic disease, and geographically dispersed multigenerational homesteads, often with no running water or internet access. As COVID-19 struck, Navajo Nation President Jonathan Nez immediately created a Health Command Cen-

ter, working with state and local governments, the Indian Health Service, and hospitals to begin testing and contact tracing. With the delay of release of federal funds to tribes, Navajo launched its own COVID-19 Relief Fund (15), and local nonprofits and GoFundMe efforts stepped up, distributing food and medical and household supplies, with volunteers dropping off boxes to families with someone positive for COVID-19 and in self-quarantine. The Gallup-based Community Outreach and Patient Empowerment organization (16), a partnership with the Navajo Nation, Brigham and Women's Hospital, and Partners in Health, and the nonprofit United Natives (17) coordinated medical supplies for clinicians and home-based resources for community members; the Na'nizhoozhi Treatment Center and the City of Gallup provided needed housing; and Auntie Project, Native women from Oklahoma, sent peer-to-peer financial support. Long-term academic partners contributed: for example, the Johns Hopkins Center for American Indian Health organized 140 Native American and other health professionals for surveillance, education, and critical supplies; the University of California, San Francisco, and Doctors Without Borders sent volunteer clinicians; and the University of New Mexico's Transdisciplinary Research, Equity and Engagement Center for Advancing Behavioral Health (TREE Center) health equity center worked with the Diné Centered Research and Evaluation Group and provided material and emotional support (18).

- A partnership across the University of New Mexico, city of Albuquerque, state and city emergency operations centers, nonprofits, primary health care clinics, the city department of health, and the Medical Reserve Corps used the community-based participatory research (CBPR) model as a planning and evaluation tool (19). The partnership first identified a short-term goal of encouraging homeless people, especially older adults, not to leave shelters. To strengthen engagement of seniors unused to sheltering in place, the partnership created a rapid-cycle CBPR process of surveying seniors on their perceived barriers to staying at the shelter, returning the results through town hall dialogues, then providing COVID-19 testing within 2 days, and responding to recommendations, such as increased meal variety, more activities, toiletries and snacks, and improved access to medical providers and case managers. After the first 3 weeks, the proportion of seniors who stayed in the shelter after sleeping there grew from 20% to 75%, with no one testing positive for COVID-19. As the crisis continued, new goals were established each week, with responses including hotel rooms paid for by the city and state for people with COVID-19, and contact tracing for this difficult-to-reach population (20).
- LGBTQ communities have organized information networks and support funds as well as advocated for the needs of LGBTQ communities (21). In semirural Solano County, California, the Solano Pride Center is conducting virtual emotional support and practical information sessions for LGBTQ youth and older adults and has opened a chat service and other safe spaces in response to the social isolation and limited emotional support accentuated by the COVID-19 crisis (22).
- In rural Eagle County, Colorado, the response built on the Mobile Intercultural Resource Alliance, which serves as a clearinghouse for local services in health education and screenings, application support for public assistance

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programs, food resources, workforce development, early childhood education coordination, and physical activity programming. Funded by Vail Health, Eagle Valley Community Foundation, and Eagle County government, and housed in a recreational vehicle that travels from community to community, it brings needed services to low-income and often isolated communities in the region. As schools closed, they shifted to providing information, free COVID-19 tests, and school lunches to anyone who needs one (23).

- In New Brunswick, New Jersey, the response has been channeled through peer-to-peer interaction and networks of partnerships with a history of practicing collective impact. Community health ambassadors, New Brunswick residents who decided to do their part to better their community, serve as the cultural bridge between community-based organizations, health care agencies, and their respective communities. They have provided valuable community insight during the pandemic. They, along with the New Brunswick Healthy Housing Collaborative partners (New Brunswick Tomorrow, Robert Wood Johnson University and Saint Peter's University hospitals, and the Middlesex County Office of Health Services) are part of a multisector network (Healthier New Brunswick) that has continued to work together to mitigate the effects of COVID-19 (24). Saint Peter's University Hospital conducted an informal geo-mapping of infected New Brunswick residents and found that close to 100% of New Brunswick residents infected with COVID-19 lived in 2 predominately Latino neighborhoods whose census tracts have the most substantial health and social disparities in the city. In response, the hospitals put together care kits that included masks, soap, and public service announcements (in English and Spanish) on proper prevention methods, which the hospitals and community partners disseminated in these neighborhoods. Other announcements addressing COVID-19 health concerns and underlying structural inequities (inability to isolate in home settings) are promoted by using community outreach and New Brunswick Tomorrow's health communications initiative (Live Well Vivir Bien New Brunswick) that uses a website, mobile app, and social media outlets.
- The state of North Carolina, recognizing the impact of COVID-19 on its racial/ethnic communities and the substantial challenge of contact tracing efforts by its local public health departments, partnered with its state primary care Medicaid program, Community Care of North Carolina (CCNC), and the North Carolina Area Health Education Centers to hire and train staff to augment local health department-led efforts in tracking transmission (25). CCNC has worked with and within local health departments for more than a decade, supporting and improving data standardization for the statewide care management services provided for children and pregnant women. The need for food and housing security has been amplified in poor, rural areas of the state during the isolation and quarantine efforts of the pandemic response, so the state also accelerated the rollout of NCCARE360, an electronic coordinated care network to connect those with identified needs to community resources and allow for a feedback loop via electronic health record or web-based notifications on the outcome of those connections (26). The personal care management provided to individuals locally, in concert with the new technologically advanced data system, aims to facilitate the connection of individuals to badly needed services and resources.

- In the coastal plain town of Raeford, North Carolina, Dr Karen Smith, a solo family practitioner, was called by her local health department director about a potential outbreak at a 24-bed youth treatment center, where 2 staff members had tested positive. A quick call to First Health, the local hospital, yielded testing kits; testing was quickly accomplished, and the local emergency medical services drove the tests to Raleigh. Fourteen were positive, and the facility then was able to separate, isolate, trace, treat, and monitor both positive and negative cases (27).

Academic groups have stepped up as well:

- Historically Black colleges and universities (HBCUs) are at the epicenter of large-scale outbreaks. Howard University partnered with Wells Fargo to offer free testing in Ward 7 of Washington, District of Columbia (which had among the highest rates in the Maryland, District of Columbia, and Virginia region) (28). North Carolina Central University (NCCU), with Duke University and University of North Carolina at Chapel Hill, are partnering with Granville Vance Public Health to offer free mobile testing in rural communities in northeastern North Carolina, with a special focus on Black and Latino neighborhoods and churches. And NCCU, along with 5 other HBCUs, was just awarded state funds to study the public health and economic impact of COVID-19 in the state's underserved communities (29).
- Schools of public health have taken lead roles in analysis and advice responses locally and nationally (30).
- Multiple medical schools and health centers have responded, especially those with histories of community engagement. The Center for Reducing Health Disparities at the University of California, Davis, quickly became a local resource and coordination point for community-engaged efforts, especially in Latino communities and for those with behavioral health challenges (31). The HealthStreet Community Engagement Program at University of Florida, which has been working to build community trust, pivoted from being a face-to-face community health worker model to a telephone-based program to continue to assess the needs of their 12,000 members and link them to needed services (32). In Minnesota, a community-engaged research partnership worked with community leaders to refine messages, leverage resources, and advise policy makers on a community-based risk communication framework, which was used to deliver messages in 6 languages across 9 electronic platforms to almost 10,000 individuals over 14 days (33).
- Nursing schools have engaged, including offering resources for health equity (34).
- Hundreds of public health, medical, nursing, and other students have participated in local public health activities, including serving as contact tracers (35).

Lessons From the Past

Partnering with the community and collaborating with its members have long been recognized as cornerstones of efforts to im-

prove public health and its core value of social justice. Community engagement was a critical driver of success during the AIDS epidemic, when activists raised awareness, educated individuals about strategies to reduce their risk, and advocated for timely governmental response. Community-based organizations in racial, ethnic, and sexual communities played critical roles in HIV prevention efforts, as the Centers for Disease Control and Prevention (CDC) recognized that such efforts “must be appropriate for and responsive to the lifestyle, language, and environment of members of that population” (p. 704) (36).

These lessons were reinforced in 1995, when CDC, recognizing the importance of involving the community, established the Committee for Community Engagement, which was composed of representatives from across CDC and the Agency for Toxic Substances and Disease Registry (ATSDR). That committee developed the booklet *Principles of Community Engagement*, which was published by CDC and ATSDR. A second, enlarged edition of the *Principles of Community Engagement* was published in 2011 by the National Institutes of Health (NIH), with CDC and ATSDR (37). The same year, CDC released its social vulnerability index, facilitating the ability of local officials to identify communities that may need support in responding to hazards (38).

The response to the next major outbreak, severe acute respiratory syndrome (SARS) in 2003, again noted the need to identify high-risk groups; provide close, targeted communication and coordination across community partners; and ensure access to needed supplies by those in isolation or quarantine (39).

The Institute of Medicine (IOM) report *The Future of the Public’s Health in the 21st Century* reinforced the idea that public health’s broad mission of ensuring healthy communities required interactions among numerous health-influencing actors, such as communities, businesses, the media, governmental public health, and the health care delivery system (40).

These reports were accompanied by a broader movement of agencies in partnering with communities in improving health. In 2006, NIH established the Clinical and Translational Science Awards to spur clinical and translational research, with community engagement as one of its core functions. The IOM reinforced this effort in a 2013 review of the program, calling for ensuring community engagement in all phases of research (41). Similar efforts followed in the National Institute on Minority Health and Health Disparities (42) and National Institute on Drug Abuse (43).

A parallel IOM initiative in 2012 assessed the opportunity to link primary care and public health around the needs of communities, noting that “Improving population health will require activities in 3 domains: 1) efforts to address social and environmental condi-

tions that are the primary determinants of health, 2) health care services directed to individuals, and 3) public health activities operating at the population level to address health behaviors and exposures” (p. 19) (44). In turn, this led to the establishment of a collaboration between the deBeaumont Foundation, CDC, the Health Resources and Services Administration, and Duke University to provide practical tools for partnerships for health, to connect interested individuals and organizations, and to support training and capacity building for partnerships for health (45).

Common across all these examples and activities are several principles, which have been consistent themes for how public health and its partners can effectively engage to ensure improved health in diverse communities (37):

- “All aspects of community engagement must recognize and respect the diversity of the community. Awareness of the various cultures of a community and other factors affecting diversity must be paramount in planning, designing, and implementing approaches to engaging a community” (p. 51).
- “Partnering with the community is necessary to create change and improve health” (p. 50).
- “Organizations that wish to engage a community as well as individuals seeking to effect change must be prepared to release control of actions or interventions to the community and be flexible enough to meet its changing needs” (p. 52).

Public Health Implications

Pandemics and epidemics are most dangerous to those already at risk: people with underlying health conditions (caused, in part, by deeper racial, structural, and systemic inequities), and those who are members of marginalized communities without access to preventive care or health care services at their time of greatest need. As was seen in AIDS, SARS, and now COVID-19, responding to an evolving pandemic requires identification of and collaboration with those groups at greatest risk, who often lie outside the mainstream. Engagement with communities early on and throughout is critical, especially communities of color and other marginalized groups that require a public health response that is not channeled through discriminatory systems and structures and does not perpetuate inequities in the midst of crisis. Effective public health roles include gathering data on those affected; building from community strengths and priorities to shape the actions of collecting, sharing, and interpreting data with the communities; developing plans with community leaders; co-creating and communicating risk and harm reduction strategies through existing communication methods; and rapidly tracking and adjusting plans as the epidemic progresses. Although public health holds a leadership role during the epidemic response, it needs the engagement, partner-

ships, and trust of communities in shaping, communicating, implementing, and disseminating recommended strategies. Trust can only be built when government and academic collaborators are themselves trustworthy and engage communities as partners in addressing what matters to them, including inequities in testing, treatment, and potentially future access to vaccines. Community engagement and partnerships are at the heart and core of public health, are essential for achieving health equity, and are most dramatically needed during pandemics such as we now face.

The Box outlines practical steps that public health can take to successfully engage with its communities and partners for sustained equitable changes in how we live, learn, work, and play. What is not known, but which COVID-19 is helping us learn, is what additional steps public health and its partners can take to effectively work together so that trust is established and maintained, resilience is strengthened, and communication plans are refined. We must also learn how to effectively communicate the need for long-term investment in the infrastructure required for healthy, productive communities, including public health, health care from primary care through hospitals, and community partners. COVID-19 is not our last disaster, and the lessons (re)learned can both prepare us for the next challenge and help reduce and eliminate our long-standing underlying inequities in health.

Box. Steps That Public Health Can Take to Engage With Communities and Partners for Sustained Changes in How We Live, Learn, Work, and Play

Learn

- Train staff in health equity, using local resources or national training such as the National Association of County and City Health Officials' online course *Roots of Health Inequity* (46)
- Learn about effective multisector partnerships through sources such as *The Practical Playbook* (45)
- Reframe the COVID-19 pandemic as a "community" problem in which social determinants of health play leading roles, not just a "public health" problem

Partner

- Gather, share, and interpret data with affected communities, working with community members and leaders, and with analysis by race, ethnicity, language, location (zip code or census tract), and social factors
- Identify the unique risks and protective factors with affected communities
- Ensure equitable access to testing, protective equipment, clinical trials, and treatment
- Incorporate community oversight as a quality assurance tool

Work collectively (47)

- Design and implement with a priority placed on equity
- Co-create with cross-sector partners — community-based organizations, clinicians, universities, medical centers, schools of public health (especially those located in or partnered with racial/ethnic communities), housing and transportation sectors, and community development, among others. Students, including in public health, medicine, and nursing, have much to contribute and learn
- Collectively define the problem and create a shared vision to solve it
- Focus on outcomes — not just on activities or processes
- Use data to continuously learn, adapt, and improve
- Develop and deliver health risk messaging that is culturally and linguistically appropriate, relevant to vulnerable communities, and delivered through trusted sources (48)
- Move beyond information delivery to community conversations that encompass knowledge, beliefs, attitudes, and behavior
- Build a culture that intentionally fosters relationships, trust, and respect across participants

Share

- Gather and distribute stories and data both of initial failures and of solutions found
- Participate in a learning collaborative, such as Community Campus Partnerships in Health's Communities in Partnership: Ensuring Equity in the Time of COVID-19 (49), and the Big Cities Health Coalition (50)

Advocate

- Engage with partners in coordinated efforts to advocate for immediate support for communities that are most affected, for removal of barriers, for support of programs that address the root causes of health inequity, and for a diverse public health and health care workforce that works together in partnership with its communities
- Pursue health in all policies as a fundamental tool for ensuring health for all (51)

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We would like to note that we have capitalized names of races (Black, White) to mirror how groups name themselves and to match the practice of capitalizing names of ethnic groups. We also

chose single names for groups, despite variation in usage, and so used the label “Latino” rather than the alternatives of “LatinX” or “Hispanic.” We recognize that these labels may suggest that groups are distinct, rather than overlapping and evolving. Most of all, we have tried to put our communities first, and for them to tell their stories, and apologize if we have erred in the process of summarizing and editing.

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COMMENTARY

Men and COVID-19: A Biopsychosocial Approach to Understanding Sex Differences in Mortality and Recommendations for Practice and Policy Interventions

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PEER REVIEWED

Summary**What is already known about this topic?**

Data suggest that more men than women are dying of coronavirus disease 2019 (COVID-19) worldwide, but it is unclear why.

What is added by this report?

We describe an approach that considers biological and psychosocial factors that affect men's health and how these factors may intersect. Clinical, public health, community, and policy examples illustrate what can be done, and is being done, to address men's COVID-19-associated mortality risk. Our approach highlights the importance of examining COVID-19-associated mortality risk from a men's health perspective rather than one that focuses solely on sex differences.

What are the implications for public health practice?

We can seize this moment to reimagine and redesign our health care and public health systems to consider the many factors that influence men's health.

Abstract

Data suggest that more men than women are dying of coronavirus disease 2019 (COVID-19) worldwide, but it is unclear why. A biopsychosocial approach is critical for understanding the disproportionate death rate among men. Biological, psychological, beha-

vioral, and social factors may put men at disproportionate risk of death. We propose a stepwise approach to clinical, public health, and policy interventions to reduce COVID-19-associated morbidity and mortality among men. We also review what health professionals and policy makers can do, and are doing, to address the unique COVID-19-associated needs of men.

Introduction

The novel coronavirus disease 2019 (COVID-19) is shining a spotlight on the neglect of men's health at local, state, national, and global levels (1). According to the largest body of publicly available sex-disaggregated data from global government sources, although no apparent sex differences exist in the number of confirmed cases, more men than women have died of COVID-19 in 41 of 47 countries (2), and the overall COVID-19 case-fatality ratio is approximately 2.4 times higher among men than among women (3,4). In the largest survey of 72,314 suspected or confirmed cases of COVID-19 in China (men, 63.8% of cases; women, 36.2% of cases), the case-fatality ratio was higher among men (2.8%) than among women (1.7%) (5). Another study from China, of critically ill patients, showed that men with comorbidities such as hypertension, cardiovascular disease, chronic kidney disease, and diabetes had the highest mortality (6) and US data showed similar patterns (4,7,8).

A report on 3,200 COVID-19-related deaths from Italy showed higher death rates among men than women across all age groups, with men accounting for more than 70% of deaths (3). A multinational health research database using the TriNetX Network showed that among 14,712 male and female patients with confirmed COVID-19, men were older, were more likely to be hospitalized, and had a higher prevalence of hypertension, diabetes,



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coronary heart disease, obstructive pulmonary disease, nicotine dependence, and heart failure. Men also had higher all-cause mortality than women (8.1% vs 4.6%) (9). Moreover, the cumulative probability of survival was significantly lower among men after adjusting for age, comorbidities, and use of angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) (9).

In the United States, as of June 2020, 57% of deaths caused by COVID-19 have been men. With the exception of Massachusetts, all states in the United States have reported higher mortality among men (10). However, the United States has not been consistent in reporting sex-disaggregated data. In a recent analysis of 26 states, only half reported sex as a variable (10). Age is a significant risk factor for COVID-19 mortality, and a vast majority of the COVID-19 deaths in the United States has been among people older than 75; in addition, rates of preexisting health conditions (eg, hypertension, obesity, diabetes) exacerbate disparities in mortality by class, race, and sex/gender (8). Exploring the differences in COVID-19 morbidity and mortality across these sociodemographic strata are beyond the scope of this commentary, yet we recognize and note that race, ethnicity, sexual orientation, gender identity, and other factors are important and should call attention to particular populations during the COVID-19 pandemic.

In this commentary, we discuss factors that may put men at a disproportionate risk of dying of COVID-19. Although it can be useful to compare determinants of men's health to those of women's health, our approach helps to identify why, how, and under what conditions key determinants of health affect the health outcomes of men (11). This approach facilitates efforts to identify strategies to intervene and improve the health of men during this public health crisis and beyond (12). After we examine the determinants of men's risk of dying of COVID-19, we describe what medical providers, public health professionals, and policy makers can do, and have been doing, to address the unique needs and risks among men.

The sex gap in COVID-19-associated mortality is not easily explained by any single biological or social factor (3). Recognizing the difference between sex and gender in health outcomes while discerning the influences one has on the other is important (13). Differences in sex are biological. These include differences in reproductive organs and their functions, sexual hormones, and the gene expression of chromosomes. Gender is the performance of socially constructed roles, behaviors, and attributes considered socially acceptable for men and women. Consequently, we use a biopsychosocial approach that considers biological and psychosocial factors that affect men's health and how these factors may interact (14).

Factors Affecting COVID-19 Morbidity and Mortality Among Men

Although epidemiological data show a difference between men and women in the rates of mortality among those diagnosed with COVID-19, the mechanisms underlying sex differences in mortality are unclear (3,10,15). Because most health patterns are the result of a combination of biological, behavioral, and psychosocial factors, we must consider how sex-associated biological factors and gender-associated psychosocial and behavioral factors interact in determining health (14) and in explaining COVID-19-associated mortality (4,8,15). In this section, we first describe biological factors and then discuss psychological and behavioral factors associated with men's higher risk of COVID-19-associated mortality.

Biological factors

Men and women differ in both innate and adaptive immune responses, perhaps related in part to sex-specific inflammatory responses resulting from X-chromosomal inheritance. The X chromosome contains a high density of immune-related genes; therefore, women generally mount stronger innate and adaptive immune responses than men (3). This differential regulation of immune responses in men and women is contributed by sex chromosome genes and sex hormones, including estrogen, progesterone, and androgens. Sex-specific disease outcomes after viral infections are attributed to sex-dependent production of steroid hormones, different copy numbers of immune response X-linked genes, and the presence of disease susceptibility genes (3).

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) uses the SARS-CoV receptor angiotensin-converting enzyme 2 (ACE2) for entry into the host cell (16). The S spike of the virus attaches to the cellular ACE2 receptor (coded by the ACE2 gene) located on the respiratory epithelial cells. The internalization of the virus is potentiated by the cellular protease TMPRSS2 (transmembrane protease, serine 2) in the host cell (17,18). The high burden of illness and high case-fatality ratio in patients with COVID-19 may be driven in part by the strong affinity of the virus for ACE2, leading to virus entry and multisystem illness in pulmonary, gut, renal, cardiac, and central nervous systems (16).

Men have higher plasma ACE2 levels than women do, and a recent study of patients with heart failure showed that plasma ACE2 concentrations were higher than normal in men and higher in men than in women, possibly reflecting higher tissue expression of the ACE2 receptor for SARS-CoV infections (19). This could explain why men might be more susceptible to infection with, or the consequences of, SARS-CoV-2. Unravelling which cellular factors

are used by SARS-CoV-2 for entry might provide insights into viral transmission and reveal therapeutic targets. Further investigation into the association of ACE2 enzyme activity in COVID-19 and its correlation with sex is ongoing. Although biological factors clearly help to explain the sex difference in COVID-19 mortality, psychosocial and behavioral factors also play a part.

Psychosocial and behavioral factors

In addition to sex differences in immune responses, hormones, and genes, there are also psychological, social, and behavioral components that influence COVID-19 progression (1,15). Compared with women, men tend to engage in more high-risk behaviors that generate potential for contracting COVID-19 (1,4). Polls taken early in the first wave of COVID-19 cases in the United States show sex differences in the perceived severity of the pandemic (20). Another US study found that men have been more likely to downplay the severity of the virus's potential to harm them (21), and fewer men than women have reported that they have been avoiding large public gatherings or avoiding close physical contact with others (21–23). In addition, compared with women in many countries, including the United States, men tend to have higher rates of behaviors that are linked with COVID-19 infection and mortality, including higher rates of tobacco use and alcohol consumption (1,4,21,24).

Men also tend to have lower rates than women of handwashing, social distancing, wearing masks, and effectively and proactively seeking medical help (1,4,21,25,26). Many men have been socialized to mask their fear, and it is important to consider how hiding fear affects men's response to COVID-19 (27). It is particularly important to focus on men who respond to threats like COVID-19 with aggression and anger. Research shows that people with this response "tend to downplay risk and are resistant to risk reduction policies," which is problematic during efforts to promote social distancing and other pandemic restrictions (27). These socially constructed behaviors reduce the perception of susceptibility and severity, which then translates into a decrease in the practice of preventive measures, such as handwashing, and protests against pandemic-related restrictions.

Other factors may intersect with sex and gender, such as age and geography (28). For example, a US study of associations between perceived risk and worry with age and gender found that although older men perceived their risks of COVID-19 to be higher than those of younger men, older men made the fewest behavior changes across age and gender groups (29). Another study highlighted the importance of considering place or geography. In a comparison of counties where populations were predominantly Black or predominantly White, the SARS-CoV-2 infection rate was 3 times higher and the death rate was 6 times higher in

counties where the population was predominantly Black (30). In urban areas with high percentages of Black residents with low socioeconomic status, some problematic narratives have emerged that blame the men and women who live in these areas for their high rates of COVID-19 rather than the policies or structures that create these conditions (31).

In addition to these psychological and behavioral factors, differences in occupational risk exist between men and women. In the United States, a larger number of women than men are deemed essential workers primarily because of the large share of women employed as social workers and in health care (32). Nevertheless, the low-skilled or low-paid occupations that are considered essential workers (eg, food processing, transportation, delivery, warehousing, construction, manufacturing), where men outnumber women, seem to be associated with a greater risk of mortality (32).

In summary, a range of biological, psychological, and behavioral factors can explain why men have higher rates of COVID-19–associated morbidity and mortality than women. Although it is critical to identify the factors associated with increased risk for men of COVID-19 mortality, it is equally important to determine how to reduce the risk of men dying of COVID-19 (1,4). The factors that exacerbate men's risk also are intertwined with race, ethnicity, geography, and other proxies for factors that are markers of marginalization and social inequality (4,14). In the remainder of this commentary, we will discuss selected examples of what can be done, and is being done, to reduce men's risk of COVID-19–associated mortality (Table).

Intervention Strategies to Reduce Men's COVID-19 Mortality Risk

To reduce virus transmission and increase screening for the virus and thereby reduce men's risk of COVID-19 mortality, we propose 5 strategies: 1) health education, community engagement, and public health outreach; 2) health promotion and preventive care; 3) sex-disaggregated data in clinical practice and policy; 4) rehabilitation and health care delivery infrastructure; and 5) health policy and legislative interventions (Figure).

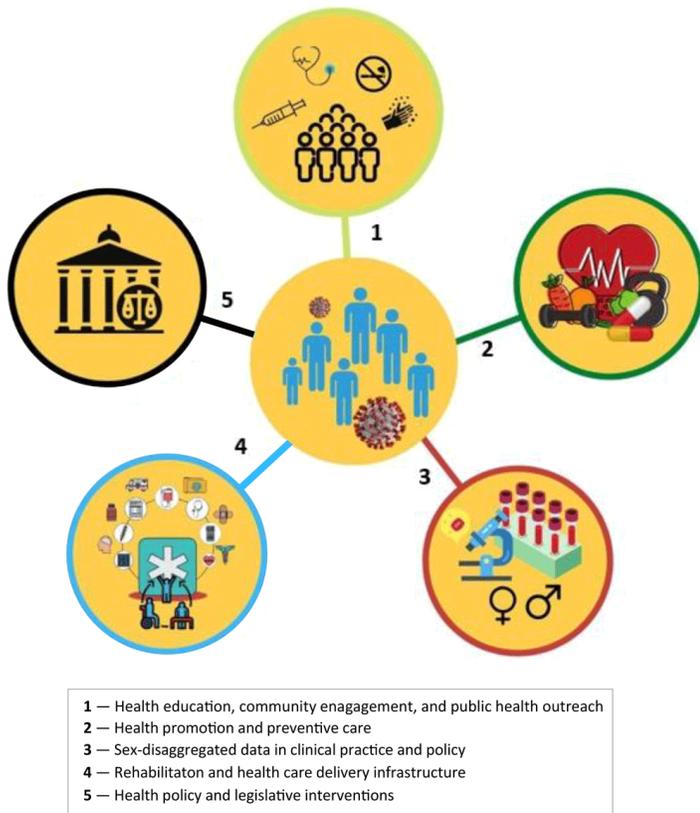


Figure. Intervention strategies to reduce men’s COVID-19 mortality risk.

Health education, community engagement, and public health outreach

Educational efforts to increase compliance with public health recommendations may be more effective in changing the behavior of men if these efforts incorporate some of the principles from health communications research that consider how health behavior is gendered (33,34). Building on research examining psychosocial barriers to men’s health-promoting behaviors (34,35), we note the importance of exploring how men’s priorities, values, and goals are affecting their choices to follow or ignore COVID-19–related transmission prevention messages and pay attention to or ignore potential symptoms that may be present in their bodies. Building on principles of the self-determination theory, we suggest that messages to engage men seek ways to motivate them to consciously choose to engage in healthier behaviors, not because of shame, pressure, or coercion but because they are intrinsically motivated to do so (36). For example, some men may be motivated to engage in behaviors to reduce their risk of contracting or potentially transmitting COVID-19 not by focusing on their risk but by focusing on the high rates of morbidity or mortality of their racial

or ethnic group, communities, neighborhood, or family. Being motivated by one’s own reasons to follow COVID-19–related transmission prevention messages is critical when men are faced with pressures to go back to work, the desire to spend leisure time with friends and family, and the inconvenience and fatigue of wearing face masks and gloves or maintaining physical distance from others.

Although the health education of men is useful, the health education of men’s partners and their families about men’s health risks is also critical. One US study of communication strategies examined the influence of men’s partners and found that communicating with a man’s loved one, combined with a reminder system implemented by providers, was associated with increases in preventive health care screenings (37). As a result, a federally qualified health center in Baton Rouge, Louisiana, for example, is conducting outreach to men with underlying conditions and their partners to ensure that they are aware of their susceptibility to COVID-19.

Increasing access and eliminating barriers to community-wide testing are additional ways to improve COVID-19 outcomes. Testing or screening use may be influenced by exposure to decision education and the influence of screening-related primary care practice factors (38). Federally qualified health centers offering primary care services are key community institutions that have increased COVID-19 testing — with no out-of-pocket costs to patients in many areas. These kinds of programs allow men to have access to testing without cost barriers that may otherwise deter them from accessing testing. The community-wide testing also offers an opportunity for men to be tested before returning to work as states begin to reopen and more services (barber shops, gyms, restaurants) are offered in communities. These initiatives help to normalize testing and reduce the stigma of getting tested, although they may not reduce the stigma of receiving a positive test result.

Health promotion and preventive care

Given the rates of cardiometabolic risk factors and underlying or preexisting conditions such as obesity or comorbid chronic diseases (eg, diabetes, heart disease, cancer) among men, a focus on men with underlying conditions that increase their risk of COVID-19 mortality is critical (34,37). Although the greater severity of complications attributable to COVID-19 among men is not well understood, preliminary findings of a higher incidence of mortality attributable to underlying comorbid conditions suggest that clinicians tailor current treatment options with this in mind. A model that examined activations for ST-segment elevation myocardial infarction (STEMI), the time from coronary artery occlusion to coronary blood flow restoration, showed a significant

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drop of 38% from roughly the year before the outbreak (January 2019) to the first month of it (March 2020) (25). The study, which used data from 9 high-volume cardiac catheterization laboratories, showed that total STEMI activations decreased from more than 180 per month (mean, 23.6 per center) to only 138 activations per month (mean, 15.3 per center). Thus, patients might be staying at home for fear of contracting the virus even though they need urgent care. We need to reassure patients that although routine and elective care might be curtailed by the pandemic, new symptoms of myocardial infarction and stroke still need to be immediately addressed.

For men who are at increased risk because of a history of a chronic condition or disease, clinicians should actively assess risks; optimize antihypertensive and statin therapies where indicated; provide behavioral and pharmacotherapy for tobacco use cessation (cigarettes and vaping); educate on healthy diets rich in vegetables, legumes, grains, fruits and nuts; and make exercise recommendations (39). In addition to providing information, clinicians should encourage men to participate in behavioral interventions that target psychosocial factors (eg, self-efficacy, motivation) that can facilitate lifestyle change and maintenance of behavior changes over time (34). These important interventions should continue during a pandemic through virtual visits and telemedicine platforms. Several professional organizations have made COVID-19-specific clinical and operational guidelines in their specialties; these include patient education information on occupational risk mitigations and recognizing signs and symptoms of COVID-19 infection, hand hygiene and surface decontamination, and protecting family members (40,41).

Sex-disaggregated data in clinical practice and policy

While designing clinical trials to address COVID-19-related conditions, clinicians and researchers need to consistently consider sex as a biological variable and the behaviors and social stressors associated with gender that might affect drug efficacy, treatment options, and adverse outcomes (3,13). There is a long history of not analyzing and reporting sex differences and underrepresenting women in cardiovascular clinical trials and in the treatment of infectious diseases (10), and COVID-19 is proving no different in many countries (4,15). Results from the randomized, controlled Adaptive COVID-19 Treatment Trial, which tested remdesivir as a therapeutic agent for the treatment of COVID-19, showed a 4-day difference in time to recovery between the treatment group and the control group, but the study did not provide explicit information on sex-based efficacy or adverse reactions (42). An immunologic sex difference may exist in the mitigation of COVID-19, yet 86%

of participants enrolled in clinical trials of immunotherapies (eg, tocilizumab) are men (43). Only by investigating sex differences consistently, critically, and reflectively can we fulfill the requirements of scientific rigor, excellence, and maximum impact.

Rehabilitation and health care delivery infrastructure

Strategies aimed at preventing complications associated with COVID-19 are essential for safe and effective return to personal, professional, and societal obligations. Urgent needs also exist to provide post-acute care rehabilitation services for patients recovering from COVID-19 and to train a new workforce to care for these patients (44). Strong evidence suggests that interventions engaging community health workers improve health outcomes for patients, including men, across multiple chronic conditions. As care extenders, community health workers provide a culturally and linguistically appropriate clinical-community linkage for difficult-to-reach patients, such as men. They can provide direct outreach to men with comorbidities that make them more susceptible to COVID-19 and its complications.

Given the high rates of pre-existing chronic conditions among men (1), the Center for Medicare and Medicaid Services may need to expand access to telehealth services for men to receive care where they are to allow them to remain in isolation and prevent spread of the virus; however, most assisted living and long-term care facilities do not have computer access for residents for this purpose. This patient-centered care delivery model could be a particularly useful strategy to increase access to preventive medicine for men who are from medically underrepresented groups or groups with lower socioeconomic status (45).

Health policy and legislative interventions

In addition to various practice initiatives to reduce virus transmission and mortality, we must also consider the potential policy efforts to address the COVID-19 epidemic in the United States. Because men are dying of COVID-19 disproportionately, policy makers need to explicitly consider gender but not conflate gender with women (1). To do so, local, state, and national policy makers should ensure that legislation includes language that promotes data collection, disaggregation, and dissemination by race, ethnicity, and sex (1,4,15). Collecting and disseminating data by sex may help to make a vital economic case for considering men's health explicitly in the COVID-19 pandemic; however, men's health policy needs to be located in a framework that embraces gender equity and that does not treat men's health and women's health as though they are competing interests or priorities (1). Finally, it is essential for policy makers to adopt an equity-based approach that considers the heterogeneity among men (1,12). Men who are mar-

ginalized or disadvantaged because of their race, ethnicity, sexual orientation, incarceration, homelessness, or other factor are particularly vulnerable to COVID-19 and policies should explore which groups of men are overrepresented among essential workers, at risk because of preexisting health conditions, or most in need because of other socioeconomic factors.

Public Health Implications

A biopsychosocial approach takes into account not only the range of factors that determine risk but also the range of places where we might intervene within a population health framework that considers both biomedical and public health points of intervention to reduce mortality from COVID-19. We must ensure that COVID-19 screening, testing, and quarantine of all confirmed and potential cases; contact tracing; financing; and development of vaccines and clinical trials for novel therapeutic targets do not vary by sex or other socially meaningful markers of difference in our society. Moreover, we need to dramatically increase our investment in the prevention and control of chronic diseases such as hypertension, diabetes, cardiovascular diseases, chronic renal disorders, and mental health disorders that may help us to reduce COVID-19 mortality among men. We can seize this moment to reimagine and redesign our health care and public health systems to consider men's health, which would have significant benefits for our health care institutions, public health system, and economy.

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Table

Table. Biopsychosocial Determinants and Associated Practice, Policy, and Clinical or Biomedical Intervention Strategies for Reducing Disproportionate COVID-19–Related Morbidity and Mortality Among Men

Determinants (Risk Factors)	Type of Strategy	Strategies (Varying Levels)
Clinical or Biomedical		
Comorbidities such as hypertension, cardiovascular disease, chronic kidney disease, diabetes, and chronic obstructive pulmonary disease	Practice	<ul style="list-style-type: none"> Educate men with comorbidities during routine visits, emergency encounters, and follow-up telephone calls about their susceptibility to COVID-19 and about when to obtain urgent care rather than stay at home for fear of contracting the virus. Reassure patients that new symptoms of myocardial infarction and stroke still need to urgently be addressed.
	Policy	<ul style="list-style-type: none"> Increase investment in primary prevention of chronic diseases.
Use ACEIs or ARBs	Clinical or biomedical	<ul style="list-style-type: none"> Physicians and medical researchers should consider consequences of withholding ACEIs or ARBs for men with hypertension. Clinicians should actively assess risks and optimize cardiovascular health.
Sex-dependent immune response and the presence of disease susceptibility genes	Clinical or biomedical	<ul style="list-style-type: none"> Design clinical trials and population health databases; consider sex as a biological variable that might affect drug efficacy, treatment options, and adverse outcomes. Consider immunologic sex difference in mitigation of disease and clinical trials that consistently investigate sex differences.
ACE2 and TMPRSS2	Clinical or biomedical	<ul style="list-style-type: none"> Unravel which cellular factors are used by SARS-CoV-2; review for insights into viral transmission; and reveal therapeutic targets for vaccines and medical therapy.
Behavioral		
Men who are at increased risk because of cardiometabolic or other preexisting risk factors or are at increased risk because they use tobacco, alcohol, or other drugs	Practice	<ul style="list-style-type: none"> Focus on helping men who have underlying conditions that increase their risk of COVID-19 mortality to change behaviors that could make it more difficult for their bodies to fight COVID-19–related conditions. Promote American Heart Association’s Life’s Simple 7, including smoking cessation, maintaining a healthy weight, adequate physical activity and balanced healthy diet and target values for cholesterol, blood pressure, and blood glucose
Men who perceive reduced susceptibility and severity of disease and engage in higher-risk behaviors	Policy	<ul style="list-style-type: none"> Pass risk-reduction policies.
	Practice	<ul style="list-style-type: none"> Encourage health professionals to educate men on how to reduce viral transmission. Engage men’s partners, families, and trusted loved ones about men’s unique biological or psychosocial risks.
	Clinical or biomedical	<ul style="list-style-type: none"> Develop and institute COVID-19–specific clinical and operational guidelines in specialties; these include patient education information on occupational risk mitigations, recognizing signs and symptoms of COVID-19 infection, hand hygiene, surface decontamination, and protecting family members.
Men tend to delay seeking clinical care for COVID-19 symptoms	Practice	<ul style="list-style-type: none"> Eliminate barriers associated with underutilization of health services and improving health literacy. Engage men’s partners and families to support and encourage symptomatic men to seek care. Engage community health workers to provide direct outreach to men with comorbidities to provide culturally and linguistically appropriate preventive care.
	Policy	<ul style="list-style-type: none"> Increase access to community-wide testing; eliminate costs of testing and other barriers. Collect data related to COVID-19, including data on testing, hospitalizations, intensive care unit admissions, and fatalities, disaggregated by race, ethnicity, sex, and gender at the local and national level to help distribution of resources.

Abbreviations: ACE2, angiotensin-converting enzyme 2; ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; TMPRSS2, transmembrane protease, serine 2.

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COMMENTARY

The Critical Need for a Population Health Approach: Addressing the Nation's Behavioral Health During the COVID-19 Pandemic and Beyond

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PEER REVIEWED

Summary

What is known about this topic?

Behavioral health needs in the United States are not being met by the current health care system, and the COVID-19 pandemic will likely dramatically increase the need for psychological services.

What is added by this report?

Adopting a population health approach provides opportunities to target interventions to those populations and communities most in need of psychological health care services, with the potential of preventing development of disorders.

What are the implications for public health practice?

Implementing and evaluating population health strategies to promote overall well-being requires system change that translates to policy decisions and programs to meet the needs of local communities.

Abstract

The COVID-19 global pandemic highlights the necessity for a population health approach to identify and implement strategies across systems to improve behavioral health. Adopting a population health approach helps to address the needs of the total population, including at-risk subgroups, through multiple levels of intervention and to promote the public's behavioral health and psychological well-being.

Introduction

Calls to bring a population health framework to the nation's health care system have been increasing. Although this approach had been steadily gaining traction for physical health (1), using this approach with respect to behavioral health (ie, mental health and substance use conditions) has only recently been considered (2,3). However, the need for this approach has never been so apparent as it is during the coronavirus disease 2019 (COVID-19) pandemic. Individuals and communities are grappling with the spread of the virus, the struggle to effectively treat all infected individuals, and the challenges of physical distancing and quarantine, all while attempting to reopen the economy. These challenges, along with the economic impact of prolonged school and business closures and high levels of stress and uncertainty, exact a tremendous psychological toll on many people in the United States (4). The existing capacity of the US health care system to address the resulting behavioral health needs is severely limited (5). A population health approach is needed to address the impact of the COVID-19 pandemic and the inadequacies of the nation's current approach to behavioral health needs, which have been magnified during the pandemic (6).

The current approach to behavioral health care in the United States is primarily a one-on-one approach that focuses on individuals who have a clinical diagnosis (7). This approach drastically limits the number of people for whom the appropriate level of care is available, let alone addressing the needs of those whose level of psychological distress does not reach the diagnostic threshold. As a result, many people with high levels of stress and uncertainty are left without appropriate psychological support and miss the opportunity for prevention and early intervention.

The Definition and Application of Behavioral Health

Behavioral health encompasses traditional mental health and substance use disorders, as well as overall psychological well-being



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(8). Behavioral health can be understood as the behaviors that affect physical and mental health, and good behavioral health results in a “state of mind characterized by emotional well-being, good behavioral adjustment, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life”

(9). Obtaining and maintaining behavioral health requires flexibility, the ability to understand and manage emotions, engaging in behaviors that are healthy for the body and the mind, awareness of one’s relationship to others and recognition of one’s responses, and effectively employing strategies to deal with the demands of living.

The manifestation of behavioral health varies over the lifespan and across cultures. Similarly, the large number of factors that influence behavioral health must also be acknowledged: genetics, family environment, discrimination, socioeconomic status, traumatic experiences, physical health, loneliness, culture, and a host of others (10). Supporting behavioral health often means addressing social determinants of health through an array of social and community factors (11). For instance, when individuals and communities lack economic stability, physical survival alone can be a challenge. The focus is on getting what is needed to live, which will not necessarily include what is needed to thrive. Integrating behavioral health with community access to job training programs is one example of increasing access to behavioral health services and to psychological skill development to help individuals navigate the challenges of seeking employment.

We need to be as concerned about a population’s psychological well-being as we are about its physical well-being. Psychological well-being is neither a categorical nor a permanent state. That is, people are not either mentally healthy or unhealthy (eg, meeting diagnostic criteria for a psychological disorder, such as depression or schizophrenia; developing a substance use problem). A person’s or population’s overall psychological well-being falls on a continuum and changes over time. To truly recognize and support degrees of mental wellness on that continuum requires changing how we identify and meet the behavioral health needs of the population.

Specialist Health Care Framework Is Insufficient

How behavioral health is addressed within our health care system must change. Currently, one must typically have a diagnosis to have care covered by insurance; therefore, early intervention and prevention is difficult, and in many places in the United States, access to services is limited (12). Furthermore, specialist behavioral

health care professionals, such as psychologists and psychiatrists, work in settings distinct from where most of individuals live, work, play, and worship, creating both physical and psychological barriers to access.

Although more integration of professionals who specialize in behavioral health care into primary care and other settings has occurred, the trend is not universal and it does not go far enough in reaching people in other settings. In instances in which this integration has occurred, the behavioral health expert has the capacity to immediately meet with individuals who have identified behavioral health needs, triage the concerns, and determine appropriate next steps, thereby reducing the number of individuals who are “lost” in the transition to specialty care. Also, the psychologist or other behavioral health care professional frequently provides consultation and support to nonbehavioral health care professionals, helping to educate them as well as reduce the stigma often associated with patients who have behavioral health care needs (13). Integrated care improves on our current approach by providing a range of interventions and reaching people “where they are” (13). This approach, similar to a population health approach, emphasizes addressing behavioral health needs — regardless of whether the person has a diagnosis — and building the capacity of the setting to address behavioral health needs along a continuum.

Addressing behavioral health within the health care system alone is not sufficient. Many individuals do not have a regular primary care provider. Of those who do, the behavioral health needs being addressed are those further along the continuum toward distress, impairment, and disorder. Because only 50% of individuals with behavioral health concerns actually enter any form of treatment (14), we must develop new strategies to reach people wherever they are — at work, in school, and in the community. Furthermore, we must engage the communities themselves, which have the wisdom to address many of these problems but may need the resources and expertise of mental health professionals to do so.

Scope of Needs During the COVID-19 Pandemic

Behavioral health needs have long been insufficiently met in the United States, and the population is now facing increasing psychological stress and significant growing needs as the pandemic unfolds (15). According to a survey conducted by the American Psychological Association (APA), the average stress level reported by US adults in May 2020 was significantly higher than that reported in the 2019 survey (data collected in August), and it is the first significant increase in average reported stress since APA first started surveying American households about stress more than a decade ago (16). Furthermore, some groups in the APA survey, such as

parents with children younger than 18 and Hispanic adults, reported even higher levels of stress. Stress that is not addressed can become chronic and result in physical and behavioral health problems such as cardiovascular disease, obesity, inflammation, and depression (17).

Analyses from previous pandemics (18,19), as well as studies about COVID-19 coming from China (20) and Italy (21), indicate that we should expect an increase in a variety of behavioral health symptoms, especially among front-line health care workers. Emerging data suggest that health care workers treating individuals with COVID-19 are reporting significant distress and symptoms of depression, anxiety, and insomnia (22). At a minimum, those on the front lines of addressing COVID-19 need onsite emotional support and the capacity to meet their own basic needs such as obtaining food, transportation, and personal protective equipment. Some of those on the front lines experiencing distress will want and benefit from more focused, brief psychological interventions intended to provide them with skills that enable them to cope with highly stressful work situations (eg, Psychological First Aid, Skills for Psychological Recovery) (23). Unfortunately, many hospitals are not set up to provide this kind of psychological support (24,25).

Furthermore, a 2020 systematic review of the psychological impact of quarantine indicated that individuals experience an array of negative effects, including anger, confusion, and posttraumatic stress symptoms (26). These effects are heightened when quarantine is of a longer duration, people have fears of infection, receive inadequate or unclear information, and face financial loss. If the pandemic is similar to other community traumas (27), most individuals will adapt and demonstrate resilience, but a minority will develop a behavioral health condition that requires intervention.

The long-term population health needs resulting from the pandemic could be substantial. Although humans are remarkably resilient, some individuals benefit from psychological intervention. In addition to workers on the front lines (eg, health care professionals, essential workers) who may develop disorders such as depression or posttraumatic stress disorder as a result of their experiences treating individuals with COVID-19, many other segments of the US population (and worldwide) are also likely to need interventions in some form. In the current environment of quarantine and physical distancing, patients with COVID-19 are typically separated from their families and do not have the benefit of the close emotional support and physical help of their loved ones.

The families and friends of patients with COVID-19 experience high levels of stress, which is magnified in cases in which they are unable to be present when their loved ones die. Furthermore, because traditional funerals and other rituals are not possible in the

current environment, survivors must create new ways to mourn. Individuals who survive COVID-19 may have major behavioral health needs that we are only beginning to understand. For instance, research makes clear that the experience of being on a ventilator and staying in an intensive care unit for an extended period of time can be traumatic (28,29). Some individuals may face cognitive challenges as they recover from the infection, which necessitates specialized behavioral health care (30).

In addition to the large numbers of individuals who have had direct experience with COVID-19, the US population has also experienced some degree of stress as a result of the nation's sweeping efforts to reduce transmission of the virus. Many individuals have struggled to cope with the uncertainty of stay-at-home orders, changes in work and financial status, facilitating their children's online schooling, virus-related discrimination, and major disruptions in routines and plans. Each of these factors poses the potential for the development of ongoing stress and its fallout. Of particular concern are people facing both significant financial distress and experiencing discrimination, as both of these stressors are linked to the development of future behavioral health problems (31,32).

Adopting a Population Health Framework

In the face of this kind of population distress, the importance of using public health strategies, rather than relegating behavioral health to treatment by specialist providers only, cannot be overstated. Promoting population behavioral health has the potential to increase overall resiliency and reduce the number of individuals who ultimately develop behavioral health problems, and improvements in behavioral health can also lead to improvements in physical health (33). This crisis, although difficult, can provide an opportunity to make this shift. Philadelphia (34) and New York City (35) have adopted a population health approach to behavioral health and provide models for how to begin. Key aspects of this work include the necessity of reimagining what a behavioral health system is and how one operates and to establish a broad, evidence-based vision of what that entails.

This change needs to happen both at the national and the local level. National leadership can highlight issues, advocate for resources, and encourage solutions, but implementation must take place at the local level to best meet community needs. Unfortunately, many local health governments are not actively engaged in systematic activities to promote behavioral health. Although local leaders often recognize the priority of doing so, they often do not control the behavioral health resources in their communities, which are often administered at the state or county level. Con-

sequently, local leaders cite as barriers limited resources, knowledge, and data along with the challenges of communicating and collaborating with local behavioral health agencies (36). Increasing partnerships between these local governments and behavioral health funding agencies is essential for success.

The American Psychological Association (APA) is using a population health framework to tackle the emerging behavioral health issues associated with this pandemic. APA has identified several principles to guide this work (Box), conceptualized as taking place across 3 broad levels of the population: 1) those with behavioral health conditions requiring clinical intervention, 2) those who are experiencing subclinical psychological distress or who are at great risk for experiencing clinically significant behavioral health problems, and 3) those who are relatively healthy.

Box. Principles Guiding Population Health Framework for Behavioral Health at the American Psychological Association

- Use data and the best available science to inform policies, programs, and resources.
- Prevent when possible and otherwise intervene at the earliest moment.
- Strategize, analyze, and intervene at the community/population level (in addition to the individual).
- Reach broad and diverse audiences through partnerships and alliances.
- Utilize a developmental approach (eg, change over time, age-appropriate interventions).
- Consider the “whole person” and the structural/systemic factors impacting individual behavior.
- Be culturally sensitive while also thinking transculturally.
- Recognize that inherent in every community is the wisdom to solve its own problems.
- Champion equity by addressing systemic issues (eg, social determinants of health, access to treatment).

Strategies and interventions must be tailored to achieve the health goals at each of these levels. *Indicated* approaches to behavioral health target the first level. These approaches are often provided by specialists, such as psychologists, to individuals with clear problems or disorders and use evidence-based strategies to reduce symptoms and improve functioning. *Selective* approaches to behavioral health are designed to reduce risk or mitigate the impact of risk factors that lead to psychological distress, for example using targeted, scalable interventions designed to build people’s ability to adapt and cope. *Universal* approaches are intended to promote general behavioral wellness, with a focus on messages to the public to destigmatize mental illness, promote psychoeducation about responses to stress, and focus attention on the foundation necessary to support and maintain psychological well-being.

A population health approach has, as its goal, optimal behavioral health and wellness across the continuum of need. This approach addresses the need to “get upstream” as it promotes intervention before individuals need clinical services. It also shifts the goal of practitioners to behavioral wellness and not just the absence of psychopathology. Because this is a significant paradigmatic shift for most behavioral health professionals and the systems in which they work, we will need to develop leaders and professionals who can work from this public health perspective. From a systems perspective, individual localities should determine their own needs and collaboratively work with local experts — members of the public, scientists, providers, policy makers, and others — to design and implement the programs that each community needs.

Implications for Public Health

The pandemic has elevated stress levels nationwide, with serious implications. Chronic stress is linked to greater risk for a range of adverse health outcomes, so adopting a rigorous, evidence-based approach to identifying needs and designing interventions is critical. In the United States, there have been some effective public education campaigns to encourage handwashing, physical distancing, and mask wearing to slow the spread of the coronavirus. Similarly, key messages can be developed and used to increase the public’s capacity to handle stress, cope with the current uncertainty, and manage distress to slow the development of behavioral health problems. The opportunity to act is now, before a behavioral health pandemic develops and accelerates and too many lives are disrupted or lost.

Using a population approach to behavioral health holds much promise. It will allow us to address many long-standing issues that affect our current behavioral health system by placing a greater emphasis on prevention and early intervention and by reaching underserved subgroups. It will also enable us to simultaneously and effectively address the potential surge in need caused by the COVID-19 pandemic. The challenge will be reorienting and training the workforce to adopt this perspective, develop new interventions, and build the service infrastructure to meet a broader range of behavioral health needs. Furthermore, we need to develop a fiscal and regulatory policy framework to support this work. Finally, evaluation of these changes can be essential to determine how future population health approaches can be effective at improving not only the psychological well-being of those impacted by COVID-19 but also the overall behavioral health of the US population. Although there are important examples of the successful implementation of a population mental health approach, these are rare exceptions. The behavioral health pandemic that is likely to emerge as a result of COVID-19 creates urgency and should spur immediate action. We have a window of opportunity where

the public and policy makers can see firsthand that behavioral health concerns are affecting a large proportion of the population and that we need an approach and the resources to address the full range of these concerns. Action must be taken for the health and well-being of our nation.

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COMMENTARY

Culture Matters in Communicating the Global Response to COVID-19

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PEER REVIEWED

Summary**What is already known on this topic?**

The World Health Organization developed risk communication and community engagement (RCCE) to facilitate global response to COVID-19. RCCE communicates about individual risks but communicates little about community risks.

What is added by this report?

Community engagement requires knowledge of culture in framing COVID-19 communication and messaging. The PEN-3 cultural model was used to frame community engagement for collective actions.

What are the implications for public health practice?

COVID-19 reveals existing structural inequity in black and brown communities nationally and globally. PEN-3 offers a cultural framework for community-engaged communication and messaging for COVID-19.

Abstract

Current communication messages in the COVID-19 pandemic tend to focus more on individual risks than community risks resulting from existing inequities. Culture is central to an effective community-engaged public health communication to reduce collective risks. In this commentary, we discuss the importance of culture in unpacking messages that may be the same globally (physical/social distancing) yet different across cultures and communities (individualist versus collectivist). Structural inequity continues to fuel the disproportionate impact of COVID-19 on black and brown communities nationally and globally. PEN-3 offers a

cultural framework for a community-engaged global communication response to COVID-19.

Introduction

Our primary aim in this commentary is to offer a community-engaged communication strategy that focuses on coronavirus disease 2019 (COVID-19) messages in cultural context. COVID-19, the disease caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a global pandemic on March 11, 2020. Since that time, messages of prevention have focused primarily on preventing individual risks, particularly for those with preexisting chronic conditions, including hypertension, diabetes, stroke, and asthma. As infection and death rates grow, communication about response to the pandemic has increasingly focused on individual behavior choices, which assumes that prevention is largely in an individual's control. In efforts to promote uniform messaging for COVID-19, the World Health Organization developed a multilevel risk communication and community engagement (RCCE) response strategy for health care workers, the wider public, and national governments (1,2).

Well intentioned as RCCE may be, the strategy ends up focusing more on individual risk and less on community engagement. By community engagement, we mean creating spaces and opportunities for those who live in the community to have their voices heard in naming the problem and offering solutions to the problems they face (3). The process of such engagement also includes identifying community resilience and ways to build on values that are important to the community. Communication about individual risk is important, but prevention and control messaging is more likely to be achieved when we engage the voices of those who live in the communities, particularly communities that bear the heaviest burden of the pandemic.

Vulnerability to the COVID-19 pandemic cannot be fully explained by individual risks alone but rather by broader social and structural determinants of health that result in inequities in com-



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munities where vulnerable populations live, work, play, pray, and learn (4–6). Moreover, a disproportionate burden of COVID-19 mortality is among racial and ethnic populations in communities that have had historical inequities in health (7–9). With increasing global mortality, a deep concern remains about the alarming levels of general spread, disease severity, and inaction for these communities (10). Research on health disparities, particularly on anti-racism (11), demands a focus on risk environment and risk situation rather than the conventional epidemiologic focus on risk factor, which tends to place the burden of behavior change on individuals rather than the context and structure that define and confine their vulnerability (12–14). Thus, community-engaged communication is crucial for acknowledging the voices of those in the community with culturally relevant solutions that are more likely to be sustained beyond the pandemic. Communities that are the most affected experience historical, structural inequities that create not only their preexisting chronic health conditions but also their preexisting vulnerable living and working conditions (15). To understand these communities, the role of culture matters if any communication strategy is to be adopted or sustained.

Culture and Communication for Health

Culture is central to effective COVID-19 messaging for community engagement. We define culture as a collective sense of consciousness that influences and conditions perception, behaviors, and power and how these are shared and communicated (3). Culture may appear neutral, but its power to define identity and communities as a collective is based on values expressed through institutions such as health care, education, and families (3). Culture shapes language, which in turn shapes communication both in message delivery and reception. In response to COVID-19 in Europe, for example, cultural sensitivity to racial and ethnic minority group experiences is believed to be critical if messages for mitigation are to have broader impact (16).

Framing communication messaging that engages the most affected communities can draw some lessons from the multilevel strategies employed in HIV communication, which identify relevant structural factors of institutional policy, economic status, gender, and spirituality while grounded in the force of culture (17,18). For example, as part of HIV communication strategy, the concept of “zero grazing” was introduced in Uganda as a prevention message for multipartner marriages by encouraging that sexual activities be kept within the circle of those in the marriage only. This message was a community collective response to the conventional individualist message of one-to-one sexual relations.

For COVID-19, some black and brown communities have initiated collective communication for mitigation so that messages

have cultural meanings for those with whom they share common cultural values. For example, although heavily affected by COVID-19, some indigenous communities in the United States have sought their own solutions to this pandemic by using traditional knowledge and language to promote voluntary isolation at the individual level and sealing off their territories at the community level (19) while still being able to continue aspects of their spiritual well-being (20). Thus, to rapidly improve our communication messages in response to COVID-19, we need an effective global response that invites community-engaged solutions with culture as a connecting space.

Culture is key to the global response to community engagement. COVID-19 unveils a pattern of cultural insensitivity that has also been evident in communication about Ebola. In the early stages of the Ebola outbreak in 2014–2015, conventional messages did more harm than good because they did not value the cultural roles associated with death. Two examples of these messages were, “When you get Ebola, you will die” or “If someone is sick, don’t touch him.” In Liberia, the high death rate from malaria and other diseases among the poor blunted messages for urgency to heed prevention and treatment of Ebola (21). In the West Point slum of Monrovia, Liberia, for example, adhering to physical distancing for Ebola and now COVID-19 is made difficult by sea erosion from the past 10 years, which reduced the land mass by 50%, even though the same number of people remain. Structural inequities often reveal the limit of individual choices in the absence of corrective actions to address contextual constraints over which the community has no control. These constraints are the preexisting contexts of inequities in many black and brown communities globally (5,22).

We believe that COVID-19 mitigation efforts that focus on individual behavior such as handwashing and physical distancing must be balanced with structural mitigation efforts such as clean water, access to housing, unemployment, and for those with jobs, ability (type of job) and tools (access to computer and internet) to work from home. These are the daily realities of racial/ethnic and economically disadvantaged populations that bear the heaviest burden of the pandemic (22). Yet as has been learned from HIV (23) and Ebola (21), culture offers communication messaging that ranges from positive aspects of lived experience that should be promoted to negative practices that should be overcome within the context of communities. To frame approaches to communications and community engagement for COVID-19, we use the PEN-3 cultural model (Figure). We believe that this model offers a roadmap for engaging communities in communication about COVID-19 mitigation efforts.

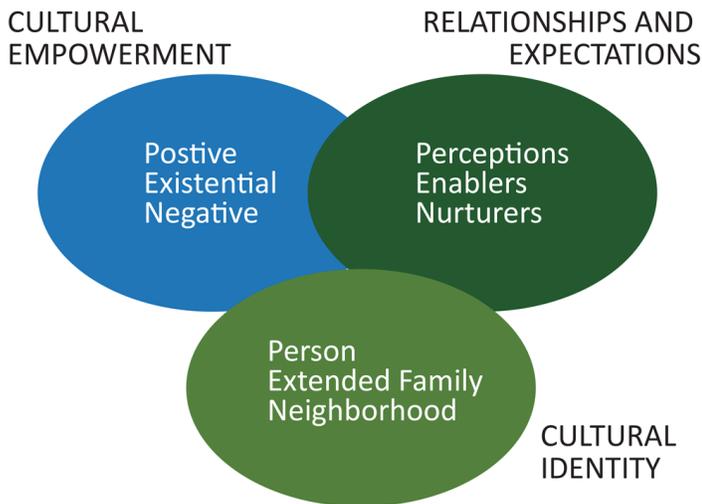


Figure. The PEN-3 Model. The model has 3 primary components: cultural identity, cultural empowerment, and relationships and expectations, and each of the 3 components has 3 domains.

PEN-3 Model and Communication Response to COVID-19

PEN-3 is a cultural model that was developed and first published in 1989 (24). The PEN-3 cultural model consists of 3 primary domains: 1) cultural identity, 2) relationships and expectations, and 3) cultural empowerment. Each domain includes 3 factors that form the acronym PEN; person, extended family, neighborhood (cultural identity domain); perceptions, enablers, and nurturers (relationship and expectation domain); positive, existential and negative (cultural empowerment domain). The domains are described in detail elsewhere (3). A key outcome of using PEN-3 is learning to first identify the positive aspects of behavior and culture such that negative behavior is not the only focus of intervention, as shown in a systematic review (25). At the height of the global HIV stigma and racism against the cultures of black and brown identities, PEN-3 was developed to offer a space for voices to be heard that are otherwise silenced. The model was designed to guide researchers and practitioners to listen to those voices, and in so doing, to ask for not only what these communities were doing wrong but to begin with what they are doing correctly. Culture exists where we live, work, play, pray, and learn. In PEN-3, the focus on cultural logic of decision making about a pandemic is less about who is right or wrong than about what societal reasoning and rationale are at the foundation of the message. Even more important is which populations and communities are the intended audience for messages meant to be solutions. Thus, the importance of the positive aspects of a community and people, their collective resilience, and

their cultural logic must not be overshadowed by the presence of diseases, as we have learned from the work on HIV and Ebola and now COVID-19. Therefore, reframing COVID-19 communication messages globally must respond not only to individuals but to the community as a collective. Individuals must not be privileged over the collective or community.

Science also has culture. The application of the PEN-3 model to COVID-19 communication also applies to the scientific community whose task it is to solve the disparities unveiled by COVID-19. To acknowledge that the scientific community exists within 1 or more cultures is to remove it from the pedestal on which it has rested for so long in ways that are well beyond any reproach and critique of the notion that science is inherently value-free (26). Indeed, questions about the effectiveness of social distancing have contrasting beliefs between a country like Sweden (which does not believe in social distancing) and the United States (which does); yet both are based on scientific claims, confirming that science is itself a production of culture and politics. In focusing on the PEN-3 domain of cultural empowerment, for example, the positive and existential dimensions of scientific culture are eagerly and frequently promoted by the scientific community. However, the negative dimensions evident in contrasting recommendations must also be examined, because they create communication challenges. To remedy the challenges requires messaging that promotes cultural inclusivity in the responses to the COVID-19 pandemic.

For years, science ignored the role of structural racism in explaining and predicting disease burdens. Yet it is structural racism that created and maintains communities in which preexisting chronic health conditions such as hypertension and diabetes exist. Therefore our communication should address actions we take at the individual level, risks we face at the collective and community level, and the role science plays in promoting or hindering mitigation efforts. Thus, for COVID-19, PEN-3 offers the importance of cultural empowerment anchored in community-engaged mitigation efforts. We need to focus on both individual risks and community engagement and in so doing address 3 binarisms that must be coalesced to advance global communication for COVID-19. To illuminate the power of culture in community engagement, each of the PEN-3 domains is paired with a binary that needs to be understood and coupled in communication about COVID-19.

Preexisting Chronic Conditions and Preexisting Structural Contexts: Cultural Empowerment

Whereas the language of risk factors focuses on individual preexisting chronic conditions such as diabetes, hypertension, and

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asthma, the language of health disparities and risk environments focuses on preexisting community contexts. These include unhealthy food structures, unemployment environments, poor housing (eg, intergenerational cohabitation), and job types that define and confine vulnerability to COVID-19. The language of individual risk has been used to frame the prevention message of social distancing and wearing a mask. Yet, a recent commentary concluded that physical distancing is a privilege for populations with preexisting contexts that reinforce not only vulnerability to conditions like diabetes but also living conditions that make it impossible to adhere to physical distancing (27). Several recent publications have emerged in which scholars have lamented the heavy racial burden of COVID-19 on African American, Latino, and Native American populations in the United States (8,9,28). Similar alarm has been raised in Europe, particularly among immigrant populations (16) and in Brazil, which has one of the highest number of cases in the world. In Brazil, nearly 6% of the population, which is mostly black, live in favelas (slums or shantytowns located within or on the outskirts of the country's large cities) and are exposed to social and environmental vulnerability with poor access to water and employment, among other needs (29). Socio-spatial inequality determines the patterns of Brazilian cities and the disposition of housing conditions, which limit adherence to the health policy of social isolation. This accumulation of disadvantages represents structural risks for any health condition, which has resulted in high prevalence of many neglected diseases in these vulnerable areas in Brazil. In South Africa, particularly in the absence of official data based on race/ethnicity, the government downplayed racial/ethnic vulnerability until the premier of the Province of Gauteng, which includes Johannesburg, revealed that the hotspots of COVID-19 in his province were shifting from the suburbs, where most whites live, to townships, where most blacks and people of mixed race (known as coloreds) live (30). In many Nigerian cultures, certain cosmological viewpoints suggest that fate determines diseases and ill health and that these are independent of science and human actions (31). The cultural empowerment domain of the PEN-3 model allows COVID-19 interventionists to look at the total context, including how people construct their lived experience within their resilience and the hurdles in their communities. COVID-19 communication should begin with positive factors, such as persistence and resilience, to achieve solutions that nurture and revive the community. To better understand the role of culture in a pandemic we can draw lessons from 2 pandemics that remain with us today, HIV and Ebola (Table).

Individualist Versus Collectivist: Cultural Identity

Every society has a social contract that frames the ways we act and prioritize decisions and choices: as individuals, such as in the United States, as the collective as in China, or some mix of those forms as in Canada and France. One of the key lessons for a global response to a pandemic is that the cultural logic of different societies shapes and influences their prevention strategies. In the United States, individual vulnerability to risk is culturally privileged over community risk, when both should be addressed equally. Such coalescing of dual logics is embodied in the cultural messages from the yin and yang (coexistence and balancing of opposite forces) that may inform messaging in China; Ubuntu (I am because we are) in South Africa; and the expression “Nit nittay garabam” (The person is the remedy of the person) in Wolof in Senegal (32). These cultural expressions are different, neither better nor worse than individualist cultural logic that typically informs messaging in the United States. In China, for example, quarantine was implemented in Wuhan as a collective action to varying degrees and scopes. At the individual level, everyone was mandated to stay at home, and a permit to leave home could be obtained only from a community committee made up of volunteers. At the city level, all city entries and exits were screened; all public transport was discontinued including public bus, subway, ferry, and taxi. This response reflected the collectivist social and cultural contract of Chinese society (33). Thus, when a message of response in one country is communicated in another as draconian, for example, we need to unpack the different rather than competing cultural logics that inform these messages, particularly in a pandemic. Given the virulence of COVID-19, communication messages must be inclusive of multiple cultural logics whereby the word “and” is preferred over the word “or”. In the book entitled *Built to Last* (34), the authors debunked the competing binarism of and/or in their study of the characteristics of successful and enduring visionary companies. In advancing the phrases, the “tyranny of the or” and the “genius of the and,” the authors made the case for why duality is a strength and not a competition in which one side has to win. COVID-19 messaging globally should embrace cultures and communities with the genius of the “and” by not privileging any one culture over another. The late Chinua Achebe, a Nigerian novelist, once noted that for collective cultures, wherever one idea stands, it is absolutely necessary to expect another idea to stand next to it (35). Thus, instead of thinking in single cultural logic, we have to embrace multicentric logics – individual, collective, and everything in between.

Noncommunicable Diseases and COVID-19: Relationship and Expectation

As the world is consumed with the COVID-19 pandemic, there remains a silent pandemic of noncommunicable diseases (NCDs) that now coexist in the same communities most affected by COVID-19. The response to NCDs in the context of COVID-19 should remain a top priority as part of structural solutions to inequities. To promote equity, we must address the structural determinants of health by first addressing structural racism, which is inscribed in institutional policies and practices that have created and sustain the disproportionate burden of hypertension, diabetes, and other NCDs in the black and brown communities (5). Thus, structural racism is a key determinant of such NCDs as hypertension, diabetes, stroke, and asthma (6). NCDs are the leading cause of death worldwide, with the most significant burden placed on low-income and middle-income populations in terms of premature deaths. In the United States, racial minorities, specifically black, Latino, and Native American populations, are the most burdened by NCDs (36). Indeed, the leading causes of death in these populations are heart disease, cancer, unintentional injuries, chronic lower respiratory disease, stroke, and cerebrovascular diseases, which together account for approximately 65% of total deaths (37). Thus, the NCD burden exists in the same population where COVID-19 exists. Our communication messaging, therefore, should erase a binarism of competition that leads to a pandemic *or* NCDs rather than COVID-19 *and* NCDs. The behaviors and context that favor one condition are likely to favor the others. Indeed, where NCD stands, infectious diseases like COVID-19 are likely to stand next to it. The messages of COVID-19 prevention in social and physical distancing and wearing masks are important solutions, but their sustainability depends on adequate response to disparities in the burden of diabetes, asthma, and other NCDs that are preexisting chronic conditions. Structurally, social distancing is problematic in South African townships, Brazilian favelas, and Nigerian slums where people share with one another basic essentials, such as sugar or salt when they run out of stock. The situation is further exacerbated by the lack of access to potable water in many of these communities including the *quartiers* of Senegal, the town of Khayelitsha in South Africa, favelas in Brazil, slums of Nigeria, and Flint, Michigan, in the United States. Communication and messaging for COVID-19 should also focus on us as health scientists and professionals by looking to ourselves for the same needed cultural transformation that we expect from communities responding to NCD pandemics as we do for infectious pandemics. Similar to Ebola (38) and HIV, COVID-19 revealed the falsehood in the separation of disease burdens by how they come to inhabit our bodies. This is the time for communication

and messaging to focus not only outward to the community but also inward toward public health experts who frame the messages. How we respond now to COVID-19 is how we must respond to NCDs like hypertension, diabetes, obesity, cholesterol management, and asthma, because these disorders are constant reminders of persistent inequities in our communities.

Implications for Public Health

COVID-19 communication and messaging should address community risks at least as much as individual risks. PEN-3 offers a communication framework that engages the community by promoting positive factors, acknowledging unique factors, and preventing negative factors. There is a limit to the culture(s) of science, and scientists should reexamine the negative dimensions of scientific cultural solutions to the pandemic. Research and evaluation are also needed to embrace alternative perspectives and the culture of policy and politics that influence the choice of architecture for communication and messaging strategies. Such research and evaluation, for example, on communicating risk mitigation, should democratize scientific research and empower communities to advance solutions to the root causes of health inequities and strategies to improve their own well-being (39). By offering a model for effectively engaging communities, PEN-3 also focuses on mutual community-centered strategies, highlighting not only the perceptions that matter but also the enablers or resources and nurturers or collective roles that foster community agency and voice in mitigating the COVID-19 pandemic. Moreover, to the extent these strategies center equity, they enable culturally grounded approaches to scientific inquiry and challenge the field from within itself to honor community agency and resilience. These alternative perspectives can accelerate efforts in health equity by identifying and addressing the underlying structural determinants of inequities, such as structural racism, that lead to the disproportionate burden of COVID-19 cases and deaths among racial/ethnic minority groups. Ultimately, the goal of COVID-19 communication and messaging within culture is to mitigate increase in new cases and deaths, address preexisting structural contexts, and ultimately advance global communication messaging that promotes health and social justice for this pandemic now and others in the future.

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Table

Table. Application of the PEN-3 Cultural Model to COVID-19, Ebola, and HIV

PEN-3	COVID-19	Ebola	HIV
Perceptions	++Knowledge about 80% exposure with little or no illness ==Pandemic affected all countries, rich and poor -Awareness did not translate into action for prevention, therefore the need to modify messages	++Knowledge of virulence of the disease ==Pandemic affected mostly West and Central Africans -Awareness did not translate into behavior change, therefore messages had to be modified to fit cultural context	++Knowledge of behaviors that lead to vulnerability ==Different contexts and factors of vulnerabilities -Awareness did not translate into behavior change
Enablers	++Availability and use of protective personal equipment, such as masks and gloves ==Traditions like burial were partly affected -Health care providers do not have all the support they need to care for those infected	++Availability and use of protective personal equipment, such as masks and gloves ==Traditions like burial were fully and directly affected -Health care providers do not have all the support they need to care for those infected	++Availability of male and female condoms and needle exchange programs ==Traditions like marriages were directly affected -Health care providers do not have all the support they need to care for those infected
Nurturers	++Family members caring for loved ones even when there is risk ==Cultural identity-based messaging about community inequities as response to COVID-19 and noncommunicable diseases -Family members losing their jobs and not being able to provide basic needs for loved ones	++Family members caring for loved ones even when there is risk ==Culture-based solution such as traditional leaders (eg, chiefs overseeing burial rites) -Family members losing their jobs and not being able to provide basic needs for loved ones	++Family members caring for loved ones even when there is risk ==Culture-based messages such as monogamy for individualists and “zero grazing” for collectivist contexts -Job discrimination against those infected

Key: ++ positive to be promoted; == existential to be recognized; - negative to change.

COMMENTARY

Incorporating Geographic Information Science and Technology in Response to the COVID-19 Pandemic

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PEER REVIEWED

Summary

What is already known about this topic?

Incorporating geographic information science and technology (GIS&T) into COVID-19 pandemic surveillance, modeling, and response enhances understanding and control of the disease.

What is added by this report?

Applications of GIS&T include developing spatial data infrastructures for surveillance and data sharing, incorporating mobility data in infectious disease forecasting, using geospatial technologies for digital contact tracing, integrating geographic data in COVID-19 modeling, investigating geographic social vulnerabilities and health disparities, and communicating the status of the disease or status of facilities for return-to-normal operations.

What are the implications for public health practice?

Protections for individual privacy and close collaboration among the fields of geography, medicine, public health, and public policy to use GIS&T are imperative.

Abstract

Incorporating geographic information science and technology (GIS&T) into COVID-19 pandemic surveillance, modeling, and response enhances understanding and control of the disease. Applications of GIS&T include 1) developing spatial data infrastructures for surveillance and data sharing, 2) incorporating mobility data in infectious disease forecasting, 3) using geospatial technologies for digital contact tracing, 4) integrating geographic data in COVID-19 modeling, 5) investigating geographic social vulnerabilities and health disparities, and 6) communicating the status of the disease or status of facilities for return-to-normal operations.

Locations and availability of personal protective equipment, ventilators, hospital beds, and other items can be optimized with the use of GIS&T. Challenges include protection of individual privacy and civil liberties and closer collaboration among the fields of geography, medicine, public health, and public policy.

Introduction

The spread of infectious disease is inherently a spatial process; therefore, geospatial data, technologies, and analytical methods play a critical role in understanding and responding to the coronavirus disease 2019 (COVID-19) pandemic. Geographic information science and technology (GIS&T) is the academic field centered on geospatial data and analysis. The field encompasses geographic information systems (GIS), spatial statistics and visualization, and location-based data derived from global navigation satellite systems (GNSS, eg, global positioning systems [GPS]) and remotely sensed imagery. Opportunities for incorporating GIS&T into COVID-19 pandemic surveillance, modeling, and response include 1) developing spatial data infrastructures (SDI) for surveillance and data sharing, 2) incorporating mobility data in infectious disease forecasting, 3) using geospatial technologies for digital contact tracing, 4) integrating geographic data in COVID-19 modeling, 5) investigating geographic health disparities and social vulnerabilities, and 6) communicating the status of the disease or status of facilities for return-to-normal operations. Locations and availability of personal protective equipment, ventilators, hospital beds, and other items can be optimized with the use of GIS&T.

Developing Spatial Data Infrastructures for COVID-19 Surveillance and Data Sharing

Current surveillance of COVID-19 at the national and global levels is built on lessons learned from maintaining previously developed databases of contamination and disease, such as FluNet



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(1). Disease surveillance systems have been enhanced by the use of GIS for monitoring disease outbreaks, facilitating contact tracing, and evaluating the efficacy of interventions. For example, Zenilman et al described the application of GIS to a surveillance system for sexually transmitted diseases at the Fort Bragg military base (2). The assessment of various potential risk factors indicated that geography was the only variable positively associated with gonorrhea among study participants. The Connect to Protect program is an example of how researcher–community collaborations (or community-based participatory research) can assist program planners to efficiently use limited resources (3). Connect to Protect, a nongovernmental organization, uses GIS and community involvement to prioritize resources and outreach activities. The research team uses GIS to evaluate the geographic epidemiology of sexually transmitted diseases and HIV among adolescents in 15 US cities and Puerto Rico. Their work led to a shift from traditional evaluations of condom use, number of sex partners, and demographic characteristics, to identification of socio-physical environments. The observation of clusters of cases in geographic areas informed research teams on where to apply interventions. The use of GIS supports the investigation of the social and environmental correlates of disease clusters, thereby facilitating targeted interventions and researcher–community collaborations to assist program planners to efficiently use limited resources (3).

An important aspect of monitoring the spread of infectious disease is spatial data infrastructure (SDI), composed of the human resources and institutions that create and maintain the foundation to which additional spatial data can be attached and used. Key components of an SDI include geospatial culture and awareness, resources for information and communications technology, common standards for data integration and interoperability, a legal framework for data security and privacy, a common lexicon, the use of robust statistical and epidemiological methods, and interdisciplinary collaboration and partnerships (4). Along with the SDI, the concepts of open data, crowd sourcing, and data sharing for georeferenced health data are important components of real-time infectious disease surveillance, particularly in under-resourced settings (5).

Maps play a key role in communicating the risks and spread of COVID-19 (6). Interactive web-based maps and dashboards present near–real-time data on morbidity, mortality, and recovery, as well as pandemic-related factors such as supply-chain quantities of personal protective equipment or therapeutics. A dashboard developed by Johns Hopkins University in collaboration with ESRI (Redlands, California), which originally showed the number of COVID-19 cases, deaths, and recoveries, was updated to show smaller geographic areas (ie, counties) and detailed infographics

(7). This type of infographic has been useful for tracking COVID-19 cases globally and for allocating resources and planning for “return-to-normal” conditions. Location-enabled infographics also allow for dissemination of knowledge on, for example, the readiness of facilities such as retail outlets to accept customers, or schools and campuses to reopen. An interactive dashboard (ESRI, Redlands, California), developed for faculty, staff, students, and administrators at the University of California, Berkeley, shows the status of custodians’ efforts to disinfect university buildings (Figure). The dashboard is populated in real time as custodial staff members complete disinfection of rooms. The room number and type (eg, classroom, laboratory, bathroom), the date and time completed, and the product used for disinfection appear in a pop-up on the dashboard when the user selects a building.

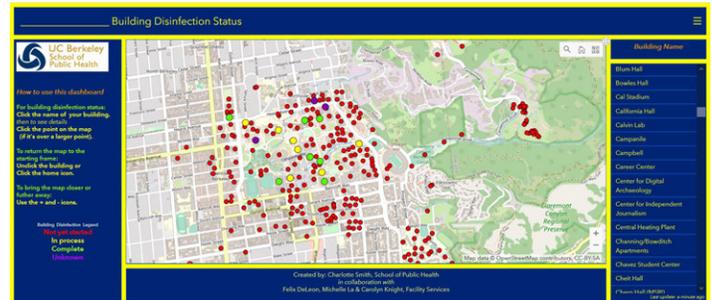


Figure. An interactive dashboard for showing the status of disinfection of buildings during the coronavirus disease 2019 (COVID-19) pandemic on the campus of the University of California, Berkeley.

The GIS&T community has long worked toward development of the National Spatial Data Infrastructure (NSDI) for the United States (8), an effort managed by the US Federal Geographic Data Committee (FGDC); facilitated by spatial data interoperability standards, such as those developed by the Open Geospatial Consortium (OGC); and recently bolstered by the Geospatial Data Act of 2018, a component of H.R.302, the FAA Reauthorization Act of 2018. The US NSDI is typically considered an infrastructure for geospatial framework data (eg, cadastral and transportation) and not necessarily health data; however, just as the events of September 11, 2001, catalyzed the development of enhanced spatial data sharing to support disaster response in the United States, the COVID-19 pandemic has the potential to spark the improvement of health data infrastructures to facilitate spatial data sharing and interoperability for health crisis response. A particular challenge is that SDIs for responding to a crisis like COVID-19 require sharing data not only among various national and international governments but, as with the US NSDI, also among various levels of government, including the federal, state, and county levels. Corporate partners also play a pivotal role in the development of SDI for pandemic response, because they have large sets of spatial data

on the mobility, purchasing, and web browsing behaviors of individuals and other relevant place-based and georeferenced data that may be useful in understanding disease dynamics. In addition, responding to a rapidly evolving health crisis such as the COVID-19 pandemic requires pipelines for supplying health and related data in near real time, which presents challenges. Finally, privacy protection for individuals is paramount in developing useful SDIs for pandemic response. As with the US NSDI, initiative and management at the federal level is likely necessary to develop an SDI for pandemic response.

Incorporating Population and Mobility Data in COVID-19 Forecasting

Along with handwashing and social distancing, perhaps the foremost mitigation strategy for reducing person-to-person contact and transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the absence of pharmaceutical intervention is regulation restricting mobility (ie, human movement and travel behavior). Consequently, one key role for geospatial technologies in responding to the COVID-19 pandemic is monitoring population distribution and mobility through the use of social media and location-tracking applications embedded in mobile telephones that employ GNSS, cell phone tower connections, and/or wireless connections (9). Several corporate location-data collectors and vendors have released spatially aggregated COVID-19 pandemic-related data on population mobility. These data have been widely used by the popular media to report on the effects of jurisdictional stay-at-home orders on population mobility and by researchers to analyze the efficacy of population mobility change for altering disease dynamics (10).

Modeling population distribution and mobility has a long history in GIS&T and focuses on fine-scale estimations of population distribution and mobility (11,12), most recently by using mobile telephone-based location data (13,14). The scholarly response to the pandemic marks a major advance in the incorporation of fine-resolution data on population and individual mobility from geospatial technologies to understand disease dynamics and formulate effective intervention strategies. Because questions remain about the best way to measure and collect data on individual mobility, provide such data to researchers, and incorporate such mobility measures into infectious disease models, the COVID-19 pandemic provides an opportunity for testing methods for using such data to evaluate and forecast the effects of nonpharmaceutical interventions that restrict mobility. However, current legal frameworks and practices for preserving the privacy of individuals are obstacles to widespread adoption.

Using Geospatial Technologies for Digital Contact Tracing

Monitoring mobility at the individual level, in addition to the population level, has also emerged as an important use of geospatial technologies, particularly in its application to digital contact tracing. Conventional contact tracing, involving identifying, contacting, and encouraging quarantine for the people with whom an infected person has had close contact to mitigate disease transmission, is labor intensive. The process can be made more efficient and scaled up to large populations by exploiting individual digital mobility data, as well as data indicating proximity among mobile telephones using Bluetooth or related technologies, to computationally show close proximity among individuals (15). Such location data can be combined with health and other data that might indicate vulnerability to infection or disease. Individuals can then be contacted and given quarantine instructions automatically through mobile telephone text messages, or their future behavior may even be monitored to encourage or enforce quarantine. Such procedures have been used to some degree, in combination with population mobility restrictions, in an attempt to reduce SARS-CoV-2 transmission in China, Israel, Singapore, and South Korea, among other nations, and developments for digital contact tracing technologies by the largest international technology companies continue (16).

Advances in GIS&T have been made in modeling the geographic trajectories of individuals throughout their daily lives, their interactions with other people, and their immediate environment using geographic and computational constructs such as activity space and space-time prisms (17–20). However, to leverage this body of research for digital contact tracing, progress needs to be made in developing, testing, and implementing digital contact tracing applications, including evaluations of behavioral compliance, efficacy, and scaling. Additionally, this approach raises concerns about confidentiality and civil liberties that need to be addressed before widespread adoption (21).

Integrating Geographic Data in COVID-19 Modeling

A strength of GIS is the ability to integrate diverse spatial data sets based on georeferencing, facilitating the integration of health data with contextual characteristics. Descriptive modeling research that leverages this capability has examined the spatial associations of COVID-19 with socioeconomic and environmental characteristics. This research found, for example, that lower income and income inequality (22), higher temperature and humidity (23), exposure to fine particulate air pollution (24), and mobility and transportation

networks (25,26) were associated with a higher prevalence of COVID-19 cases or mortality. GIS&T also offers approaches to investigating statistical spatial effects and spatial heterogeneity, such as spatial autoregressive models and geographically weighted regression, to account for modeling geographic processes such as spatial diffusion and the variation in relationships among variables over space (27,28). Recent research leveraged these approaches in demonstrating the spatial heterogeneity in the relationships among observed COVID-19 cases and mortality with georeferenced socioeconomic and environmental variables (22,29,30) and found that the influence of area-based socioeconomic status, pre-existing health conditions, and environmental characteristics on disease transmission may vary from place to place.

Computational infectious disease models are widely used to predict or forecast the spread of COVID-19 disease and the effects of intervention strategies. Predictive modeling approaches can be generally categorized as SEIR/SIR (susceptible, exposed, infected, and removed/recovered) (31), agent-based (32), or statistical modeling (33). Such modeling approaches are inherently geographic in the sense that they make predictions for certain areas or regions, although only some models contain an explicit spatial interaction component or forecast the spatial variation in disease incidence over small areas. Explicitly incorporating a spatial component into infectious disease models attempts to account for 1) place-based contextual mechanisms of infection or disease related to the socioeconomic, built, or natural environments, such as air pollution or type of employment, 2) spatial heterogeneity in the drivers of disease transmission, for example, where certain socioeconomic characteristics may be associated with disease prevalence in one region but not in another as a result of regional differences in culture or behavioral norms, and 3) transportation networks or patterns of human mobility to better account for disease transmission dynamics (34,35). Such approaches have been extended to modeling the spread of COVID-19, providing evidence that restrictions on mobility have mitigated the spread of COVID-19 in different parts of the world and aided in forecasts of disease diffusion under various scenarios of mobility restriction (36,37).

Spatial transportation and mobility data can play an important role in forecasting disease prevalence, where, for example, the effect of nonpharmaceutical interventions (eg, restrictions on mobility) on city-level transmission of COVID-19 in China was analyzed using mobility data harvested from mobile telephone location-based services. This method allows one to parameterize the local contact rate and forecast the geographic distribution of disease prevalence under different intervention timing scenarios (37). Related approaches to modeling the spread of COVID-19 also incorporated airline transportation networks (38) and were extended to other

countries with extensive COVID-19 outbreaks, such as Italy (36), providing substantial evidence that restrictions on mobility have mitigated the spread of COVID-19 in different parts of the world.

Investigating Geographic Health Disparities of the COVID-19 Pandemic

Indices of social vulnerability are place-based variables that incorporate factors such as race/ethnicity and socioeconomic status to encode the vulnerability to adverse health outcomes and other types of hazards (39). Community social vulnerability, along with health care resources, plays an important role in predicting health care capacity in responding to the COVID-19 pandemic (40). Social vulnerability can interact with pre-existing medical conditions and access to medical resources, such as prescription drugs, to produce inequities in COVID-19 outcomes (41). People with underlying medical conditions, such as asthma, obesity, and diabetes, as well as people who are immunocompromised or aged 65 or older are at higher risk of serious consequences from SARS-CoV-2 infection than their healthier or younger counterparts. Because such medical conditions are often concentrated geographically and among certain demographic groups, understanding the spatial and demographic distribution of these conditions is critical to investigating health disparities associated with COVID-19. For example, COVID-19 morbidity and mortality are higher among African American and Hispanic people than among non-Hispanic white people (42). Such racial/ethnic disparities highlight the importance of efficient collection of socioeconomic, demographic, and other data among people with COVID-19.

Resources for investigating COVID-19-related social disparities include publicly available data on COVID-19 cases by small areas, such as zip codes (43), although such data are not widely available at a national level. The same issue exists for fine spatial resolution data on social vulnerability. The Public Health Disparities Geocoding Project at the Harvard T.H. Chan School of Public Health seeks to address this latter shortcoming (44). Researchers should understand the geographic and historical background of discrimination and resource deprivation that may produce place-based social vulnerabilities, to avoid stigmatizing or placing blame on certain communities. An understanding of the social determinants and structural forces, such as food insecurity, housing insecurity, and disparities in educational or health care infrastructure, that can influence health outcomes such as obesity, hypertension, and certain types of cancer, is important.

The multidimensional social, economic, and health consequences of the COVID-19 pandemic are geographically inequitable: some places and populations have greater social, economic, health and other effects than other places and populations. Beyond the need

to identify such factors as lack of access to resources or the prevalence of pre-existing health conditions is the need to recognize and understand the mechanisms of vulnerability that have been in place and led to the exacerbation of the COVID-19 crisis in some communities. Community recovery from the COVID-19 pandemic requires incorporation of social, economic, and health components and an emphasis on investigating how place shapes the uneven effect of COVID-19.

Implications for Public Health

We have outlined how GIS&T can be used for understanding and responding to the COVID-19 pandemic and future infectious disease epidemics and pandemics. Central to this understanding and response is a commitment for the use of GIS and geospatial technologies as the platform for collecting, integrating, and analyzing georeferenced data on the locations and characteristics of individuals and the spatial distribution of socioeconomic, health, and built and natural environmental characteristics. Geospatial resources for COVID-19 response are available through several organizations, including the University Consortium for Geographic Information Science (www.ucgis.org/covid-19-resources), the OGC (www.ogc.org/resources-for-COVID-19-from-ogc), and the National Alliance for Public Safety GIS Foundation (www.napsgfoundation.org/resources/covid-19).

Leveraging GIS&T for responding to the COVID-19 pandemic requires a close and extensive collaboration between researchers in the fields of geography, medicine, public health, and public policy. The field of GIS&T has a long history of research in data synthesis, statistical modeling, and computational simulation for spatial data and applications. Recognizing that GIS&T is a theoretical and scientific approach rather than simply a set of analytical tools will facilitate transdisciplinary collaboration. Advances in preserving individual privacy and civil liberties in the age of big spatial data, where geospatial technologies generate massive repositories of individual-level data on movement, health, and behavior widely available, are also necessary. These advances will likely require enhanced government regulations, corporate policies, and technological innovations in data sharing and privacy protection.

The COVID-19 pandemic is still in the beginning phase, and the research community is continuing to learn and revise the best way to respond to this global public health crisis. Geospatial data, methods, and technologies have a crucial role to play in understanding and responding to the pandemic, and the lessons learned on the use of GIS&T for pandemic response at this time should enhance preparedness and response for future public health crises.

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COMMENTARY

Recommendations for Keeping Parks and Green Space Accessible for Mental and Physical Health During COVID-19 and Other Pandemics

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PEER REVIEWED

Summary

What is already known on this topic?

Engaging in regular physical activity and having access to nature or green space are beneficial for physical and mental health.

What is added by this report?

Shelter-in-place and safer-at-home orders limit access to parks and green space for many people. We propose some short- and long-term solutions that can provide access to green space, while allowing for physical distancing.

What are the implications for public health practice?

These solutions may be useful and informative for cities, states, and countries around the globe as they implement policies to address the coronavirus disease 2019 pandemic, which can lead to healthier communities and populations.

Abstract

The importance of engaging in any type of physical activity regularly, for both physical and mental health, is well established, and may be particularly beneficial in protecting the body and limiting the damage caused by the coronavirus disease 2019 (COVID-19). Exposure to nature or green space also has positive physical and mental health benefits. Closures of parks and green spaces during the COVID-19 pandemic has limited the options for physical activity and may affect vulnerable populations more than others. We provide both short-term and long-term recommendations to encourage access to green space for people while allowing for physical distancing.

Introduction

The importance of engaging in any type of physical activity regularly, including exercising for both physical and mental health, is well established and, more important, may be particularly beneficial in protecting the body and limiting the damage caused by the coronavirus disease 2019 (COVID-19) (1). Engaging in regular physical activity is also protective against poor cardiovascular health, obesity, hypertension, and diabetes, which are shown as risk factors for COVID-19 (1). Exposure to nature or green space also has positive physical and mental health benefits, including lower rates of heart disease, stroke, obesity, stress, and depression (2). In fact, exposure to green space, even in a limited setting (eg, residential city streets in urban areas), is just as beneficial for health as that of visiting a natural setting or large public park (3).

In March 2020, the majority of United States governors issued shelter-in-place orders (4). Collectively, these orders severely restricted movements of individuals across the nation (4). These orders resulted in the closure of primary, secondary, and post-secondary schools; local fitness, physical activity, and recreational facilities; sports clubs; and non-essential businesses. Yet public health entities, such as the American Public Health Association and the Centers for Disease Control and Prevention, have stressed the importance of staying physically active while sheltering in place during COVID-19, which includes visiting parks and green space (5). With the closure of schools, fitness facilities, and other community places for recreation, local streets, parks, trails, and open green spaces are the only places available for physical activity outside of the home environment (6). However, many public parks and green spaces were also closed because of concerns about social distancing, and most state and local shelter-in-place orders allow only limited use of parks and green space (6). For example, people may access parks and green space near their homes, but playgrounds and equipment, sports courts, and trails are likely closed to the public. These restrictions might contribute to increased adverse physical and mental health outcomes for a substantial portion of the population, particularly those in urban set-



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tings, which, in turn, may be negatively associated with how well people can fight COVID-19 (1,7). The latest research shows that people must have sustained contact of 10 minutes or more (7) and be less than 6 feet (8) from others to be most susceptible to contracting COVID-19. If park, trail, and playground patrons remain appropriately physically distant, do not engage in lengthy conversations with nonhousehold members, and wear a protective face mask, their risk of contracting COVID-19 by exercising outdoors is low, making parks and green spaces safe places to be physically active during a pandemic (9). Being quarantined is associated with poor mental health outcomes (10), but maintaining access to parks and green space could counteract these negative effects.

Shelter-in-place orders limit physical activity options for everyone but have a greater effect on vulnerable populations (6). For example, racial minorities, such as African Americans, contract COVID-19 at higher rates than non-Hispanic whites and are disproportionately dying from the disease (11,12). These same populations tend to live in dense urban areas (13,14) with limited green space, and often in multiunit housing (11,12). Urban areas also have a greater likelihood of park deserts (ie, a defined geographic area that does not have a park present and accessible for use), or only small parks with limited features (15). These small parks are more likely to be restricted from public use during statewide shelter-in-place orders because of their size and might be dominated by play structures and banned from use (16). Communities lacking parks might need to explore alternative solutions for physical activity in outdoor public spaces. Urban and minority populations might also be reliant on public transit, which has been restricted to use for work or other essential needs (eg, purchasing groceries). Use of public transit for leisure activities (eg, visiting parks or other green spaces) is not recommended in many areas. Shelter-in-place orders might exacerbate inequities for people to access parks or green spaces if they do not live near them. Although the recommendations we provide can apply to a wide variety of populations in urban, suburban, and rural settings, they may be particularly relevant for minority populations in urban settings.

Recommended Strategies to Address Parks and Green Space Accessibility

A recent article highlights ways to be physically active in the home, but these recommendations lack suggestions regarding access to green space (17). Exercising at home might be adequate and feasible for certain segments of the population, but many people live in homes with limited space or other factors that negatively affect health. The relationship between housing conditions and health is well established (18). Although most states are partially or fully lifting shelter-in-place orders, maintaining some physical distancing (19) is recommended until a vaccine is de-

veloped or until adequate immunity is realized within the population. Reintroduction of shelter-in-place orders might be necessary in response to an increase in COVID-19 cases or for future communicable disease outbreaks.

In this commentary, we propose some solutions that can be implemented, now or in the future, to provide access to green space while allowing physical distancing. Our recommendations are not necessarily new or novel ideas. Several of the strategies and policy recommendations proposed here have been advocated for various public health sectors for more than a decade (20–24). The COVID-19 pandemic has highlighted these long-known deficiencies in walking, biking, and recreational infrastructure (25,26) that contribute to health disparities. We hope that some of the solutions we offer can be useful and informative for cities, states, and countries around the globe as they implement their own policies to address the COVID-19 pandemic. Ours is not a comprehensive list nor a list that can or should be implemented in all places; it is meant to be a starting point for a conversation between national, state, and local governments, parks and recreation departments, other nonprofit organizations (eg, National Recreation and Park Association, Trust for Public Land, sports leagues, philanthropic park partners), and researchers.

Short-Term Recommendations

Keep parks open

For both urban and rural areas, state and local parks with trails and open green space should remain open. Modifications in scheduling might be needed to help control the number of visitors at one time and allow for appropriate physical distancing.

- This could include structured schedules, time slots, or sign-up sheets either in person or online for smaller parks, or monitoring by park staff in larger parks.
- Staff from other departments may be needed to help ensure physical distancing guidance and that other rules are followed.
- Park visits and access to other green spaces could be proactively prioritized and formally organized for vulnerable populations.
- For parks with fees, fees could be adjusted on the basis of need. People who receive SNAP (Supplemental Nutrition Assistance Program) or Medicaid could have a reduced fee. Caution should be taken in terms of waiving fees for everyone as this might lead to a large increase in park visitation and crowding, as was seen in some parks early during the COVID-19 pandemic.
- Evaluate policies that change schedules and modify fees, to determine best practices in balancing expanded access with strategies to control the number of visitors.

Modify policies on the use of public transit

During shelter-in-place orders, maintain transit routes to parks and green

space. Allow riders to use transit to access parks and green space. Require public transit users to wear masks or face coverings and maintain physical distance. Public transit access to essential businesses and services (eg, healthcare facilities, grocery stores, and child care centers) must be balanced with access to parks and green space.

Adopt Open Streets or Slow Streets initiatives

Particularly in urban areas, such initiatives will allow closure of certain streets to vehicle traffic during specific days and times so that pedestrians and cyclists have more space to move. Some cities that have permanently adopted these initiatives could be evaluated to determine the impact of these initiatives (27). Streets with greenery, plants, or other natural features can be prioritized for these initiatives, given the positive association between public green space and mental health (28–30). To increase access to parks and green spaces, streets surrounding or connecting them could be designated as Open or Slow Streets.

Adopt consistent messaging

Consult communication resources for use of parks, such as the Centers for Disease Control and Prevention (<https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/visitors.html>) (5) and the National Recreation and Park Association (<https://www.nrpa.org/our-work/Three-Pillars/health-wellness/coronavirus-disease-2019/>).

- Messages should be targeted to the specific population, especially vulnerable and marginalized populations. Consider messages in multiple languages and the use of pictograms or diagrams.
- Consideration should be given to the appropriate messengers and format for delivery.
- Emphasis should be placed on maintaining appropriate physical distancing, not social isolation (19).

Long-Term Recommendations

Create built environments for all users

Infrastructure plans should include policies and plans for creating healthy environments, such as Complete Streets, Safe Routes to Parks, Safe Routes to Schools, and mixed-use policies (20,24). Plans should also intentionally include green space and public spaces for leisure and recreation.

- Ensure that including green space is prioritized on streets in neighborhoods that lack them. Municipalities should review local design guidelines and zoning codes to ensure they include provisions for greenscapes, green streets, sidewalk planters, or other greening strategies.
- Consider access for all users through various approaches. Install protected bicycle lanes (ie, provide physical barriers between cars and bicyclists) or pedestrian connections to local trails, paths, parks, and green spaces. Increase parking for bicycles at parks and green spaces. Ensure public spaces comply with the Americans with Disabilities Act regulations. Engage with community members to explore availability, accessibility, and quality issues that are important to the community.

- Plan for maintenance and regular improvements of green spaces and parks.

Consider where to locate parks and green spaces

Ensure that quality parks and green spaces are located in close proximity to people, regardless of where they live.

Conduct ongoing monitoring and evaluation

To ensure that any strategies implemented work in the expected ways, plan for ongoing monitoring and evaluation. This should include examining any unintended consequences, such as decreased sanitary conditions, litter, substandard bathroom facilities, and increased crime.

- Evaluation should include the impact of strategies on mental and physical health.
- Create a national open platform for policy makers and researchers to share evidence-based strategies. Learning from the successes and mistakes of implementing these strategies is vital during this unprecedented situation.

These recommendations can apply to all settings, including rural main streets and suburban areas, but they might be particularly important for urban areas. We have highlighted several advantages to keeping parks open during a pandemic. Careful consideration of potential disadvantages is also essential. For example, with most public settings inaccessible, keeping parks and green space open could lead to overcrowding, making it difficult to maintain physical distance and resulting in increasing the spread of disease. Significant increases in park visitors could also add strains to local budgets and staff members (ie, maintenance and cleaning responsibilities might increase). Strains might also increase risk of illness or other unintended consequences to staff. Local communities might not have access to the resources needed to appropriately staff and maintain parks during a pandemic. Finally, less is known about how COVID-19 spreads in outdoor settings. The virus might be susceptible to sunlight (31). If COVID-19 transmission risk is lower outdoors, the efficacy of adhering to physical distancing guidelines (8) and avoiding prolonged close proximity to other people (7) might be increased. More studies are needed to evaluate the likelihood of contracting the disease while exercising outdoors.

Implications for Public Health

The COVID-19 pandemic has illuminated underlying disparities in access to parks and green space for underserved and vulnerable populations. Building a stronger infrastructure of neighborhood parks and green space throughout the country will help limit the impact of future public health disasters. Before and during a pandemic, national, state, and local policy makers, urban planners, and governments should thoughtfully consider what is appropriate

and important for overall population health and how best to implement some of the recommendations proposed while maintaining appropriate physical distancing in public spaces. Access to parks and green space is vitally important for the health and well-being of individuals, and it will lead to healthier populations.

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COMMENTARY

Overcoming Challenges Resulting From COVID-19: New York State's Creating Healthy Schools and Communities Initiative

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PEER REVIEWED

Summary**What is already known on this topic?**

Increasing access or reducing barriers to healthy foods and opportunities for physical activity are central to encouraging and supporting healthy behaviors that prevent chronic disease at a population level. While strategies to increase access or reduce barriers are generally difficult to implement, the COVID-19 pandemic has added challenges.

What is added by this report?

The New York State Creating Healthy Schools and Communities initiative used a human-centered design (HCD) that enabled support to be responsive to practitioners' constantly changing needs during the pandemic.

What are the implications for public health practice?

More research and evaluations should be conducted to better understand how the use of HCD could support practitioners addressing other complex public health issues in the United States.

Abstract

“Upstream” interventions that increase access or reduce barriers to healthy foods and opportunities for physical activity — referred to as policy, systems, or environmental strategies — are central to encouraging and supporting healthy behaviors that prevent chronic disease at a population level. However, they are complex and challenging to execute, especially during coronavirus disease 2019 (COVID-19), and efforts to build practitioner capacity are warranted. In this commentary, we describe a user or human-centered design (HCD) capacity-building approach to support

practitioners in accomplishing the goals of the New York State Creating Healthy Schools and Communities (CHSC) initiative. This approach has been especially helpful during COVID-19, as it enables support to be responsive to practitioners' constantly changing needs. Given that CHSC is a project specific to New York State and that the efforts of the Obesity Prevention Center for Excellence were tailored to obesity prevention, more research and evaluations should be conducted to better understand how the use of HCD could support practitioners addressing other complex public health issues in the United States.

Introduction

Factors beyond health care, including those that are often outside the scope of traditional public health activities (eg, health education), impact health (1). “Upstream” interventions that increase access or reduce barriers to healthy foods and opportunities for physical activity — referred to as policy, systems, or environmental strategies (PSEs) — are central to encouraging and supporting healthy behaviors that prevent chronic disease at a population level (2–4). However, they are complex and challenging to execute (5,6).

Practitioners positioned to implement PSEs include those working in local departments of public health, transportation, and planning, as well as education and community-based organizations (7). Often working together, they must address an array of factors at the levels of social systems, communities, and organizations (8). However, they may be unaware of the health problem and solutions (eg, educational organizations may not focus primarily on health); lack the capacity to act with a systems perspective (eg, work across sectors toward health goals); or struggle with politics, differing organizational protocols, vocabularies, and funding (9–12). To prioritize and successfully implement PSEs, practitioners and their respective organizations must have capacity, including resources and networks in and beyond the communities they represent (12–16).



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Capacity building is necessary to support the implementation of PSEs (10,11,17). It includes activities to develop or improve the knowledge, skills, commitment, collaboration, structures, and systems at the individual, organizational, and community levels (18,19). Various models have been implemented to build this multilevel capacity (10,18,20) including funders or contracted agencies that provide one-on-one consultation and web-based learning options, develop materials and resources, and facilitate training opportunities (17). For example, the Centers for Disease Control and Prevention (CDC) and its partners provided support to state-level practitioners implementing obesity prevention initiatives (11); the National Association of Chronic Disease Directors and others were contracted to support communities funded by Action Communities for Health, Innovation, and Environmental Change (ACHIEVE) (18); and the Missouri Department of Health and Senior Services provided assistance to local public health agencies implementing Building Communities for Better Health (20).

Creating Healthy Schools and Communities

Creating Healthy Schools and Communities (CHSC) is a 5-year (2015–2020), coordinated, multisector initiative of the New York State Department of Health (NYSDOH) with the goal of reducing major risk factors of obesity, diabetes, and other chronic diseases in 85 high-need school districts and associated communities (N = 266). CHSC practitioners (CPs) work with individuals, schools, government, businesses, and other groups to share ideas, plan, and act to improve access to healthy foods and opportunities for physical activity. Since its launch, NYSDOH has contracted with the Obesity Prevention Center for Excellence (OPCE), whose sole charge has been to build CHSC capacity, both in terms of the practitioners and the communities in which they work. The OPCE capacity-building model draws largely on the principles of user or human-centered design (HCD) (21,22), in that staff work jointly with NYSDOH, CPs, and other beneficiaries to co-create capacity-building activities to ensure successful PSE implementation. Most importantly, the 4 iterative phases of HCD (discovery, definition, design, and implementation) enable OPCE's capacity building to be responsive to CPs' constantly evolving needs.

In the discovery phase, OPCE interacts regularly with NYSDOH and CPs and conducts evaluation surveys and annual assessments to identify practitioner assets, needs, motivations, and concerns. OPCE accounts for diverse perspectives and provides an array of solutions for CPs. The information collected throughout the continuous discovery phase is used to determine where OPCE can support practitioners individually, as well as identify where it can support synergies, collaboration, and opportunities to leverage re-

sources across the state. The input of NYSDOH and CPs ultimately drives the design and implementation processes.

The ultimate goal of CHSC is to strengthen food systems, increase opportunities for physical activity, and promote wellness policies and practices in worksites and schools. Unfortunately, New York State has been the epicenter of the coronavirus disease 2019 (COVID-19), which was first diagnosed in the United States in January 2020 (23). CPs and community partners continue to experience challenges such as school and worksite closures and, more broadly, issues of food insecurity in their communities, which have forced them to redirect their work while ensuring that the original goals of CHSC are achieved.

The purpose of this commentary is to present how the use of an HCD approach has enabled OPCE to return repeatedly to the context, emotions, needs, and desires of its intended beneficiaries during these uncertain times to strengthen and sustain their capacity to implement PSEs in their communities.

Pre-COVID-19 Capacity Building – Focus on CHSC Practitioners and Organizational Levels

In the first few years of CHSC, NYSDOH and CPs requested support that was specific to the 6 CHSC strategies (Figure). OPCE provided technical assistance in the form of resources, individual consultations, in-person meetings, collaborative brainstorming calls, collaborative learning communities, monthly newsletters, an online collaboration and resource library, and virtual trainings. For example, OPCE facilitated a brainstorming call where CPs talked about recruiting worksites to adopt food service guidelines and worked with NYSDOH to create a worksite wellness recognition program as a way for CPs to engage worksites in their efforts to increase access to healthy foods in the community. Over the past few years, the capacity-building support also included resources on engaging local policy makers, effective communication and messaging, and skills necessary for ensuring PSE success. OPCE also worked with national partners to tailor technical assistance to meet the needs of CPs and their local partners. One example includes the partnership between OPCE and America Walks (americawalks.org) to design and implement the New York State Walking College (<https://americawalks.org/walkingcollege/>). In this initiative, CPs and their planning and transportation partners received tailored assistance in expanding local leadership capacity and multi-stakeholder partnerships for walkable communities by learning about strengthening municipalities' commitment to Complete Streets policies and implementation plans, traffic calming pop-up projects, Vision Zero (<https://visionzeronetwork.org/>)

policies and goals, and leveraging additional funding for Complete Streets design and construction.



Figure. Schematic diagram of the Creating Healthy Schools and Communities initiative, New York State Department of Health, 2015–2020.

And Then There Was COVID

There is no “business as usual” during COVID-19, which continues to bring with it a host of issues that affect the ability of CPs to conduct their work. Beginning in March 2020, OPCE has assessed the needs and challenges of CPs and their partners. In addition to needing support with implementing PSEs during school and community closures, many reported personal feelings arose, from frustration to empowerment, and there was recognition of the importance of self-care during the pandemic. In an article on self-care and parents, Coyne et al (24) describe several evidence-based practices that align with those taken by OPCE to support CPs, including delivery of self-care in small, manageable “doses,” and strength in numbers.

Small acts of self-care

OPCE offered opportunities for CPs to engage in small acts of self-care by providing space for them to share stories and support to one another. Virtual trainings start with self-care questions such as “What is one thing you have done to support your own wellness in the last week?” or “What has made you laugh most recently?” CPs are asked to share aloud or via the call’s chat function, and this exchange is followed by conversation. To provide regular “brain breaks” for CPs, OPCE offers weekly 10-minute virtual Zumba Fitness sessions (Zumba Fitness, LLC) led by one of the technical assistance leads.

Strength in numbers

As CHSC was entering its fifth year, CPs wanted to build their capacity and that of their school partners to ensure the sustainability of their efforts. OPCE worked collaboratively with leadership experts to design and implement a Leadership Academy, which was

launched at the end of January 2020, just before COVID-19. A total of 54 participants were enrolled (17 CPs and 37 school staff of various roles [ie, physical education teacher, guidance counselor, principal, nurse, wellness coordinator, and assistant superintendent]).

The Leadership Academy focuses on adaptive leadership and includes individual coaching sessions and action learning groups. To date, 42 people (28 school staff and 14 CPs) participated in 1 or more coaching sessions (mean, 3 sessions). The remaining 12 Leadership Academy enrollees declined or did not participate. Action learning groups expand individual support through group interactions in which participants receive and provide feedback on PSE implementation. Originally, OPCE and leadership experts created teams of people in various roles from New York State. However, CPs and their school partners expressed concerns because of school closures and other challenges related to COVID-19. As a result, OPCE changed the structure from monthly scheduled calls to weekly open drop-ins. Nine drop-in action learning groups were held in April and May 2020, with 7 to 13 people participating per call (mean, 10 participants). In total, 43% of those who signed up for the Leadership Academy have participated (9 school staff and 14 CPs) in 1 or more action learning group sessions (mean, 4 sessions). Although a formal evaluation has yet to be conducted for the Leadership Academy, OPCE has received informal feedback from CPs and coaches that the opportunity has been invaluable during the pandemic. One CP reported, “I’m very appreciative [of the Leadership Academy opportunity] and love my coach. . . . We talk about our challenges, successes, and everything that comes up.” Another stated, “I have done the coaching calls and have been to almost every weekly ALG [Action Learning Group] call. . . . I find them to be so useful.” Another reported that she has “learned so much talking to other people around the state,” and that “it [the Leadership Academy] came at the right time [during COVID-19].”

Even without a crisis, practitioners like to hear from others with similar experiences (11), and peer-to-peer interaction is especially helpful during times of stress (24). OPCE hosted a virtual “solution room” where CPs presented challenges to their colleagues for feedback and suggestions. Topics included how to 1) support a virtual school wellness committee; 2) proceed with required grant assessments; 3) sustain engagement with populations in which religion or other barriers may prevent them from having or using technology; 4) encourage safe physical activity, including walking and biking; and 5) use platforms to sustain engagement with school and community partners. This format was well received by CPs, one of whom stated, “I feel some comfort in the fact that many of us are going through similar issues and challenges . . . and that we came together to provide some solutions to some chal-

lenges.” As issues of equity, diversity, and inclusion are being elevated nationally and throughout New York State, CPs are now requesting opportunities to discuss social injustice with their peers; OPCE is currently (June 2020) using the HCD approach in an attempt to meet this need.

Sustaining Efforts and Achieving CHSC Goals Post COVID-19

Communication efforts can help garner support and change public opinion, raise awareness of solutions, and build capacity among diverse sectors and constituencies (15,16). CPs have worked for years to increase awareness of CHSC and establish relationships with school and community-based partners. They empathize with their partners and wanted to support them during this pandemic and the resulting uncertainty. Several content-specific needs identified during COVID-19 included encouraging students and employees to be physically active during the day, helping households to access food, and creating safe outdoor spaces that support social distancing.

Since the start of the pandemic, organizations throughout the United States have developed many resources. OPCE sorted through the information and created an online database most relevant to CHSC where CPs can also share resources. As of this writing, 60 resources are listed, including free guided physical activity for adults, live-streamed recesses and physical activity toolkits for parents and teachers, state department of education updates, and nutrition guidance through the Supplemental Nutrition Assistance Program.

CPs report sharing these resources with their respective school and community partners who also disseminate them among their constituents. One CP reported sharing the resources through her virtual community engagement teams to support administrators, teachers, and students. Another CP used the database and skills she learned from action learning groups to facilitate a virtual wellness workshop that brought partnering school districts together. She collaborated with an educational organization to offer continuing teacher and leader education credits for staff who attend the meetings, which has helped to meet a staff need. The first virtual wellness workshop was so successful that partners agreed to meet again to discuss updating the wellness policy and the completion of the triennial assessment.

In addition to content-specific needs, CPs identified several technical areas, such as virtual engagement, that they felt could help develop and maintain partnerships and related efforts during COVID-19. OPCE responded quickly to enhance capacity to virtually engage stakeholders by developing and disseminating a guide

that included video conferencing and production, communications, team management, and external engagement platforms. The guide was followed by a brainstorming call to see how implementation of these resources was going and where additional support might be needed.

Given the attention to the impact of chronic disease and the risk it poses for severe illness, CPs want to increase awareness of maintaining a healthy lifestyle and the PSEs they have helped to implement across the state. OPCE developed a “toolbox” with a compilation of resources to support communication efforts and delivered a webinar entitled Elevate Your Design Skill Set: Tips, Tricks, and Tools. Both of these resources supported integrated and strategic communications efforts through the development of effective messaging and strengthened graphic design capabilities. In addition, OPCE created resources that could be tailored and used for easy dissemination, including a 1-page template for sharing CHSC-related resources. CPs share the template electronically to reinforce their willingness and availability to support partners during COVID-19.

OPCE also supported CPs to increase awareness of chronic disease prevention by creating “bite-size” messages that reinforced health and CHSC for CPs to share through social media. Messages included “People of all ages with chronic conditions such as diabetes and heart disease are at highest risk if they contract the coronavirus. Increasing access to healthy foods and opportunities for physical activity is a critical component of preventing chronic diseases. Since 2015, CHSC has worked to create environments that are supportive of overall health and wellness in 245 communities across New York” and “COVID-19 has more people relying on biking and active transportation for both physical activity and a means of transport. The need for widespread, sufficient bike infrastructure has never been more apparent. . . . CHSC has worked with communities across New York to expand bike infrastructure at over 205 sites.”

The support OPCE has provided to CPs and their partners has helped not only to successfully implement many PSEs but also to support their response to the emerging needs of their schools and communities.

Building on partnerships to increase access to healthy foods during the pandemic

For the past 5 years (starting in 2015), CHSC-funded organizations have worked closely to help small retailers, bodegas, and food pantries stock and sell healthy, affordable foods. These efforts have expanded access to healthy foods by enhancing the food supply chain. Before COVID-19, the North Country Healthy Heart Network helped the Joint Council for Economic Opportunity se-

cure funding to install 2 additional greenhouses equipped with hydroponic systems where fresh produce could be harvested for the mobile farmer's market. The market has 21 stops in 10 communities and sells to a local distributor that serves local schools, hospitals, and jails. When stay-at-home orders went into effect and food pantry supplies were low, the Joint Council for Economic Opportunity redirected its products to stock pantries and emergency food packages for those in need, reaffirming the critical role of local food retailers and pantries in the larger food system, especially in lower-income communities that have limited access to full-service grocery stores.

A CP from the Rockland County Health Department is assisting with food distribution as part of the food bank of the Hudson Valley's Get Fresh Program. In April and early May 2020, more than 63,000 pounds of food were delivered to Rockland County. Fresh produce and dairy products were distributed to 20 food pantries, group homes, and food programs.

Building on partnerships to create safe spaces for physical activity

CPs have worked in more than 200 communities to expand bike infrastructure, make streets and sidewalks safer for walking, and increase access to parks. For example, Common Ground Health invested heavily in expanding access to public spaces by advancing Play Walk, Safe Routes to Parks, and 10-Minute Walk to Park initiatives. Now more than ever, these outdoor spaces have helped residents to safely engage in physical activity at a distance during the pandemic. However, high-volume areas, or places restricted by right-of-way widths and other limited designs, continue to challenge pedestrians who are attempting to follow safe distancing guidelines. GObike Buffalo has helped to promote safe recreation and socially responsible active transportation by ensuring that bike shops are considered an essential business, launching a bike match program to connect those in need of a bike with others who have one to give, developing a tip sheet for municipalities outlining quick and inexpensive options for open streets and temporary "pop-ups," and creating an outdoor opportunity index and map to identify areas where people may not have access to public spaces for recreation where they can maintain a safe social distance. GObike Buffalo is engaging residents as part of the Better Streets, Better Buffalo campaign to advocate for safe public spaces throughout the city.

Working together to keep remote learners active

Before the pandemic, CPs of the Chautauqua Health Network made substantial strides in institutionalizing opportunities for physical activity throughout the school day. Since schools have closed and efforts have shifted to distance learning, administrators

and teachers have worked to maintain academic standards. However, many schools partnering with the Chautauqua Health Network integrated the Daily Mile program, where kids ran a mile every day and recorded their mileage on an online platform; this has helped both teachers and students continue to track their progress during the pandemic. Now instead of logging progress at school, students are encouraged to log at home either online or on a worksheet.

Collectively planning for the future

COVID-19 highlighted areas in need of intervention related to food access, physical activity, and active transportation. It has also served as a "forced pause," offering CPs the opportunity to think strategically and creatively about how to build and strengthen partnerships, enhance communication channels, connect particular populations with resources, and advance efforts when the pandemic subsides. During several brainstorming calls, CPs shared strategies they were employing to move CHSC deliverables forward.

Many CPs are advancing their plans as intended through virtual meetings. For example, before COVID-19, the Chautauqua Health Network was in the process of developing a trail through Jamestown. In responding to physical distancing guidelines, the Network has continued moving forward through virtual meetings. The Buffalo Region CP is working with the statewide professional organization for physical and health education; local partners, including physical education and health teachers; and the local PBS (Public Broadcasting Service) station (WNED) to develop physical education and health lessons that can be aired on television. The CP reported, "We want to get physical education lessons out to students who don't have internet access, but we also want to use this opportunity to advocate [for physical activity]." Several other CPs have used this time to develop and disseminate materials using data they have previously collected. The Genesee Valley Educational Partnership CP created a wellness policy implementation tool.

Implications for Public Health

As indicated by the African proverb "It takes a village to raise a child," it also takes the support of many to successfully implement PSEs. Similar to the CDC obesity prevention initiative (11) and project ACHIEVE (18), NYSDOH and CPs have identified OPCE as a valuable resource in providing or linking them to content experts, other practitioners, and resources related to their PSE initiatives. Findings from an evaluation of ACHIEVE (18) showed that the practitioners engaged in PSE-related work benefitted from the wide-ranging technical assistance that was provided by the Na-

tional Association of Chronic Disease Directors and others. We are finding this also to be true in New York State, and the HCD approach to capacity building seems to be especially helpful during COVID-19.

The uncertainty, isolation, and anxiety of COVID-19 are real. As we navigate the pandemic, the goal of OPCE continues to be building capacity and strength at the individual and organizational levels so that CPs and their partners can continue to implement PSEs across their communities. The acts of regular discovery, definition, design, and implementation enable OPCE to provide responsive capacity building to CPs and their partners, especially during a pandemic such as we are now experiencing.

Finally, if there is a silver lining to COVID-19, perhaps it will include the priority we as a nation place on health and the significance of the environment in supporting healthy behaviors. Moreover, building capacity in low-income communities and communities of color should be prioritized, given existing racial and ethnic health-related disparities (25). In New York State, CPs will continue to engage with their school and community partners to ensure that PSEs are in place to increase access to nutritious foods and opportunities to be physically active. Using the 4 iterative phases of HCD may help organizations to be responsive to the constantly changing needs practitioners have when implementing PSEs. This iterative process may be especially helpful during crises like COVID-19. Given that CHSC is a project specific to New York State and that OPCE efforts were tailored to obesity prevention, more research and evaluation should be conducted to better understand how the use of HCD could support practitioners addressing other complex public health issues in the nation.

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COMMENTARY

Reaching the Hispanic Community About COVID-19 Through Existing Chronic Disease Prevention Programs

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PEER REVIEWED

Summary**What is already known on this topic?**

Emerging data suggest that the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has disproportionately affected Hispanic communities in the United States.

What is added by this report?

We summarize how available infrastructure from Better Together REACH, a community-academic coalition promoting chronic disease prevention, and Penn State Project ECHO, a telementoring program, was adapted to support coronavirus disease 2019 (COVID-19) pandemic efforts for the Hispanic community.

What are the implications for public health practice?

Leveraging resources, including community health workers, from an existing chronic disease prevention program is a promising strategy to reach Hispanic populations during these unprecedented times.

Community Health) to address these needs. We also describe programming to support COVID-19 efforts for Hispanic communities by using chronic disease prevention programs and opportunities for replication across the country.

Introduction

Pennsylvania is home to over 970,000 Hispanic people (1). Vibrant Hispanic-majority communities can be found across the state in cities such as Lebanon (total population, 25,902; 44.0% Hispanic) and Reading (total population, 88,495; 66.5% Hispanic) (1). Compared with state and national averages, incidence for Hispanic people in these 2 communities are higher for poverty, lack of health insurance, and poor health outcomes as a result of inadequate fruit and vegetable consumption, obesity, and a higher incidence of chronic diseases (2). In 2018, Better Together, a community-academic coalition led by Penn State College of Medicine, received a Racial and Ethnic Approaches to Community Health (REACH) award from the Centers for Disease Control and Prevention (CDC) to reduce the high incidence of chronic diseases among Hispanic people in both Lebanon and Reading (3). The coronavirus disease 2019 (COVID-19) pandemic has substantially affected our coalition's ability to deliver REACH program activities because many were planned as in-person events or large community gatherings.

The pandemic has also created great fear and anxiety in Hispanic families as many face language barriers and limited access to health care and health information. The Pew Research Center recently found that about two-thirds (65%) of Hispanic adults say the novel coronavirus is a major threat to the health of the US population as a whole, compared with less than half (47%) of the general public (4). In the same national survey, more Hispanic adults than American adults overall also said that COVID-19 is a major threat to their personal health (39% vs 27%, respectively) (4). Recognizing these challenges, our REACH coalition has strategically shifted resources to actively support the demands of local and

Abstract

Publicly available data on racial and ethnic disparities related to coronavirus disease 2019 (COVID-19) are now surfacing, and these data suggest that the novel virus has disproportionately sickened Hispanic communities in the United States. We discuss why Hispanic communities are highly vulnerable to COVID-19 and how adaptations were made to existing infrastructure for Penn State Project ECHO (Extension for Community Healthcare Outcomes) and Better Together REACH (a community-academic coalition using grant funds from Racial and Ethnic Approaches to



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state COVID-19 response efforts while still attending to our main goal to reduce disparities related to chronic disease prevention. The objective of this commentary is to discuss why Hispanic communities seem to be highly vulnerable to COVID-19, summarize the Better Together REACH initiatives, discuss how Better Together REACH has adapted program offerings to support COVID-19 pandemic efforts for the Hispanic community, and consider steps that might be taken to replicate these efforts across the country.

Hispanic Communities Are Especially Vulnerable to COVID-19

Publicly available data on racial and ethnic disparities related to COVID-19 (ie, people who have been tested for, who were infected by, or who have died from the virus) are now surfacing, and these data suggest that the novel virus has disproportionately sickened Hispanic communities (5–7). For example, in Pennsylvania’s neighboring state New Jersey, 19% of the total population is Hispanic but Hispanic people make up 30% of COVID-19 cases (6). Similar COVID-19 case rate disparities for Hispanic people are reported in many states across the United States such as Utah (14% of total population vs 38% of COVID-19 cases) and Washington (13% of total population vs 34% of COVID-19 cases) (6). Partial COVID-19 death data disaggregated by Hispanic ethnicity also show that Hispanic people are dying at a rate above what population data would suggest (7). For example, CDC’s weighted population data show that over 26% of US COVID-19 deaths were among Hispanic people, who represent only 18% of the total US population (7). In Pennsylvania, where Hispanic people are 7.6% of total state population, 11% of COVID-19 deaths were among Hispanic people, when applying weighted population distributions (7).

The vulnerability of Hispanic communities to COVID-19 can arise from many factors, including differential exposure, susceptibility, and access to health care (8). First, many Hispanic people work in frontline jobs in grocery stores, waste management, cleaning and sanitation services, and food delivery (9), putting them at constant exposure to people or materials that may be infected with COVID-19 (10). In addition to work circumstances, living conditions may also increase exposure to COVID-19 among Hispanic families (11). Twenty-five percent of Hispanic people live in multigenerational households (compared with only 15% of non-Hispanic white people) (12), which may make it challenging to take precautions to protect older family members or to isolate those who are sick if space in the household is limited (11). Although having a chronic disease does not increase the risk of contracting the new coronavirus, the presence of chronic disease can worsen the outcome of COVID-19 (13). Emerging data from the state of New

York show that among those who died of COVID-19 (23,083 people as of May 20, 2020), the leading underlying illnesses were hypertension (54% of deaths) and diabetes (36% of deaths) (5). This is alarming for Hispanic people because they have higher rates of both hypertension and diabetes as compared with non-Hispanic white people (14). Also, the lack of reliable information in Spanish has impeded efforts to combat the spread of the virus in Hispanic communities (15). This is especially true among those with language barriers, making them more likely to be unaware of best practices. Lastly, Hispanic people are the largest population segment without health insurance coverage in the United States (14), leaving those with presumptive symptoms or with a positive COVID-19 test with limited access to needed health care.

Better Together REACH Initiatives

Established in 1999, REACH is CDC’s cornerstone program aimed at reducing racial and ethnic health disparities. In 2018, CDC funded a new 5-year cycle of 31 grant recipients to reduce health disparities among racial and ethnic populations (ie, Hispanics, African Americans, American Indians, Asian Americans, Alaska Natives, and Pacific Islanders) with the highest level of chronic disease such as hypertension, heart disease, type 2 diabetes, and obesity (3). Through REACH, recipients plan and carry out local, culturally appropriate programs to address preventable risk behaviors leading to chronic diseases, such as poor nutrition and physical inactivity. Given the overwhelming socioeconomic and health disparities that Hispanic people face in both Lebanon and Reading, our coalition focused on improving chronic disease prevention outcomes in these 2 communities. Since 2018, Better Together REACH has leveraged strong community collaborations to implement locally tailored practice-based and evidence-based strategies aimed at increasing healthy nutrition programming, physical activity opportunities, and diabetes prevention programs. This initiative brings together over 60 local organizations that are now working together to break down silos, to share a common agenda to address health disparities, and to improve community wellness and the quality of life for all their residents (16).

Two of our signature initiatives related to healthy nutrition include expanding access to affordable and nutritious food (eg, Farmers Market Nutrition Program; Veggie Rx, a fruit and vegetable prescription program to alleviate food insecurity among patients with diabetes) and creating bilingual hospital-based breastfeeding programming and support with local Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) offices. To improve physical activity opportunities, we are actively promoting use of existing walking and bike routes that connect everyday destinations (eg, parks, schools, businesses, community facilities) and supporting the planning and designation of new

routes (eg, Walk Works). To address critical community–clinical linkages, we are expanding access to diabetes prevention program offerings by training local, bilingual community health workers (CHWs) to connect at-risk people with existing programs and supporting the CHWs to become certified lifestyle coaches. Our initiatives are promoted throughout our community networks with culturally relevant marketing campaigns. Many of these initiatives have been paused following CDC’s social distancing recommendations and Pennsylvania’s stay-at-home orders. What has not paused in the face of the pandemic is the commitment of our coalition to serve the Hispanic communities in Lebanon and Reading in these uncertain times. Our local and state partners are now facing an increased demand for health and social services, without receipt of additional resources and while simultaneously experiencing a loss of revenues and staff. The Better Together REACH team has been quick to recognize these challenges and the changing needs of the Hispanic communities over the past few months.

Local Response to Help Hispanic Communities

Since Pennsylvania’s Department of Health confirmed the first cases of COVID-19 in early March, the Better Together REACH team has been working to assist the Lebanon and Reading communities in their fight against this novel disease. As the rapidly evolving pandemic unfolds across our communities, families are faced with unprecedented challenges including loss of income, which has a trickledown effect in their ability to support basic needs. National survey data show that Hispanic adults (44%) were more likely than non-Hispanic white adults (26%) to report that they “cannot pay some bills or can only make partial payments on some of them” as a result of the economic challenges caused by the pandemic (17). Sixty-one percent of Hispanic adults also reported that they or someone in their household had lost a job or wages because of the coronavirus pandemic, compared with 38% of non-Hispanic white adults (17). Many members of our community are unpaid if their employers cannot open for business, and those who are immigrants are less likely to qualify for most government-sponsored assistance programs. Acknowledging these major issues, our team developed and disseminated a 1-page resource in Spanish to address questions about emergency lodging, food access, unemployment benefits, utility payments, and other nonmedical basic needs in Lebanon and Reading during local COVID-19 response events. This resource has been distributed to families picking up meals from local school district distribution sites.

Our team also identified, and has helped to address, the need for Hispanic families to stay informed about best practices to avoid the spread of COVID-19 as well as how and where to seek testing

and health care if they develop symptoms. To better understand this need, our bilingual CHW convened virtual meetings with Hispanic community leaders and organizations serving Hispanic people (Figure). Through these conversations, we learned that Hispanic people were struggling to access reliable information in Spanish. We also learned that many had access to smartphones and internet (major carriers are now providing free internet access during the pandemic), and they were willing to join remote learning activities if offered in Spanish. With this information in hand, we reached out to Penn State Project ECHO (Extension for Community Healthcare Outcomes) to facilitate a series of community-facing webinars in Spanish to disseminate information about COVID-19.

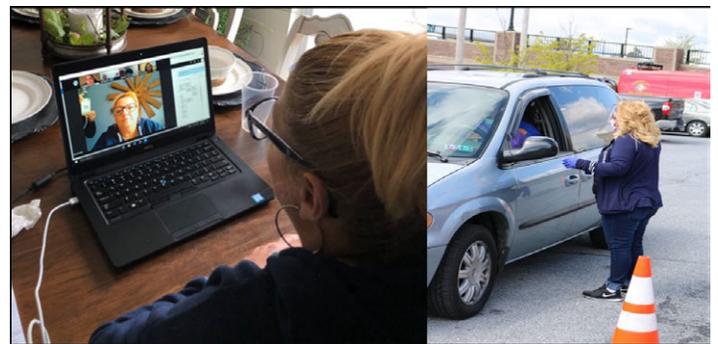


Figure. Community health worker leading a video conference call with community leaders in Lebanon County, Pennsylvania, to discuss the needs of Hispanic residents regarding coronavirus disease 2019 (COVID-19) (left) and distributing masks, bottles of hand sanitizer, and Spanish-language public service announcements at a local drive-through COVID-19 response site (right).

We partnered with Penn State Project ECHO at the right time, as they had launched a COVID-19 ECHO series on March 20 to inform health care providers and administrators of the latest best practices in emergency preparedness and patient treatment of COVID-19. Through this series of 1-hour webinars, participants presented patient and clinic or hospital system cases to academic expert teams who mentor them on patient care and systems quality improvement. These case-based discussions were supplemented with brief didactic presentations to improve content knowledge and share evidence-based best practices for dealing with COVID-19. Project ECHO is not telemedicine where expert specialists assume the care of the patient, but instead is “telementoring.” Registered participants received the sessions via real-time, interactive videoconferencing by using Zoom (<https://zoom.us>; Zoom Video Communications, Inc), a user-friendly, Health Insurance Portability and Accountability Act (HIPAA)–compliant, cloud-based software application offered at no cost to them. Zoom

has numerous benefits, including the ability to run on lower-speed internet connections. Participants easily connected to sessions by using a PC or Mac computer, laptop computer, tablet, or smartphone with or without a camera.

By using this existing infrastructure, we conducted the first Spanish-language community-facing COVID-19 ECHO series for the Hispanic community on April 2. This first session was “Preparing your household for COVID-19” and it was well attended through Zoom with concurrent transmission via Facebook Live (Table). While our bilingual CHW continued communicating with Hispanic community leaders daily, she assessed the evolving needs of Hispanic people in Lebanon and Reading with regard to COVID-19. Knowing our community needs, we planned and delivered Spanish-language sessions on diabetes management, mental health resources for families, and how to keep children physically active and eating healthily during COVID-19 times. We partnered with bilingual health care providers and public health scientists with expertise on these topics to deliver the sessions in Spanish. Additional sessions are being scheduled for upcoming weeks (eg, the role of CHWs in COVID-19 responses).

A key feature of our community-facing COVID-19 ECHO series was the opportunity for community members to actively participate in discussions about situations or challenges they have faced. Before each session, our CHW assessed questions or concerns from the community, so speakers used that information to craft their presentations and discuss those real-world scenarios as identified cases. These local cases served to reinforce the didactic portion of the webinar. Because we used an “all teach, all learn” approach, community members were free to ask questions and participate in discussions at any time during the session. Participants had the option to write questions in the chat box or use the raise hand feature to indicate that they had a question or comment to share with all participants. We also instructed the presenters to set aside the last 10 to 15 minutes of the session to allow questions from the public. Because these community-facing sessions were delivered in Spanish, all questions were raised and responded to in the same language. Most of the participants’ comments were requests for educational materials in Spanish to be distributed in their communities.

After each session, we made available to the general public the video recordings through the Penn State Project ECHO’s YouTube channel (https://bit.ly/COVID_Spanish; YouTube, LLC). Presentation slides and other resources (eg, information sheets from CDC, public service announcements [PSAs] developed by Better Together REACH [18]) discussed in the sessions were also sent to participants via email or shared through access to a dedicated online shared folder. The success of our community-facing COVID-19 ECHO series motivated other collaborators to launch a

Nepali-language series to reach the growing Nepali Bhutanese community that has found refuge in Pennsylvania. Our Better Together REACH team also supported the COVID-19 ECHO series for health care providers and administrators by organizing and presenting sessions about maternity health and breastfeeding and how to reach minority populations during the pandemic.

We have also been very active supporting local organizations and state agencies in their communication efforts. The Pennsylvania Commission on Latino Affairs and the state’s Office of Health Equity have noted a lack of reliable messaging in Spanish about COVID-19 as a barrier for information dissemination in the state. To address this issue, we have translated health communication materials for local nonprofit organizations needing assistance in serving Spanish-speaking Hispanic people, and we have created educational resources in Spanish to help families stay informed during the pandemic. For example, we developed a collection of Spanish and English PSAs, which have been published through regional media outlets and distributed at local events to reinforce the importance of following CDC guidelines for preventing the spread of COVID-19. We developed these PSAs with an understanding that not all community members have access to a computer or internet in their homes. These PSAs are available for any community organization to use and can be freely accessed online (18), already having been shared with the National REACH Coalition.

Opportunities for Next Steps

As we did with the existing infrastructure of Better Together REACH, other chronic disease prevention programs can employ similar promising strategies to reach vulnerable populations across the country during these unprecedented times. Using the infrastructure of Penn State Project ECHO to deliver Spanish language, community-facing webinars was an invaluable asset to connect hard-to-reach populations with best-practice communication about COVID-19. Equally important, supporting our COVID-19 responses with CHWs was effective for both public health and community well-being.

We need to continue leveraging available infrastructure and technology to amplify the unique community connections CHWs have. On the basis of our own experience in Pennsylvania, we can offer several suggestions, although we acknowledge that every community faces unique challenges and every organization has unique strengths and limitations. We found that CHWs can easily use low-key and freely available technology like Zoom or social media to get real-time data from local leaders and organizations and share it with decision makers so that they can disseminate health and social service resources to vulnerable populations. CHWs can likewise deliver evidence-based information about COVID-19

prevention, testing, and health services to community members. At a time when misinformation is widespread and culturally appropriate information is limited, CHWs' communication skills are more important than ever. Also, as many health care organizations and government health agencies are turning to CHWs to fill gaps in community-based pandemic response efforts, including contact tracing, we have to protect their well-being (19).

Implications for Public Health

Despite the observed health disparities, the pandemic presents a window of opportunity for achieving greater equity in preventing disease and providing health care for vulnerable populations (20). To achieve this goal, we require improved data collection to monitor and track disparities among racial and ethnic groups in the number of COVID-19 cases, complications, and deaths (20). These data would serve to quickly inform decisions on how to effectively address disparities and allocate resources at different levels of action. We also need consistent and credible culturally appropriate information to share with the general public (11,15). CHWs are proven to be effective messengers (19). Increasing the CHW workforce, especially in underserved communities, can meet the urgent demand to educate and connect people to health care services (19). Efforts should continue working across sectors beyond health to identify critical resources, such as temporary housing, because many families are now facing serious financial struggles (11). Our experience suggests that by working together, we all help to make our communities stronger, more stable, and healthier.

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Table

Table. Participation Metrics of the Spanish-Language Community-Facing COVID-19 Project ECHO Series, Lebanon and Reading, Pennsylvania, 2020

Session Topic	Zoom ^a	YouTube ^b	Facebook		
			Reach ^c	Engagement ^d	Views ^e
Preparing your household for COVID-19 ^f	62	250	746	15	122
Diabetes management ^g	36	122	1,595	209	509
Mental health resources for families ^h	31	90	415	92	165
Healthy eating and physical activity ⁱ	24	54	258	30	140

Abbreviation: COVID-19 Project ECHO, Coronavirus disease 2019 Project ECHO (Extension for Community Healthcare Outcomes).

^a Number of unique people who joined the session via Zoom (<https://zoom.us>; Zoom Video Communications, Inc).

^b Number of recording views in YouTube as of May 27, 2020 (<https://www.youtube.com>; YouTube, LLC).

^c Number of unique people (estimated metric) who saw any session content in Facebook (<https://www.facebook.com>; Facebook, Inc).

^d Total number of actions (eg, likes, comments, shares) that people took involving the session.

^e Number of times the session content was viewed by people.

^f Spanish title shown in YouTube “COVID-19: Estrategias para preparar su hogar y cuidar a su familia” (April 2, 2020).

^g Spanish title shown in Youtube “COVID-19: Manejo de la Diabetes” (April 14, 2020).

^h Spanish title shown in YouTube “COVID-19: Recursos de salud mental para familias durante la pandemia” (April 22, 2020).

ⁱ Spanish title shown in YouTube “COVID-19: Como Mantener Niños Activos y con Habitos Alimentarios Saludables en tiempos de COVID-19” (May 6, 2020).

COMMENTARY

Community Engagement of African Americans in the Era of COVID-19: Considerations, Challenges, Implications, and Recommendations for Public Health

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PEER REVIEWED

Summary

What is already known on this topic?

African Americans are more likely to contract coronavirus disease 2019 (COVID-19), be hospitalized for it, and die of the disease when compared with other racial/ethnic groups. Psychosocial, sociocultural, and environmental vulnerabilities, compounded by preexisting health conditions, exacerbate this health disparity.

What is added by this report?

This report adds to an understanding of the interconnected historical, policy, clinical, and community factors associated with pandemic risk, which underpin community-based participatory research approaches to advance the art and science of community engagement among African Americans in the COVID-19 era.

What are the implications for public health practice?

When considered together, the factors detailed in this commentary create opportunities for new approaches to intentionally engage socially vulnerable African Americans. The proposed response strategies will proactively prepare public health leaders for the next pandemic and advance community leadership toward health equity.

Abstract

African Americans, compared with all other racial/ethnic groups, are more likely to contract coronavirus disease 2019 (COVID-19), be hospitalized for it, and die of the disease. Psychosocial, so-

ciocultural, and environmental vulnerabilities, compounded by preexisting health conditions, exacerbate this health disparity. Interconnected historical, policy, clinical, and community factors explain and underpin community-based participatory research approaches to advance the art and science of community engagement among African Americans in the COVID-19 era. In this commentary, we detail the pandemic response strategies of the Morehouse School of Medicine Prevention Research Center. We discuss the implications of these complex factors and propose recommendations for addressing them that, adopted together, will result in community and data-informed mitigation strategies. These approaches will proactively prepare for the next pandemic and advance community leadership toward health equity.

Introduction

Racial/ethnic minority populations have historically borne a disproportionate burden of illness, hospitalization, and death during public health emergencies, including the 2009 H1N1 influenza pandemic and the Zika virus epidemic (1–4). This disproportionate burden is due to a higher level of social vulnerability — “individual and community characteristics that affect capacities to anticipate, confront, repair, and recover from the effects of a disaster” — among racial/ethnic minority populations than among non-Hispanic White populations (5). These characteristics include, but are not limited to, low socioeconomic status and power, predisposing racial/ethnic minority populations in general and African Americans in particular to less-than-optimal living conditions. Some racial/ethnic minority populations are more likely than non-Hispanic White populations to live in densely populated areas, overcrowded housing, and/or multigenerational homes; lack adequate plumbing and access to clean water; and/or have jobs that do not offer paid leave or the opportunity to work from home (6,7). These factors contribute to a person’s ability to comply with



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the mitigation mandates of the coronavirus disease 2019 (COVID-19) pandemic established to reduce risk for infection, such as physical distancing and sheltering in place (8).

The COVID-19 pandemic presents new challenges for public health evaluators, policy makers, and practitioners, yet it mirrors historical trends in health disparities and poor health outcomes among African Americans. African Americans are more likely to contract, be hospitalized, and die of COVID-19–related complications (9–12). Social vulnerability is often compounded by preexisting health conditions, exacerbated during times of crisis (13–17).

Public health leaders are now at a critical juncture to advance health equity among vulnerable African Americans. To advance this health equity, we must first have a comprehensive understanding of the factors that create health disparities and the factors that can contribute to an effective, multilevel response. With this understanding, we can then deploy effective mitigation strategies based on a community-based participatory research framework that fosters and sustains community leadership in the assessment and implementation of culturally appropriate and evidence-based interventions that enhance translation of research findings for community and policy change (18,19). The objective of this commentary is to 1) detail the interconnected historical, policy, clinical, community, and research challenges and considerations central to comprehensively advancing the art and science of community engagement among African Americans in the COVID-19 era; 2) describe The Morehouse School of Medicine Prevention Research Center (MSM PRC) pandemic response strategies, driven by community-based participatory research (CBPR); and 3) discuss community-centered implications and next steps for public health action.

Challenges and Considerations

Historical context

Racial/ethnic health disparities have always existed in the United States. Differential health outcomes between African Americans and non-Hispanic White Americans have been part of the American landscape for more than 400 years (20). Many measures of health status have been used to assess differences among racial/ethnic groups; more recently, health researchers have advanced concepts and constructs of health equity and social determinants of health (21). Reaching back to the mid-20th century, the US government documented that African Americans were far more likely than non-Hispanic White Americans to have a wide range of potentially fatal illnesses, including noncommunicable diseases such as type 2 diabetes, asthma, end-stage renal disease, and cardiovascular disease (21). In 1985, the US Department of Health and Hu-

man Services published the landmark *Report of the Secretary's Task Force on Black and Minority Health*, better known as the Heckler report (21). The report documented an annual excess 60,000 deaths among African American and other racial/ethnic minority populations. These underlying determinants can only result in disproportionately adverse health outcomes for racial/ethnic minority populations during the COVID-19 pandemic.

The COVID-19 pandemic is intensified by the long-standing income inequality between non-Hispanic White people and racial/ethnic minority populations. Economists use the Gini coefficient to measure income inequality. Values for this measure range from 0 to 1, with higher values representing greater income inequality. From 1990 to 2018, the Gini coefficient in the United States rose from 0.43 to 0.49 — an increase in income inequality. When income disparities exist along with other disparities (eg, health insurance, employment, education, social justice, access to quality health care), public health pandemics marginalize racial/ethnic minority groups, and this marginalization requires a strong and strategic response (22).

Policy landscape

Racial/ethnic minority populations are disproportionately affected by COVID-19 (23), as they are by many diseases. In the United States, African Americans, Hispanics/Latinos, Native Americans, Native Hawaiians, and Pacific Islanders are more likely than other racial/ethnic groups to die of COVID-19 (24). The pandemic has not affected all populations equally for several reasons, including social, behavioral, and environmental determinants of health. In addition, economic and social policies have not benefitted all populations equally. Obesity, asthma, depression, diabetes, heart disease, cancer, HIV/AIDS, and many other disorders that put vulnerable populations at greater risk of dying of COVID-19 can often be linked to a policy determinant (25). Air pollution; climate change; toxic waste sites; unclean water; lack of fresh fruits and vegetables; unsafe, unsecure, and unstable housing; poor-quality education; inaccessible transportation; lack of parks and other recreational areas; and other factors play a large role in overall health and well-being (26). These factors increase a person's stress and limit opportunities for optimal health (27). Too often, public health researchers and practitioners stop at the social determinants of inequities. These social determinants do, indeed, play an outsized role in these human-made inequities, but underlying each one is a policy determinant that should be addressed to improve health equity.

Consider, for example, the problem of asthma among many racial/ethnic minority populations. One community, in East Harlem, one of Manhattan's poorest neighborhoods, found that a bus depot caused the high rates of asthma among children who lived near it

(28). Six of 7 bus depots in Manhattan are located in East Harlem, and East Harlem has the highest rate of asthma hospitalizations in the country (29–31). In another community, the exhaust and dust from the vehicles traveling a major highway that cut through the middle of the community was found to contribute to the high rates of asthma among residents who lived near it (32). In both of these examples, an underlying policy determined the placement of the bus depots and the highway, which led to the eventual health inequities.

Examples of how legislative and policy change can immediately affect the social determinants of health are demonstrated in government and public responses during the first 3 months of the COVID-19 pandemic in the United States. Federal, state, and local policies were implemented to stimulate local economies and infuse communities with free food and direct revenue, including increases in SNAP (Supplemental Nutrition Assistance Program) benefits and expanded unemployment benefits. These initiatives have helped communities and individuals during the crisis. Despite these programs, however, some marginalized African American communities have not benefitted. As the nation adjusts to the “new normal,” it is imperative that the social, economic, and health gaps in these communities also conform to a “new normal” that is driven by new or expanded *and* sustained policies.

Clinical mechanisms, chronic conditions, and increased risk of COVID-19

African Americans are twice as likely as non-Hispanic White Americans to die of heart disease and 50% more likely to have hypertension and/or diabetes (33,34). This elevated risk increases the likelihood of other complications and death from COVID-19 (35,36). Let us consider, for example, people living with diabetes. Their immune system is depressed overall, because their blood glucose is not well controlled (hyperglycemia) (37). It is hypothesized that hyperglycemia causes an increase in the number of a particular receptor in the lungs, pancreas, liver, and kidneys; this increase impairs the function of white blood cells, which are designed to fight off infections (37). This impairment predisposes the person living with diabetes to an increased risk of bacterial and viral infections. When severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) enters the lungs by way of this particular receptor, it overwhelms the alveoli (air sacs) in the lungs and disables the exchange of oxygen and carbon dioxide (38). As a result, some people with diabetes may need supplemental oxygen, intubation, and/or admission to an intensive care unit (37). Hyperglycemia in combination with a disease such as COVID-19 makes recovery difficult (37). People with diabetes who are in good mental health, know the names and dosages of their medications, and know their blood pressure, blood glucose, and other laboratory values, such as hemoglobin A_{1c}, tend to have better

control of their disease and have lower levels of illness and death (16,37). Emphasizing the importance of good blood glucose control to prevent diabetes complications and associated COVID-19 risk is more important now than ever (36–38). Mental health plays a major role in a person’s ability to maintain good physical health and optimally manage their chronic conditions, and mental illnesses may affect the ability to participate in health-promoting behaviors (39).

Mental and behavioral health

The constellation of stressors triggered by the COVID-19 pandemic undermines the nation’s mental health (40–42). Various disruptions in daily life, coupled with the threat of contracting the deadly virus, is leading some people to experience anxiety and depression, sometimes to the extreme. Reports of family violence and use of suicide prevention hotlines have increased (43,44). Physical distancing, shelter-in-place orders, business and school closures, and widespread unemployment have radically changed ways of life and contributed to a sense of hopelessness, isolation, loneliness, helplessness, and loss (45,46). Pandemic-related factors, including quarantine, have led to posttraumatic stress disorder, confusion, and anger (47). One study indicated that a constant consumption of media reports had detrimental psychological effects on some people (48). If interrelated mental, behavioral, and emotional issues are not adequately addressed, disorders among racial/ethnic minority populations and other vulnerable populations (eg, the medically underserved, homeless, and disabled; inmates in the criminal justice system) will surge and exacerbate disparities (49).

Interrelated COVID-19–related stressors include childcare and safety, elder care, food insecurity, and interpersonal relationships (50). These stressors may trigger aspects of unresolved trauma. Poor coping mechanisms (eg, use of illicit drugs, excessive alcohol consumption, overeating, inadequate sleep) may develop or worsen. In addition to facing chronic stressors, communities of racial/ethnic minority populations often deal with the stigma associated with seeking mental and behavioral health care. A Surgeon General’s report, *Mental Health: Culture, Race, and Ethnicity*, concluded that racial/ethnic minority populations, compared with the non-Hispanic White population, have less access to mental health care, are less likely to receive treatment, and when treated, often receive poorer quality of care (51). As a result, racial/ethnic minority populations often have a greater burden of behavioral disorder–related disability (51). Addressing the multifaceted mental and behavioral health needs of racial/ethnic minority populations in the United States is a complex issue that warrants attention from clinicians, researchers, scientists, public health professionals, and policy makers. It is imperative to recognize the signi-

ficant role of community leaders in exploring solutions to COVID-19–related mental and behavioral health problems among racial/ethnic minority communities. Their lived experiences are central to the co-creation of pandemic response strategies for these populations.

Perspectives of community leaders

The realities of research, evaluation, and clinically focused community engagement after the COVID-19 pandemic may change for the foreseeable future. Efforts to initiate and sustain culturally competent engagement of racial/ethnic minority groups previously relied on face-to-face interactions in homes, churches, and other community settings. Social or physical distancing has nearly stopped communities and their collaborators from real-time gathering. These changes challenge the human need for connection and in-person exchange. Although the adjustment has been difficult, the pandemic has resulted in new modes of engagement. Webinar and digital technology are now accessible for most people at low or no cost. Many community residents have newfound capacities to use technology for social and professional interactions as part of daily life.

Current health communication and messaging require community-informed improvements. The use of terms like *sheltering in place*, *social distancing*, and *flattening the curve* do not naturally resonate with many people. For some, these terms foster anxiety and distrust of systems perceived to separate communities rather than promote COVID-19 mitigation strategies. Community leaders, as well as business and faith leaders, have found themselves in a space of terminology and descriptions that are understood mostly by public health practitioners. Therefore, health literacy and the interpretation of current health conditions are vital.

The pandemic has intensified the economic strains among low-income and moderate-income people and families (52). Low-wage workers, many on the frontlines of the pandemic since it began, have had little to no increase in income (53). African American families who struggled to make ends meet before COVID-19 are now facing dire economic circumstances in making the best decisions for their families. Stressors include, but are not limited to, deciding how to pay rent or a mortgage, paying for food, assisting children with virtual learning, and protecting themselves with minimal or no health care benefits. The mental and behavioral health implications of these problems, along with the economic and practical challenges, have made a fragile ecosystem even more unstable. Low-wage workers in hospitality, food service, and retail industries cannot work from home. Workers who depend on employer-provided health insurance now have the additional burden of how to maintain health insurance coverage (54). Ulti-

mately, lack of adequate access to health care, along with the complex realities of the COVID-19 pandemic, will increase health disparities for socially vulnerable African American employees and their families.

Local examples of COVID-19 response strategies driven by community-based participatory research

The MSM PRC relies on a deeply rooted, community partnership model that responds to the health priorities of vulnerable African American residents before, during, and after public health emergencies such as the COVID-19 pandemic. For more than 20 years, the MSM PRC has applied dynamic CBPR approaches that focus on prevention, establish partnerships between communities and research entities, and are culturally tailored (6,55–57).

The MSM PRC capitalizes on community wisdom through a community coalition board (CCB) that has governed the center since its inception. The CCB is composed of 3 types of members: neighborhood residents (always in the majority), academic institutions, and social service providers (58). Neighborhood residents hold the preponderance of power, and all leadership seats and are at the forefront of all implemented approaches. Neighborhood resident members are intentionally recruited from census tracts with a high incidence and prevalence of chronic and infectious diseases. The communities served by the MSM PRC are majority (87%) African American, have an average household income of \$23,616, and rank lowest among other local communities in other socioeconomic conditions and community neighborhood health factors (55).

The MSM PRC has strategically partnered with the CCB and the community to facilitate health research and related interventions based on a comprehensive understanding of historical, political, clinical, and community considerations. The community governance model was developed to address CBPR challenges that exist when academics are not guided by neighborhood leaders in understanding a community's ecology, when community members do not lead discussions about their health priorities, and when academics and neighborhood leaders do not work together as a single body with established rules to guide roles and operations (59,60).

The MSM PRC conducts a recurring (every 4 years) community health needs and assets assessment (CHNA²) process through the CCB, empowering community members to take on roles as citizen scientists who develop locally relevant research questions and identify priority health strategies (60). The recently completed CHNA² (February 2018) was co-led by neighborhood residents to advance a community health agenda. Survey development, data analyses, and response strategies are reviewed, monitored, and evaluated by the CCB and its Data Monitoring and Evaluation

Committee (55). This 7-member committee, established in 2011, is designed to extend the CBPR engagement of CCB members in the work of the MSM PRC. It exists through academic–community co-leadership (a CCB neighborhood resident member and the MSM PRC assistant director of evaluation) of a group of CCB members tasked with leading assessments. For CHNA², members met bimonthly (every other month, when the CCB did not meet) to discuss and inform evaluation and data collection activities and prepare for reporting of evaluation findings and interim results to the broader CCB to determine corresponding respond strategies. CHNA² primary data included surveys administered to 607 community residents. The most frequently cited community health concerns were diabetes, nutrition, high blood pressure, overweight/obesity, and mental health. County-level, top-ranking causes of illness and death, including cardiovascular disease, diabetes, and mental health disorders, align with these community perspectives (61).

CHNA² is relevant, despite being administered before the outbreak of COVID-19. The chronic conditions and health problems identified are those exacerbated by COVID-19 (diabetes, cardiovascular disease, and mental health), thereby making their focus even more relevant to the community.

The mental and behavioral health components of CHNA² were amplified to address the stress and anxiety caused by the pandemic. First, during National Mental Health Awareness Month (May 2020), the MSM PRC convened a virtual forum, *Our Mental and Behavioral Health Matters*. It was strategically designed to address the culturally bound mental health stigma in racial/ethnic minority communities that is due, in part, to the schism between religion and therapy. The forum also addressed challenges related to social isolation. Concerns centered on how to navigate a virtual mental health checkup and support for parents seeking to help their children process the realities of the pandemic and minimize childhood trauma. Featuring psychologists, researchers, and community- and faith-based pioneers, the forum engaged more than 230 local and national participants. Second, a CCB member representing Fulton County's Department of Behavioral Health and Developmental Disabilities helped the MSM PRC to develop and disseminate an infographic on mental and behavioral health services for insured and uninsured residents. Third, the MSM PRC will offer annual Mental Health First Aid (62) trainings to community residents and professionals over the next 4 years.

The MSM PRC leads the Georgia Clinical and Translational Science Alliance's Community Engagement Program, which is designed to advance community-engaged clinical and translational research (63,64). The Program is led by a community steering board adapted from the CCB model and includes co-leaders (faculty and staff, including a community health worker) from Emory

University, the Georgia Institute of Technology, and the University of Georgia. The program conducted a webinar, *Community Engagement in the Era of COVID — Opportunities, Challenges and Lessons Being Learned*, in May 2020. The webinar addressed the challenges and opportunities associated with initiating or sustaining community-engaged research during physical-distancing and shelter-in-place mandates. Clinicians, scientists, and community leaders from Atlanta, Athens, and Albany, Georgia, discussed uniquely nuanced issues for urban and rural community engagement and the basic need for social connectedness through virtual navigation of community engagement strategies (eg, via Zoom) and newly expanded access to telehealth medical visits (65). The webinar emphasized the importance of being a credible source of COVID-19 information and linkage across social and economic services, given heightened community anxiety and preexisting mistrust of medical research.

The MSM PRC is a central collaborator in a national initiative led by the National Center for Primary Care at Morehouse School of Medicine and the Satcher Health Leadership Institute, also at Morehouse School of Medicine. The National COVID-19 Resiliency Network is designed to mitigate COVID-19 in racial/ethnic minority, rural, and socially vulnerable communities. The initiative will work with community organizations to deliver education and information on resources to help fight the pandemic. The information network will strengthen efforts to link communities to COVID-19 testing, health care services, and social services through the institution's leadership in policy, community engagement, and primary care. The MSM PRC's CCB model will be scaled to collaborate with community organizations in highly affected geographic areas to assess and inventory community assets for COVID-19 testing, vaccination, and other health care and social services through a national community coalition board. The MSM PRC CHNA² model will also be scaled to inform mitigation approaches implemented by community-based organizations through establishment of a centralized inventory of culturally appropriate COVID-19 response strategies, by geography and population vulnerability. Approaches will engage community health workers, who are mission-critical stakeholders, nationally galvanized, and locally deployed.

These MSM PRC activities are founded on long-standing, community-partnered, and informed relationships in response to preexisting health priorities that are simply heightened by the COVID-19 pandemic. Ideally, this CBPR framework is established before a public health crisis. This framework and the practice of identifying community needs and mobilizing strengths are now poised, adapted, and scaled up in response to the COVID-19 pandemic. The continued evolution of the pandemic means that

these approaches and solutions must be flexible in response to changing needs and new data.

Implications for Public Health

Public health practitioners, evaluators, policy makers, researchers, and clinicians with a community-engaged mindset have long understood, grappled with, and proclaimed the complexities of health disparities in the context of historic and current social determinants (66). When considered together, the challenges and realities detailed in this commentary create opportunities for new approaches to intentionally engage socially vulnerable African Americans. The response strategies proposed below reflect the complex web of historical and current policy and clinical, mental and behavioral, and community factors. Use of a CBPR framework undergirds all response strategies proposed.

Promote local community leadership to proactively inform mitigation strategies. The importance of CBPR and related needs assessments and response strategies are heightened during the COVID-19 era. Health promotion for chronic conditions such as diabetes, obesity, and cardiovascular diseases may have previously been structured to result in poor health or premature death for racial/ethnic minority populations through reduced or nonexistent access to health care; these conditions now require more immediate attention because they increase vulnerabilities and risks that can lead to poor health outcomes or death. Community knowledge, perceptions, and approaches to culturally responsive mitigation strategies must be prioritized. Carefully constructed local community governance boards that include multidisciplinary leadership (clinical, policy and social service, and research, among others), should be formed to lead assessments toward community and data-informed COVID-19 mitigation strategies for vulnerable populations in highly affected geographic areas.

Strategically engage public health and community-attuned policy leaders and prioritize community stimulus strategies. The political landscape calls for public health leadership by mitigation response teams (25). These teams are key informants from the beginning of public health initiatives designed to mitigate the pandemic, and their engagement is essential. They will provide another lens through which to examine the structures and processes that enable inequities to systematically develop and flourish or be eradicated through community co-created responses.

The essential areas of policy for optimal community health are in prioritized economic development, food security, and access to health care protection for vulnerable African American communities. Collectively, these areas present opportunities for intervention in response to chronic disease self-management (clinical), economic strains (community), and health care protections (policy)

associated with the COVID-19 vulnerabilities of many African American communities. These essential policy areas represent a proposed foundation that rests on 4 “Es” hypothesized to narrow disparity gaps and offer opportunities for self-sufficiency and community resiliency.

- Employ trained/certified, compensated community health workers, coaches, and ambassadors who are charged with cultural messaging and education, contact tracing, and surveillance toward increased adherence to policies on physical distancing and sheltering in place.
- Expand SNAP programs with vouchers to include the purchase of household and personal care items rather than encouraging recipients to barter for basic care products.
- Enhance school lunch programs so that all children receive high-quality, balanced meals throughout the year, regardless of the ability to pay.
- Ensure universal broadband internet access to reduce education, health care, and information barriers.

Cultivate community-informed public health disaster health literacy. Health literacy concepts, modes, and education must be reframed. The media have newly exposed the lay public to the realities of unequal treatment and unequal pandemic risk. The public is, thereby, witnessing the more rapid connection between who they are, where they live, and who is more likely to suffer from and die of COVID-19. Marketing frameworks for community-based prevention can be used to position community leaders to inform and lead health communication strategies. These marketing frameworks will ensure that messages resonate, engage, and foster action with objectivity and community/cultural sensitivity.

Foster culturally tailored behavioral and mental health dialogue and response. Multidimensional prevention education strategies that encourage resilience (positive adaptation to adversity) must be promoted in African American communities. This promotion should involve advocating for proactive self-care, reducing stigma, and encouraging integrated health care. These strategies should be promoted and proactively integrated as cross-cutting components of any research and health initiative.

Prioritize patient-centered medical homes and neighborhood models. Patient-centered medical home infrastructures that include models of integrated care (mental and behavioral health care services in primary health care settings) can help overcome barriers to comprehensive health care and overall wellness. This model engages comprehensive resources to care for a patient, regardless of race/ethnicity, sex/gender, sexual orientation, language, socioeconomic status, or health insurance coverage. Primary care providers are encouraged to incorporate this model into their practices to decrease illness and death among African Americans at heightened risk of COVID-19 (67,68).

Redefine essential workers. Although the accomplishments of first responders — physicians, nurses, scientists, and other people fighting to preserve life — are laudable and undeniable, many African American nonclinical frontline workers, such as maintenance, janitorial, or food processing workers, are excluded from the definition of essential workers. The social vulnerability of nonclinical frontline workers, who often have chronic health conditions that place them at particular risk for contracting COVID-19, should be acknowledged and considered in planning.

Community and public health leaders in health care, behavioral health, and policy must consider the implications of health inequities among racial/ethnic minority populations, seriously tackle their root causes, and develop culturally responsive COVID-19 strategies for socially vulnerable African Americans. CBPR-driven approaches that elevate marginalized communities as senior partners in planning, implementing, and evaluating strategies will promote community leadership and increase adherence to health communication messages as the COVID-19 pandemic evolves. Efforts should be characterized by strong data (research or evaluation), contextually relevant community engagement strategies, and action (policy, systems, and environmental change approaches). The COVID-19 pandemic has presented an optimal opportunity to reprioritize and sustain approaches toward advancing community engagement of vulnerable African Americans. These new approaches will prepare us for the next pandemic. More importantly, they will foster CBPR leadership in advancing health equity.

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COMMENTARY

The Role of Public Health in COVID-19 Emergency Response Efforts From a Rural Health Perspective

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PEER REVIEWED

Summary**What is already known on this topic?**

Coronavirus disease 2019 (COVID-19) is a serious global pandemic. Rural minority communities are particularly at risk because of a weakened health care infrastructure, health care provider shortages, and lower socioeconomic status.

What is added by this report?

This report describes challenges faced by rural communities affected by the COVID-19 pandemic and provides recommendations to address those challenges.

What are the implications for public health practice?

The COVID-19 Community Vulnerability Index is a tool that can help identify communities most at risk for COVID-19 based on indicators such as socioeconomic status and health care system factors.

Abstract

As the country responds to coronavirus disease 2019 (COVID-19), the role of public health in ensuring the delivery of equitable health care in rural communities has not been fully appreciated. The impact of such crises is exacerbated in rural racial/ethnic minority communities. Various elements contribute to the problems identified in rural areas, including a declining population; economic stagnation; shortages of physicians and other health care providers; a disproportionate number of older, poor, and underinsured residents; and high rates of chronic illness. This comment-

ary describes the challenges faced by rural communities in addressing COVID-19, with a focus on the issues faced by southeastern US states. The commentary will also address how the COVID-19 Community Vulnerability Index may be used as a tool to identify communities at heightened risk for COVID-19 on the basis of 6 clearly defined indicators.

Introduction

Rural communities are heterogeneous. In 2010, 19.3% of the US population resided in rural areas, compared with 54.4% in 1910, with the highest concentration being in the southeastern United States. The southeastern region includes Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas, and racial and ethnic minorities make up 19% of the entire rural population (1). Socioeconomic characteristics influence the risk of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). For example, in Mississippi, approximately 20% of the population lives in poverty (2). In 2019, Mississippi, Louisiana, Arkansas, and Alabama were ranked as the country's least healthy states (2). This statistic is important, because the less healthy the population, the more likely the epidemic is to have fatal consequences. In addition, the weaker the health system, the harder it is to contain the virus.

Most of the states that make up the southeastern United States are rural (Table 1). Rural communities face a unique set of challenges in the face of the coronavirus disease 2019 (COVID-19) pandemic. They are often areas already affected by high levels of poverty, lower levels of access to quality health care, lower levels of health literacy, and social stigma. Many elements contribute to these problems, including a declining population; economic stagnation; shortages of physicians and other health care professionals; a disproportionate number of older, poor, and underinsured residents; and high rates of chronic illness. This commentary will describe the challenges and issues faced by rural communities in addressing the COVID-19 pandemic. It will also show how the COVID-



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19 Community Vulnerability Index (CCVI) (4) may be used as a tool to identify communities at highest risk for COVID-19 on the basis of 6 clearly defined indicators (Table 2).

Challenges for Rural Communities

As the COVID-19 outbreak continues to place a burden on hospitals throughout the United States, concern is growing that many hospitals, in particular rural hospitals, may not have the financial reserves to remain fiscally viable. Most rural hospitals operate on tight budgets, and they rely on high-profit services, such as elective surgery, to keep them in business. For many rural hospitals, canceling these profitable services to cope with the COVID-19 pandemic may result in financial catastrophe (5).

The closure of rural health care facilities or the discontinuation of services can negatively affect access to health care in a rural community. People in rural areas who get sick with COVID-19 have fewer hospitals to treat them. Compared with urban hospitals, rural hospitals are smaller, have a higher proportion of primary care physicians and a lower proportion of board-certified physicians on their medical staffs, have fewer intensive care beds, and are less likely to have contracts with health maintenance organizations and preferred provider organizations.

People living in rural areas are at increased risk of COVID-19, because they are less likely to be employed and more likely have low incomes than people living in other areas. They also face significant barriers to accessing care, including provider shortages, recent closures of rural hospitals, and long travel distances to providers. Local rural health care systems are fragile; when one facility closes or a provider leaves, it can affect care and access to care throughout the community. Furthermore, when a hospital closes, access to nonhospital care can also decline, because many specialists cluster around hospitals. Rural hospitals face severe financial challenges, and they are also more likely than urban hospitals to close. For example, 15 of 21 hospitals that closed in the United States in 2016 were in rural communities, and since 2010, nearly 90 rural hospitals in the United States have closed (6). Another financial challenge to rural hospitals is shrinking populations, which means fewer patients to fill beds. Although populations in urban counties have increased since 2000, populations in half of rural counties in the United States have decreased, which has caused a reduction in revenue for rural hospitals. Most recent hospital closings have been in states that opted not to expand Medicaid under the Affordable Care Act, which means that a significant portion of their health care costs remain uncompensated, thus creating a financial burden for these states (7).

Given the unique challenges for rural communities — exacerbated by a weakening rural health care infrastructure, health care

provider shortages, and closure of rural hospitals — monitoring and control plans need to be developed to ensure that the magnitude of illness and death in those communities are assessed. Specifically, solutions need to be developed that account for the rural nature of these communities as well as the social determinants of health that influence health care outcomes.

COVID-19 Community Vulnerability Index

Community-level social disadvantage and vulnerability to disasters can influence the incidence of COVID-19 and its adverse outcomes in several ways. For example, lower socioeconomic status (SES) is associated with poor health care access, which may increase risk for adverse health outcomes. Labor inequalities, lack of workplace protections, and household overcrowding may decrease the ability to adhere to social-distancing guidelines. Additionally, racial/ethnic minorities and immigrants are less likely to have access to appropriate and timely health care. Evidence suggests that these inequalities contributed to disease spread and severity during the H1N1 influenza pandemic (8–11).

The CCVI, developed by the Surgo Foundation (4), can be used to identify which communities may need the most support during a pandemic or similar public health emergency. CCVI scores range in value from 0 to 1, with higher scores indicating greater vulnerability. A given geographic unit — for example, a census tract or county — is ranked relative to all similar units across the country on the basis of 6 themes: 1) SES, 2) household composition and disability, 3) minority status and language, 4) housing type and transportation, 5) epidemiologic factors, and 6) health care system factors. The score generated can then be used to designate a level of vulnerability. Each designation corresponds to a quintile of that geographic unit type in the United States. For example, a county score of 0 to 0.20 would correspond to very low vulnerability compared with all other US counties, a score of 0.21 to 0.40 would correspond to low vulnerability, and so on through the last category of very high vulnerability and a score of 0.81 to 1.

The CCVI is not designed to predict which individuals will become infected with SARS-CoV-2. However, it can provide information about the anticipated negative impact at the community level. This information can help decision makers target resources where they are most needed. The index could be useful in developing a community risk profile for SARS-CoV-2 infection that can be used to target and tailor control efforts. Data from the CCVI demonstrate that each of the 9 southeastern states has a CCVI score that indicates very high vulnerability. Scores for each state also indicated very high vulnerability on each of the 6 indicators used to generate the CCVI (4,12–14). For example, Missis-

Mississippi has a score of 1 for SES and household composition and disability and a score of 0.92 for epidemiologic factors. The overall CCVI score for Mississippi is 0.92. This score indicates that Mississippi is particularly vulnerable and prone to poorer COVID-19–related outcomes, especially in communities with lower SES and poor health status overall.

Since the outbreak of COVID-19, health care delivery has changed considerably. The United States has adapted its technology and policies to accommodate health care delivery at a distance. However, although telehealth use has increased during the pandemic, the regulatory changes that made this increase possible are not permanent. Moreover, the kinds of technologic advancements required for remote health care delivery can be challenging to implement in rural communities. The terrain can make it difficult, sometimes impossible, to install fiber or other infrastructure, and the biggest barrier to obtaining broadband internet service in certain areas of the country is low population density.

Furthermore, the cost of telemedicine for rural health clinics is an issue, because many rural patients receive either Medicare or Medicaid, and reimbursements from these government health care programs, as well as from private insurance companies, do not fully cover the costs of virtual medicine.

For rural communities in the Southeast, success at implementing these virtual systems has been fragmented. Unreliable access to at-home technology, broadband internet service, and cellular telephone reception have prevailed in some communities, while ever-present financial hurdles abound. The COVID-19 pandemic has exposed the limitations of these remote areas (15).

Special Concerns for Rural Communities

Affordability of health care is a significant challenge for rural areas in the southeastern United States. However, several of the most rural states in the country opted not to expand Medicaid under the Affordable Care Act; 59% of uninsured rural people live in these states (16). Lack of insurance has implications for access to care, because people without health insurance may delay seeking care even if they have symptoms, for fear of incurring expenses that they cannot pay (16).

In addition to lacking good health insurance, many people living in southeastern and rural states face the barrier of distance (17). Geographic isolation and related challenges, including lack of transportation and extreme weather conditions, make it harder for people in rural communities than people in urban communities to travel for care, and services are typically farther away (18). For example, to get to Sunflower Medical Center in Ruleville, Mississippi, some patients travel as far as 45 miles to receive care (15).

The lack of infrastructure is not limited to roads and highways; in rural areas, health care infrastructure may also be extremely limited, health care resources scarce, and clinical providers few. Only 9% of the nation's physicians and 16% of the nation's registered nurses practice in rural areas. Dentists and pharmacists are also scarce in these areas (18).

Implications for Public Health

Community health centers play an important role in rural and remote areas and form one of the largest systems of care available to rural populations. Today, community health centers serve 1 in 6 rural residents (19), so they have a critical role in the response strategy to COVID-19 in rural communities. Because health centers are in virtually every community in our country, they are in a unique position to respond to COVID-19. They can help increase access and availability of COVID-19 testing for the community.

However, despite ramping up testing and virtual visits, health centers are reporting steep declines in patient visits, and many staff members are unable to work because of COVID-19–related issues. These issues include having to juggle work obligations and parenting obligations as a result of school closings and not being able to find appropriate child care as a result of day care closings. Another challenge is the temporary closures of health centers as a result of the pandemic. Although health care centers received \$1.98 billion in rapid response grants from the federal government, more financial support may be needed to sustain services (20). Health centers also have issues related to the availability of personal protective equipment and testing supplies. Staffing to assist with contact tracing for COVID-19–positive people is also necessary.

The CCVI is a valuable tool that can be used as part of a coordinated response to identify communities at greatest risk for COVID-19, so that resources can be deployed strategically to those areas. This tool, in coordination with targeted testing and contact tracing, can be effective in flattening the COVID-19 curve and ensuring that the most vulnerable communities have access to health care resources. Creating a complete profile of people at risk for SARS-CoV-2 infection is also important. A complete risk profile, including geographic hotspots, needs to be developed for the southeastern region to target and tailor control efforts.

Stakeholders that work with underserved populations should be included in the emergency response planning process and enlisted to help reach disadvantaged and marginalized communities. Information generated from the CCVI can be used to develop a coordinated, comprehensive approach to addressing the pandemic that is specific to rural communities in the South. These stakeholders should include hospitals, health care centers, insurance providers, policy makers, community-based organizations, and faith-based

organizations. This coordination would be valuable in planning emergency response, identifying areas of greatest needs, developing culturally appropriate messaging, and disseminating information throughout the community.

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Tables

Table 1. Percentage of Urban and Rural Populations in 9 Southeastern US States, 2010^a

State	Total Population	Urban	Rural	% Rural
Alabama	4,779,736	2,821,804	1,957,932	41
Arkansas	2,915,918	1,637,589	1,278,329	44
Florida	18,801,310	17,139,844	1,661,466	9
Georgia	9,687,653	7,272,151	2,415,502	25
Louisiana	4,533,372	3,317,805	1,215,567	28
Mississippi	2,967,297	1,464,224	1,503,073	27
North Carolina	9,535,483	6,301,756	3,233,727	51
South Carolina	4,625,364	3,067,809	1,557,555	34
Texas	25,145,561	21,298,039	3,847,522	15

^a Source: American Community Survey (3).

Table 2. COVID-19 Community Vulnerability Index Applied to 9 Southeastern US States^a

States	Theme 1: SES	Theme 2: Household Composition and Disability	Theme 3: Minority Status and Language	Theme 4: Housing Type and Transportation	Theme 5: Epidemiological Factors	Theme 6: Health Care System Factors	CCVI
Alabama	0.92	0.86	0.42	0.28	0.88	0.96	1
Arkansas	0.9	0.98	0.36	0.82	0.84	0.82	0.96
Florida	0.68	0.42	0.88	0.52	0.46	0.9	0.9
Georgia	0.84	0.56	0.78	0.36	0.44	0.92	0.86
Louisiana	0.94	0.88	0.52	0.66	0.98	0.38	0.88
Mississippi	1	1	0.46	0.74	0.92	0.5	0.92
North Carolina	0.8	0.66	0.68	0.62	0.48	1	0.98
South Carolina	0.86	0.84	0.5	0.5	0.54	0.54	0.64
Texas	0.72	0.44	0.96	0.46	0.38	0.7	0.8

Abbreviations: CCVI, COVID-19 Community Vulnerability Index; SES, socioeconomic status.

^a CCVI scores range from 0 to 1; higher scores indicate greater vulnerability. Source: Surgo Foundation (4).

COMMENTARY

The Influence of Telehealth for Better Health Across Communities

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PEER REVIEWED

Summary**What is already known on this topic?**

The COVID-19 pandemic has forced many health care institutions to reconsider health care delivery mechanisms. Because of reimbursement restrictions, telehealth has been underutilized.

What is added by this report?

Capitalizing on existing infrastructure that supports digital connectivity through uptake of telehealth was vital to successfully reimagine safe health care delivery. Removing a critical barrier, reimbursement, supported telehealth.

What are the implications for public health practice?

Technologic advancements and policy changes can alter health care delivery and have the potential to reduce disparities in access to care and improve outcomes among the most vulnerable populations.

Abstract

Rapid spread of coronavirus disease 2019 (COVID-19) forced an abrupt shift in the traditional US health care delivery model to meet the needs of patients, staff, and communities. Through federal policy changes on telehealth, patient care shifted from in-person to telephone or video visits, and health care providers reached out to patients most at risk for exacerbation of chronic disease symptoms. ECHO (Extension for Community Healthcare Outcomes), a videoconferencing peer learning application, engaged health care providers across Missouri in the treatment and management of complex COVID-19-positive patients. Re-envisioning health care in the digital age includes robust utilization of telehealth to enhance care for all.

Introduction

In December 2019, an infection caused by a bat-origin novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was detected in Wuhan, China (1). Within less than 3 months, coronavirus disease 2019 (COVID-19), the disease caused by SARS-CoV-2, had spread across China and worldwide. The World Health Organization declared COVID-19 a pandemic on March 11, 2020 (2). As of May 30, 2020, more than 1 million infections had been laboratory-confirmed in the United States with more than 100,000 case fatalities (3). An estimated 80% of people infected with COVID-19 during this time did not require hospitalization, and approximately 5% to 12% of hospitalized patients were admitted to intensive care units (3). Hospitalization rates were highest among adults aged 65 years or older, people with multiple chronic conditions, and men (3). Among younger patients (18–49 y), obesity, underlying chronic lung disease (primarily asthma), and diabetes were the most prevalent chronic disorders (3). Because COVID-19 is a pandemic, the virus is expected to cause multiple waves of infection in future months and to persist to cause seasonal outbreaks (2).

Patients exhibiting severe symptoms related to COVID-19 were urged to seek immediate care; however, this was challenging for people in rural areas of the United States, who make up about 20% (60 million residents) of the total population (4). Rural populations in the United States face significant challenges in accessing health care and have poorer health outcomes than urban or suburban populations, including higher rates of chronic disease, higher death rates, and delayed diagnoses for cancers and other diseases (5–7). These challenges are likely due to less accessible care related to lower rates of insurance; maldistribution of the health care workforce, particularly specialists; an older population; a greater proportion of patients with multiple comorbidities; and higher levels of socioeconomic need (8).

Missouri is a predominantly rural state. More than 97% of its land area is classified as rural, and from 30% to 37% of its population currently live in rural areas (9,10). Enriquez et al reported that at least 50% of patients in their Missouri study had one or more



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chronic diseases, and that “patients with multiple chronic conditions were the norm” (11). These comorbid conditions among rural Missouri residents put them most at risk of fatal complications from COVID-19, in particular those with predisposing conditions, such as diabetes, chronic pulmonary disease, and hypertension (3). As cases of COVID-19 increased exponentially once the pandemic reached the United States, clinicians and researchers became particularly concerned about its impact on the most vulnerable rural and underserved people with chronic conditions. Our objective is to describe the multipronged approach used in Missouri to provide quick response to the COVID-19 pandemic along with preliminary trend data, including disruptive technology applications that created an environment for widespread adoption of telemedicine.

Taking advantage of the experiences of US coastal cities where the COVID-19 pandemic hit hard and fast, an incident command team was created on March 9, 2020, at a tertiary referral hospital system, University of Missouri Health Care (MU Health Care), serving a 25-county, predominantly rural, catchment area. The team was co-led by the hospital’s chief nursing officer and chief medical officer because each profession brought a unique perspective. Policies were rapidly implemented that greatly reduced or suspended medical and surgical services to reserve personal protective equipment, reduced the clinical staff’s COVID-19 exposure, limited the number of patients and visitors in hospital, redeployed staff, and extensively expanded the telemedicine infrastructure.

In this commentary, we use telehealth as an umbrella term referring to telemedicine and other health-related virtual activities, such as distance continuing medical education, training, and patient portals. Telemedicine will refer to providing medical care at a distance, which includes audio–video care or audio care only.

Workforce Redeployment

The MU Health Care system had to reconsider the delivery of care, not only for the expected deluge of COVID-19–positive patients but also the routinely sick patients. With the governor’s stay-at-home edict and fear of SARS-CoV-2 exposure, patients were reluctant to actively seek medical care or keep scheduled appointments. With these policies and behavior changes, a significant shift in nursing work duties and the way nurses provided care occurred, often in areas outside normal clinical specialty areas. In response, almost 50% of the 1,836 patient care staff completed online rapid acute care orientation within 2 weeks of implementation to competently take on pivotal changes in work responsibilities.

On March 19, 2020, 3 quick-care clinics located in grocery stores were closed to redeploy advanced practice nurses to triage hun-

dreds of patients who were calling with reports of respiratory illness ($n = 1,368$ through March 27, 2020). This strategy effectively reduced the need for clinic or emergency department in-person visits while continuing to address patients’ health care needs. During this same time period, some redeployed nurses served as ambulatory care coordinators and identified patients most at risk for exacerbation of chronic disease symptoms. Coordinators initially contacted these vulnerable patients ($n = 750$) by telephone but transitioned eventually to audio–video consultations, when possible. Care coordinators checked in with patients regarding their health and well-being and closely collaborated with the patient’s primary care provider to coordinate any necessary medical care. This repositioning of nurses to care for vulnerable populations was based on strong evidence-based research in which nurse-led interventions in primary care have been shown to improve health outcomes (12). This also harkened back to an era in which patients stayed at home and the health care provider traveled to the patient. In this case, the traveling was virtual.

Adoption of Telehealth

To readily support virtual traveling within the US health care system, the federal government allowed a more robust use of telehealth services during this national emergency. Specifically, the Centers for Medicare and Medicaid Services (CMS) made a limited-time change for allowable reimbursement for medical visits by expanding their definition to include telemedicine visits. The change was initially released on March 17, 2020, and made retroactive to March 6, 2020. CMS also relaxed the Health Insurance Portability and Accountability Act (HIPAA) requirements for secure exchange sites by allowing the use of nonpublic-facing video applications (such as Skype or Zoom) and text-based applications (such as WhatsApp, iMessage) (13). Within 24 hours of CMS’s decision to support telemedicine visits, our MU Health Care system had in place a structure to allow health care providers to use the technology for audio-visual visits. The ability of a large health care system to make this happen nearly overnight was breathtaking and a reminder of our potential to respond to an imminent challenge or threat. With this change, health care providers took care of both new and established patients in their homes by telephone and video visits (ie, telemedicine visits) throughout the 25-county catchment area.

Before the COVID-19 pandemic, reimbursement guidelines were an effective barrier to telemedicine use for both primary and specialty care with less than 1% of rural Americans using telehealth and few health care providers embracing it (14,15). In our MU Health Care system of selected specialties — family and community medicine, internal medicine, cardiology, and specialty medicine — no telehealth visits happened before March 2000

(Figure). Our visits peaked in April with almost 90% of visits happening through telehealth. With the lifting of the governor’s stay-at-home edict and opening of clinics, for the month of May the percentage of telehealth visits and the percentage of cancelled appointments reverted to March levels (Figure). In reviewing the 2019 appointment data, May had a higher volume of appointments than February through April. An opposite pattern for the same time period was observed in 2020; May had the lowest volume of appointments. This leads us to conclude that the appointment trends we are observing are not associated with seasonality. We attribute a lower number of appointments in May and higher number of cancellations to the continued public health response to the COVID-19 pandemic. Unfortunately, appointment cancellation data were not collected on type of visit so we do not have insight into whether telehealth versus in-person visits were more likely to be cancelled.

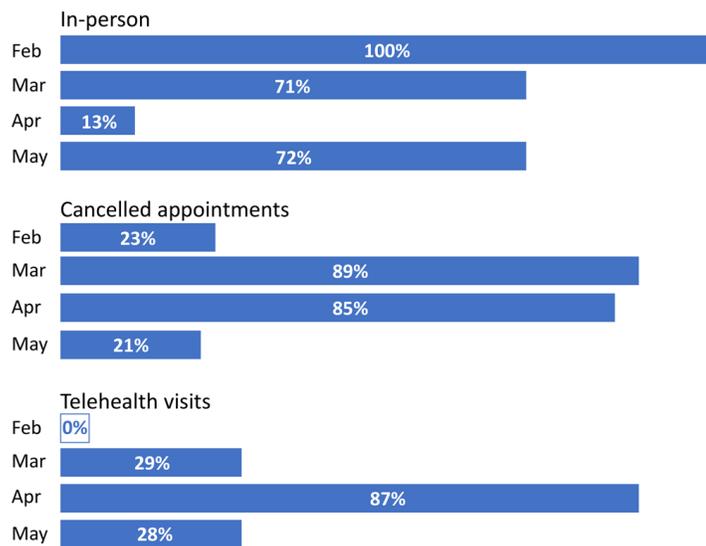


Figure. Percentage of ambulatory patients who had in-person clinical, cancelled, and telehealth visits for family medicine, internal medicine, cardiology, and medical specialty, February–May, 2020. The denominator for in-person visits and telehealth visits is in-person plus telehealth visits. The denominator for cancelled appointments is all visits plus cancelled visits.

For connectivity, another rapid change was CMS aligning audio-only with audio–video telemedicine care on April 30, 2020, retroactive to March 6, 2020. Originally audio-only visits were reimbursed at about one-third the rate of audio–video visits (16). For patients who experienced poor connectivity, this disparity in reimbursement had the potential to affect care and widen the gap in medical care for vulnerable populations. Missouri is ranked fortieth among states on the digital divide index; this score is derived by using both broadband access and broadband adoption as well as socioeconomic factors (17). The presence of any broadband in

households within our 25-county service area ranges from 60% to 82%. The literature on the telehealth divide between rural and urban areas shows that the quality of broadband access affects the use of telehealth (18,19), although some disparities are narrowing (18). Besides connectivity, other factors influence the ability to use telehealth. In preliminary data using family medicine encounters over a 1-month period (March 17–Apr 16, 2020), telemedicine services with audio–video visits were markedly less likely to be among older, black, Medicaid-insured, or self-pay patients. Schmeida and McNeal found that among demographic groups less likely to have internet access at home, including the poor, older patients, Latinos, and Blacks, limited internet access could affect the way they used the internet for telehealth and/or searched for health care–related information online (18).

Our MU Health Care system sent a patient experience survey to all who had a telehealth visit from March 19, 2020, to June 3, 2020 (N = 4,183), and 25% responded. Half were asked the question, “Was your telehealth visit as good as an in-person appointment?” to which 33% gave a positive response. The other half were asked, “Was it easy to state concerns and ask questions through telehealth?” to which 56% gave a positive response. Going forward, re-envisioning health care in the digital age in which health care providers are reimbursed for time spent with the patient virtually shifts the driver from insurance companies to patients and health care providers to determine what a health care visit looks like and to document access disparities, such as connectivity, privacy, and digital literacy. Therefore, more immediate and urgent action is needed to address these disparities for equitable health care in the adoption of telehealth.

Virtual Collaborative Learning Network

Beyond the local response to the pandemic, a statewide response (Show-Me ECHO) was initiated by using Missouri Telehealth Network’s Extension for Community Healthcare Outcomes infrastructure. The Show-Me ECHO uses disruptive innovation technologies, such as videoconferencing applications, and is different from traditional telehealth. It is centered on case-based learning, health care provider development and retention, and efficiency. Although successfully adopted in acute care medicine and non-medical applications, this model is primarily used to increase capacity of health care providers to care for patients with chronic diseases and targets rural, isolated, and underserved communities (20). Since its inception in Missouri, over 27,000 learners (medical doctors, doctors of osteopathy, nurse practitioners, physician assistants, health educators, and others) have attended sessions representing almost every county in Missouri. The existing infrastructure of this provider-facing technology was immediately expan-

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ded to create 2 new ECHOs: COVID-19 ECHO and Telemedicine ECHO.

COVID-19 ECHO, launched on March 23, 2020, supports health care professionals, especially those practicing in rural and isolated areas, with weekly meetings of didactic presentations focused on testing, triage, and other State updates, with more than 2,700 attendees as of May 26, 2020. De-identified case presentations were used for learning through a guided practice model, focusing specifically on patients with chronic conditions and COVID-19 infection or risk of infection. In addition to these weekly sessions, COVID-19–related topics were incorporated into other regular ECHO sessions, such as asthma, kidney disease, autism, and oral health, thereby substantially expanding the learning and networking opportunities among health care providers. A benefit of ECHO learning is the development of a network of professional colleagues that encourages informal communication outside of regular sessions. The spread of COVID-19 has caused fear and uncertainty among the public and concerns among health care professionals about their responsibilities to practice medicine while balancing their need to protect their families. The ECHO virtual collaborative network provides an ideal environment for reducing a sense of isolation among rural health care providers.

To support a growing number of novice health care providers using telemedicine and in response to popular demand, Telemedicine ECHO was initiated on April 14, 2020. Telemedicine ECHO is a collaboration of the University of Missouri, Missouri Telehealth Network, and the Heartland Telehealth Resource Center serving Missouri, Kansas, and Oklahoma. Telemedicine ECHO has provided didactic presentations on numerous topics, such as legal and regulatory issues, policy changes, billing and reimbursement, privacy, and security. The program has had more than 300 attendees as of May 26, 2020. Case presentations of patients with acute and chronic conditions included best practices for treatment and care management using telemedicine. Although many institutions, nudged by the COVID-19 pandemic, have adopted this technology, there is still an art to this type of encounter. As Telemedicine ECHO demonstrated, practicing health care professionals benefited from expert telemedicine support. It is likely that medical schools and residency programs will supplement their curricula on patient encounters to include telehealth visits, if it is not already included. As telemedicine becomes more commonly used, this platform can be extended to monitor those with influenza-like illness and COVID-19–like symptoms as well as assist in the management of multiple chronic diseases, as demonstrated by our Italian colleagues (21).

Implications for Public Health

The success of MU Health Care’s rapid adjustment and response to the COVID-19 pandemic lies in its dedicated workforce, strong collaborative learning network, expertise in rural health, and robust telehealth infrastructure. One comment made by leadership on the COVID-19 response team was the unwavering willingness of nurses and other health care workers to go where they were needed. This especially epitomized the dedication and professionalism of nurses and health care professionals. Innumerable stories in the media abound of nurses filling in gaps created by new policies, such as restriction on visitors to hospitalized patients and being that hospitalized patient’s touchstone. As the COVID-19 first wave passes, the health care workforce, including nurses, can continue using telehealth successfully, and its use has been extended to departments and specialties that had never implemented telehealth before the pandemic. One of our gynecologic oncologists began using telemedicine after COVID-19 policies were enacted. He remarked that he plans on continuing telemedicine encounters for enhanced patient-centered care and that telemedicine provided more comprehensive family engagement. All family members participated in a telemedicine visit, asked questions, heard his responses, and understood the treatment plan and prognosis. Our oncologist felt the telemedicine encounter allowed the extended family to actively participate in the patient’s cancer journey. Without COVID-19’s disruption of the status quo of health care, it is unlikely that this example of re-envisioning the practice of health care would have occurred.

The pattern of delivering health care continues to adapt to medical, economic, and cultural changes. Before the middle of the twentieth century, few hospitals existed, and the health system enterprise, including health insurance, was nonexistent (22). Doctors traveled to their sick patients’ homes, provided limited treatment options, and were paid a modest out-of-pocket fee. Pivotal advances in scientific medical knowledge dramatically changed the landscape of medicine. The evolution from health care providers as generalists who provided all care for their patients to health care providers who refer their patients to specialists is complicated, but most consider that the tipping point in this change began in the post-World War II era (23). Currently, approximately 30% of younger patients (≤ 64 y) are referred to specialty care, and among older patients (≥ 65 y), referral to specialists average 2 per person per year (24). In the initial response to the COVID-19 pandemic, limited referrals for specialty care as well as appointment cancellations by health care providers for established patients and patients opting to not seek routine care were the norm, leaving a group of patients temporarily adrift (Figure). Similarly, just as technology, such as the invention of the telephone and automobiles, shaped health care by reversing the traveler — the patient coming to see

the physician rather than physician going to the patient — disruptive technology in the COVID-19 era with focused attention to addressing disparities faced by some can reshape health care, especially for rural patients and patients with multiple comorbidities.

The Institute for Healthcare Improvement's new quadruple aim to optimize health system performance includes improving population health, lowering costs, and improving patient experience (25). The fourth aim is often cited as finding joy in work or elevating health equity (25). These aims may be achieved through a more robust inclusion of telehealth. However, a critical factor for success requires thoughtful supportive interventions to ameliorate reported disparities in telehealth adoption. In the COVID-19 era, informal conversations with health care providers about telemedicine, from primary care to oncology to endocrinology, suggest mixed reactions to virtual visits through telemedicine. Some providers have reverted back to the old ways whereas others have embraced this change.

Further exploration could identify factors, including barriers, associated with use of telehealth from both the health care provider's and the patient's perspective. As long as the CMS policy change for reimbursement remains, a telemedicine visit can be an option between patient and health care provider, and therefore by default create an environment of patient-centered care.

The pandemic crisis has tapped into America's strengths — our ability to summon unity and collective confidence when facing a nationwide challenge. For telehealth, many of the restrictions have been lifted, namely HIPAA compliance, licensing restrictions, and reimbursement differences by type of visit, with the hope that these will be permanently lifted. Although telemedicine has been integrated into daily clinical practice in responding to the public health emergency, barriers to telemedicine and issues surrounding associated health disparities should not be neglected. Telehealth alone is not a panacea for better health care, and it behooves researchers, providers, and educators to explore creative solutions for optimal health care for all, particularly among vulnerable populations. Undoubtedly, a concerted effort by government agencies, organizations, and community volunteers will be needed to ensure effective access to improved health care, both for high-technology and low-technology solutions.

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COMMENTARY

Community Pharmacists' Contributions to Disease Management During the COVID-19 Pandemic

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PEER REVIEWED

Summary**What is already known on this topic?**

More than 90% of people in the United States live within 5 miles of a community pharmacy. Pharmacists deliver important public health services such as vaccinations, point-of-care testing, and chronic and acute disease prevention and management. These services are and will continue to be critical in the coronavirus disease 2019 (COVID-19) pandemic.

What is added by this report?

The COVID-19 pandemic has demonstrated needed roles for the community pharmacist in an emergency, including continuity of provision of medications, providing preventive services, and ensuring health equity. Along with medication management, pharmacists provide infectious disease mitigation, point-of-care testing, and vaccinations.

What are the implications for public health practice?

Community pharmacists are essential contributors to public health and play a key role as the United States continues to combat COVID-19, especially among populations with health disparities.

Abstract

Community pharmacists assist patients to manage disease and prevent complications. Despite the enormous challenge the coronavirus disease 2019 (COVID-19) pandemic has dealt to the health care system, community pharmacists have maintained the delivery of critical health services to communities, including those most at risk for COVID-19. Community pharmacists are in a key position to deliver priority pandemic responses including point-of-care testing for chronic disease management, vaccinations, and COVID-19 testing.

Background

The coronavirus disease 2019 (COVID-19) pandemic has challenged community pharmacists to perform under difficult circumstances. The pandemic has also highlighted the key public health functions community pharmacists play in medication therapy, chronic disease management, self-care recommendations, vaccinations, point-of-care screening and testing services, and adherence support (1–4). Although the role of pharmacists in chronic disease prevention and management is well established, the COVID-19 pandemic has accentuated the critical contributions community pharmacists make during an infectious disease outbreak.

This commentary describes the current and future roles of community pharmacists in the United States in optimizing their broad access to medically and socially vulnerable populations before and during a pandemic. We show that community pharmacists are highly accessible both temporally and geographically, which puts them in a position to serve at-risk populations. The ongoing role of community pharmacists in preventing and managing common diseases during a pandemic is also addressed. Finally, we describe the key roles pharmacists play in priority pandemic responses, including point-of-care testing for chronic disease management, testing for COVID-19, and administering and advocating for vaccinations.

Community Pharmacists in the United States

Community pharmacies are located in most communities in the United States, and more than 90% of the US population live within 5 miles of one (5). Furthermore, patients visit their community pharmacist 12 times more frequently than their primary care provider (6). As medication experts, community pharmacists fill a key role in providing care for patients with chronic diseases (Table 1), with particular contributions made among economically and geographically underserved populations (8). When many health care organizations restricted patient access to noncritical services in the



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early stages of the COVID-19 pandemic, patients with chronic diseases struggled to receive routine care. Through the thoughtful implementation of social distancing guidelines, most pharmacies remained open and were in a position to support patients (9). These critical services included medication dispensing for chronic and acute conditions, vaccinations, recommendations for over-the-counter medications, and medication management (10).

The COVID-19 pandemic has resulted in an excessive burden of mortality among at-risk populations, a burden exacerbated by pre-existing racial and socioeconomic inequities in health care access and use (11–14). The proportion of COVID-19 deaths among Black and American Indian/Alaska Native people is in excess of their weighted population distributions compared with other racial/ethnic groups (Table 2). Hypertension, diabetes, and respiratory diseases are disproportionately prevalent among communities of color (16), resulting in exponentially higher mortality among minority populations than among White populations (17). COVID-19 has brought into full view the need to address health inequities experienced by some segments of the US population (18).

Community pharmacies have opportunities to redress racial and ethnic disparities in health care delivery because of their accessibility (8). Pharmacies are located close to at-risk populations, such as in rural areas or areas with higher concentrations of people of lower socioeconomic status (19). During the pandemic, pharmacists have been able to leverage their social capital with their patients in those areas, and safely maintain patient access to essential medications through curbside pickup, larger refill quantities, and home delivery (20,21). Through close partnerships with pharmacy associations, corporate and individual ownership networks, and providers, pharmacists prepared for and have met the need for surges of chronic disease medication prescriptions and for potentially beneficial COVID-19 therapies (22). These actions have shown that community pharmacies are key players in addressing the pandemic and in ensuring health equity among patients.

Others at disproportionate risk of COVID-19 are people aged 60 or older, health care workers, and medically vulnerable patients with underlying chronic diseases (23). When these people develop severe COVID-19, they are hospitalized more frequently and die at higher rates (24,25). This is particularly true of patients with diabetes, cardiovascular disease, hypertension, chronic obstructive pulmonary disease, chronic kidney disease, and possibly pregnant women (23,26). Community pharmacists play a significant role in caring for patients with these conditions because these patients are frequently on chronic medications. Therefore, community pharmacists are in a position to educate patients about the importance of protecting themselves from exposure to COVID-19.

Concerns about health equity have been raised as the COVID-19 pandemic continues to change the landscape of public health and health care delivery (13,27). All aspects of health care need to be reevaluated with regard to how they may contribute to reducing inequality and increasing health equity. The role that community pharmacists play in providing care for at-risk populations must be included in this evaluation.

Community Pharmacists' Response During COVID-19 Pandemic

Community pharmacies have continued to deliver critical services to their patients during the COVID-19 pandemic (10). In support of these efforts, the Centers for Disease Control and Prevention provided substantial guidance for pharmacists to ensure the safety of their workforce and their patients while simultaneously ensuring uninterrupted patient care (20). Two key roles played by community pharmacists are point-of-care testing and vaccinations.

Point-of-Care Testing

In the absence of proven treatment medications or vaccines to prevent transmission, the priority actions to protect the public against COVID-19 and to mitigate future waves of infection are to test, trace, and quarantine people who are infected or exposed. These roles are assumed by local public health services; however, community pharmacists can play a significant role in COVID-19 testing (28). More than 10,000 pharmacies already perform Clinical Laboratory Improvement Amendments (CLIA)-waived tests to detect influenza and streptococcal pharyngitis and to monitor chronic diseases through a wide range of CLIA-waived point-of-care testing, such as finger stick glucose, Hb_{A1c}, lipid panel, and more. These tests provide pharmacists with objective data in real time to educate patients about results, lifestyle recommendations, and referral to care. Therefore many pharmacies are authorized and prepared to incorporate COVID-19 testing into their workflow.

The COVID-19 pandemic has changed the landscape of primary care. Many patients have consulted health care providers via telehealth or cancelled their preventive care appointments (29), and these practices may continue for some time. Globally, COVID-19 has substantially affected services for noncommunicable diseases (30), which may leave a gap in chronic disease management, with people missing needed laboratory tests such as blood glucose, Hb_{A1c}, or lipid screening (7). This screening gap is an area that awaits evaluation as the consequences of the COVID-19 pandemic become clearer. Because people who postpone screening will continue to receive their medications from their pharmacies, community pharmacists will have the opportunity to encourage pa-

tients to receive these screenings to ensure effective chronic disease management.

In addition to point-of-care testing for chronic disease management, pharmacists will also play a key role in COVID-19 testing (31). Pharmacists across the country have been called on to coordinate the administration of COVID-19 tests (32–34). In the future, providing ongoing COVID-19 surveillance to communities by allowing walk-in testing at community pharmacies might be more sustainable and convenient than the large-scale public screening being done as of the summer of 2020. By the fall of 2020, many pharmacies will be offering 1 or more of the following COVID-19 diagnostic services: selling home testing kits, collecting specimens to send to partner laboratories for testing and reporting, collecting specimens for on-site symptomatic testing and reporting, and collecting specimens for point-of-care antibody surveillance (31,35,36). The US Department of Health and Human Services has authorized all pharmacists to provide these COVID-19 testing services, overriding state law where it exists (37). The Centers for Medicare and Medicaid Services (CMS) is reimbursing pharmacies for this COVID-19 testing, overcoming a major hurdle to pharmacy-based clinical and diagnostic services during the pandemic (38).

Vaccinations

Community pharmacists play a key role in advocating for and administering adult vaccines (39) (Table 1). Pharmacists must work to provide essential vaccinations to everyone entrusted to their care, especially children and at-risk populations who have fallen behind because of medical office closures (40). Additionally, community pharmacists will be key players in wide-scale administration of vaccines once a safe vaccine for the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is available. This will make vaccines widely available in convenient locations and in familiar settings. Now is the time for community pharmacy organizations to prepare for this critical public health role. Additionally, the community pharmacist's role in providing accurate health information about COVID-19 and the safety and appropriateness of vaccines will continue (41).

Implications for Public Health

In addition to ensuring uninterrupted delivery of routine pharmacy services, pharmacists are able to respond quickly to fill public health roles during a pandemic. Pharmacists have other opportunities to contribute even further to delivering upstream preventive health care measures while mitigating social and structural determinants of health in underserved and marginalized communities. Pharmacy-based community clinics, led by public health pharmacists and primary care providers, may become a common fea-

ture in community pharmacies. Pharmacist-provided vaccinations, specimen collection, and point-of-care testing will establish rapid and convenient diagnosis and surveillance of both acute and chronic diseases. Because a pharmacy is likely to be located in or near acute or chronic disease hotspots, and have real-time communication links to public health and primary care authorities, pharmacists can help public health leaders detect and prepare for surges of known and novel diseases. However, this will require deeper integration of pharmacy with the public health infrastructure than currently exists, a clear opportunity for future growth.

The United States has been hit particularly hard by the COVID-19 pandemic, revealing significant and widespread vulnerabilities and structural health disparities that challenge its health care system. The slow and uneven responses to COVID-19 indicate a public health infrastructure that lacks the resources and the authority to tackle such challenges. One reason is the lack of sustained resources to build strong public health infrastructures at the state, county, and city levels across the country (42). Furthermore, although progress has been made, the interfacing of public health in the United States with other sectors of the health care system, including community pharmacy, need to be strengthened to better prepare for quick response to a public health crisis (43). Twelve leading pharmacy organizations have signed the Pharmacy Organization's Joint Policy Recommendations to Combat the COVID-19 Pandemic to delineate key roles pharmacists play in the response (31). Among the recommendations are authority to test, treat, and vaccinate patients; easing operational barriers to address workforce issues; addressing drug shortages; reimbursement for services provided; and removal of barriers to reimbursement. These all represent growth opportunities for collaboration between public health and pharmacy.

During this pandemic, and in past pandemics, the importance of community pharmacies and pharmacists in public health and the health of their patients has been evident (10). It is imperative that systematic evaluation and dissemination of pharmacists' contributions be undertaken to determine areas where community pharmacy can best be incorporated into the way public health is operationalized and carried out in the United States. The COVID-19 pandemic has created the opportunity to strengthen the US public health system to make it even more inclusive, accessible, and effective.

The COVID-19 pandemic has challenged health care systems all over the world. During this pandemic, the community pharmacist has provided critical health services to communities, including those most at risk for COVID-19. As the role of the community pharmacist during the COVID-19 pandemic continues to evolve,

pharmacy's impact on improving patient and population health outcomes should be evaluated. The COVID-19 pandemic will likely reveal new roles that community pharmacists can play during a pandemic and beyond.

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Tables

Table 1. Pharmacist Interventions and Anticipated Outcomes in Contributing to Population Health^a

Intervention	Anticipated Outcomes
Prevention	
Medication monitoring	<ul style="list-style-type: none"> • Provide appropriate preventive medications • Address medication access issues in the face of pandemic restrictions
Patient education	<ul style="list-style-type: none"> • Educate patients about preventing coronavirus disease 2019 (COVID-19) infection and symptoms of the disease • Provide education on over-the-counter medications • Increase patient self-efficacy and reduce adverse outcomes from medications
Vaccinations	<ul style="list-style-type: none"> • Reduce novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) transmission when a vaccine becomes available • Prevent outbreaks of vaccine-preventable diseases
Point-of-care testing	Increase access to COVID-19 testing and reduce transmission by early detection and quarantine of detected individuals
Management	
Medication monitoring	Increase treatment success
Patient education	<ul style="list-style-type: none"> • Educate patients about COVID-19 disease • Increase patient self-efficacy and reduce adverse outcomes from medications
Medication therapy review	Optimize patient medication adherence and quality of life
Disease self-care and support	<ul style="list-style-type: none"> • Ensure access when medical facilities are not accepting patients • Empower patients, increase pharmacist role in multidisciplinary team, and improve population health
Point-of-care testing	Provide real-time point of care screening results for chronic disease management

^a Based on Greer N, Bolduc J, Geurkink E, Rector T, Olson K, Koeller E, et al. Pharmacist-led chronic disease management: a systematic review of effectiveness and harms compared with usual care (7).

Table 2. Comparison of Proportion of US Deaths From Coronavirus Disease 2019 (COVID-19) and Weighted Population Distribution by Race/Ethnicity^a

Race/Ethnicity	Percentage of US Population	Percentage of COVID-19 Deaths	States With Known Racial Disparity in Outcomes
Asian	10.7	5.0	Nevada
Black	17.2	23.0	Alabama, District of Columbia, Georgia, Illinois, Kansas, Louisiana, Maryland, Michigan, Mississippi, Missouri, New York, South Carolina, Texas, Wisconsin
Hispanic or Latino	16.6	27.7	None
American Indian/Alaska Native	0.3	0.7	Arkansas, New Mexico, Oklahoma
Non-Hispanic White	42.3	53.4	Florida, Indiana, Kentucky, Massachusetts, Minnesota, New Hampshire, New Jersey, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Washington

^a Table modified from Centers for Disease Control and Prevention, Weekly updates by select demographic and geographic characteristics, June 24, 2020, Table 2a (15).

COMMENTARY

Pharmacist-Led Chronic Care Management for Medically Underserved Rural Populations in Florida During the COVID-19 Pandemic

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PEER REVIEWED

Summary**What is already known on this topic?**

Ambulatory care pharmacists play an important role in chronic care and medication therapy management. These pharmacists and student pharmacists work closely with health care providers to deliver medication-related recommendations.

What is added by this report?

We discuss how 2 pharmacist faculty members from Florida Agricultural and Mechanical University College of Pharmacy and Pharmaceutical Sciences, Institute of Public Health are using telehealth during the coronavirus disease 2019 (COVID-19) pandemic to continue to care for patients in an ambulatory care setting as well as student pharmacists' contributions.

What are the implications for public health practice?

With the implementation of telehealth services, patients can continue receiving care from our ambulatory care pharmacists and student pharmacists to help improve health-related outcomes.

Abstract

Medically underserved patients in rural areas are more vulnerable to poor health outcomes, including the risks associated with coronavirus disease 2019 (COVID-19). Pharmacists, student pharmacists, and other health care professionals are working together to implement new, innovative ways to deliver the same standard of care during the COVID-19 pandemic to these vulnerable patients.

These services include telehealth with virtual and telephone medication therapy management sessions led by ambulatory care pharmacists and student pharmacists. Pharmacists, student pharmacists, and other health care professionals should continue to adapt to these new technologies to improve health outcomes for their patients during the pandemic.

Introduction

According to the World Health Organization (WHO), the novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; the cause of coronavirus disease 2019 [COVID-19]), first isolated in China, has caused over 9,473,214 confirmed cases worldwide and over 484,249 confirmed deaths (1). COVID-19 officially spread to the United States with the first confirmed case on January 20, 2020 (2). The Centers for Disease Control and Prevention state that the signs and symptoms associated with the virus include cough, shortness of breath or difficulty breathing, fever, chills, muscle pain, sore throat, and loss of taste or smell (3). During the pandemic, many people have become more anxious about acquiring the virus. People in the United States have been instructed to practice self-isolation and social distancing to help prevent the spread of COVID-19. This presents an opportunity for health care professionals, including pharmacists, public health providers, and students to assist with the health care needs of people living in various geographical locations across the country. In this commentary, we share information on what Florida Agricultural and Mechanical University College of Pharmacy and Pharmaceutical Sciences, Institute of Public Health (FAMU CoPPS, IPH) is doing to continue to sustain patient care services and support to population health in rural northwest Florida.

Northwest Florida has a large rural and medically underserved population, with much of the area being a designated Health Professional Shortage Area (HPSA) (4). Many of the patients in



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northwest Florida have limited access to medical care for various reasons. One of the community health centers in the Pensacola area is a Federally Qualified Health Center (FQHC) that focuses largely on serving the medically underserved population. Most patients (59%) seen at the clinic reported insurance through Medicaid, 20% reported having no insurance, 13% reported private insurance, and the remaining 8% reported insurance with Medicare (5). The clinic serves patients regardless of demographics, including White, African American, Asian, multiracial, and other races. Some of the patients served by the clinic are homeless, uninsured, non-English speakers, veterans, and school-based health center patients. In 2019, the clinic had 133,974 medical visits, with 9,944 patients having hypertension, 3,017 with asthma or chronic obstructive pulmonary disease, 3,873 with diabetes, 17,441 with obesity, and 7,559 with anxiety, depression, or other mood disorders (5). Many of these patients receive chronic care, medication therapy management (MTM) services, or both.

Chronic Disease Care Management

Patients with chronic diseases are at a higher risk of acquiring COVID-19 and suffering sequelae from the virus (6). Ambulatory care pharmacists play a vital role in chronic care management as well as MTM in the ambulatory care setting. Ambulatory care pharmacists, student pharmacists under their supervision, and other health care professionals work closely with patients who have various complex clinical chronic conditions (eg, diabetes mellitus, hypertension, dyslipidemia) that can present with diverse clinical symptomatology.

FAMU CoPPS, IPH has 2 ambulatory care pharmacist faculty members who work at the FQHC clinic in Pensacola, Florida. Each pharmacist has a cohort of patients to which they provide medication-related recommendations and counseling to help improve patient outcomes by using evidence-based guidelines (7,8). These pharmacists have also established an MTM program that focuses on cardiovascular disease and stroke prevention among the medically underserved population. In the MTM program, student pharmacists and pharmacists perform chart reviews, assess laboratory values, identify barriers to medication adherence, provide both pharmacologic and nonpharmacologic counseling, and make medication-related recommendations to referring providers. During each MTM interview, patients are asked about their health literacy level surrounding their medications. The goal of this exercise is to ensure that patients will become more comfortable, educated, and empowered with consistent MTM appointments, which will, in turn, improve medication adherence and health outcomes. The health outcomes being monitored for improvement include blood pressure, blood glucose, glycated hemoglobin A_{1c}, and cholesterol levels.

Telehealth is becoming increasingly popular in health care settings, and ambulatory care pharmacy is no exception (9,10). With the implementation of telehealth services for patients, our ambulatory care pharmacists are able to continue to provide the same standard of care as they would during in-person encounters. Many patients are open to this new form of communication, especially those with transportation limitations or time constraints. Telehealth sessions allow patients to speak with the pharmacists from the comfort of their home. The FQHC clinic, along with other primary care clinics, has limited patient appointments and provider availability because of COVID-19, making the ambulatory care pharmacist's role even more critical than before. With telehealth, our pharmacists can conduct patient interviews, provide medication counseling, and make medication-related recommendations to health care providers. Patients having continuous access to our pharmacists via telehealth can help improve medication adherence, safety, and patient clinical outcomes (11).

During the COVID-19 pandemic, it became essential to design the telehealth encounter with the appropriate technology to deliver a positive patient experience. The provision of iPads (Apple Inc) to patients and laptops to health care professionals that are preloaded with Zoom software (Zoom Video Communications, Inc) allows the patient a frictionless telehealth experience. The patient is only required to connect the device to their Wi-Fi network. If a patient does not have access to a Wi-Fi network, patient interviews can also be conducted via telephone.

The practice of health care professions is primarily governed by state law. Additionally, the US Department of Health and Human Services Office for Civil Rights (OCR) provided guidance that, during the COVID-19 pandemic, the office will not impose penalties for noncompliance with Health Insurance Portability and Accountability Act (HIPAA) provisions when telehealth is provided in "good faith" by using remote nonpublic-facing communication technologies such as Zoom (12). Thus, Zoom telehealth encounters with patients at the FQHC by providers is acceptable and appropriate.

Educating Patients and the Public

As health care professionals, pharmacists are at the forefront of the pandemic in providing testing and educating the public about the virus, the tests used to detect the virus and antibodies, and the different treatment options for symptoms associated with the virus. Our ambulatory care pharmacists are relied upon to provide accurate information regarding all aspects of their duties such as the distribution of medications, tests, and medical devices; clinical services; and the education of their patients, caregivers, health care professionals, students, and other associates. During COVID-19,

our pharmacists' role has expanded beyond the previously multifaceted tasks. Our 2 ambulatory care pharmacists and student pharmacists are responsible for educating patients and the public regarding the proper use and safety of the medications being prescribed for COVID-19. According to the American Society of Health System Pharmacists, one of the pharmacists' roles is to prevent diseases through vaccination (13). Several vaccines are being studied for COVID-19. Although those vaccines are not available, our pharmacists are certified to administer vaccines for other diseases. The COVID-19 pandemic offers tremendous opportunities for our pharmacists to prepare student pharmacists and educate health care providers and others about the virus, current treatments, and vaccines that are in the pipeline. Our pharmacists and student pharmacists are prepared to provide immunization against COVID-19 as they do for other vaccine-preventable diseases.

Our pharmacists also take every opportunity to educate the public about the virus and testing, treatment, and prevention of COVID-19 through flyers, webinars, patient counseling, emails, posters, in-service sessions, television, public service announcements, newsletters, public events, and health fairs (14). Our pharmacists also educate other health care professionals by providing information regarding vaccines and providing reminders for immunization dates, local immunization rates, and vaccines needed for their patients (15). Our pharmacists will continue to do so with COVID-19 vaccines in addition to promoting their appropriate use, and will participate in shared registries through the Florida Department of Health.

Student Pharmacist Involvement

Student pharmacists are working alongside pharmacists and participating in many ways to help with COVID-19-related efforts. Student pharmacists on advanced pharmacy practice experience rotations at the FQHC clinic are assisting pharmacists in interviewing patients and providing medication-related recommendations via telehealth under a pharmacist's supervision. The national shortage of personal protective equipment (PPE) has caused many institutions, including the FQHC clinic, to limit student interaction on site for rotations, so alternative ways to use students to combat COVID-19 have been implemented. Student pharmacists assisting with telehealth patient interviews require no PPE and have minimal COVID-19 exposure risk to their patients and others. These students have the full experience of interviewing patients, formulating care plans, and making recommendations to health care providers via platforms such as Zoom or telephone consultation.

In addition to providing telehealth services, student pharmacists on advanced pharmacy practice experience rotations at another clinic

for the medically underserved in the Pensacola area are assisting with curbside prescription pickup and counseling sessions. These students are required to wear PPE and practice social distancing while educating patients about their medications. This opportunity allows the students to gain experience and confidence in conveying pharmaceutical care by applying their knowledge and skills and gaining professional competence.

Training and Development of Future Pharmacists

The COVID-19 pandemic is an opportunity for colleges and schools of pharmacy to prepare student pharmacists before sending them into the workforce. Student pharmacists at FAMU CoPPS, IPH are being trained to administer vaccines and must complete their immunization training as part of their graduation requirements. Training for student pharmacists and pharmacists to administer vaccines requires an in-person component, but the bulk of the learning and training can be done by using virtual interactions and live or prerecorded webinars during the pandemic. Student pharmacists are also learning how to educate patients, caregivers, health care providers, and the public about COVID-19 and its treatment and prevention.

Implications for Public Health

The COVID-19 pandemic has greatly affected many communities, especially medically underserved rural populations (16). Telehealth can address both proximity and cultural barriers by effectively increasing access and improving outcomes in rural areas (17). Medically underserved populations in northwest Florida have experienced a lack of medical care because of social distancing measures and limited provider accessibility during the COVID-19 pandemic. With telehealth services, these patients still have access to ambulatory care pharmacists regardless of their ability to make traditional in-person clinic appointments. Medically underserved rural populations have been able to continue receiving care through the delivery of various telehealth services. Some of these provisions include virtual or telephone patient encounters with ambulatory care pharmacists and student pharmacists. It is imperative that pharmacists, student pharmacists, and other health care professionals continue to adapt to these new technologies and familiarize themselves with the laws governing their practice to deliver the same standard of care to improve health outcomes for their patients during the pandemic.

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COMMENTARY

Oral Health and COVID-19: Increasing the Need for Prevention and Access

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PEER REVIEWED

Summary

What is already known on this topic?

Oral health is an important component of health and overall well-being.

What is added by this report?

Nonemergency dental care has been curtailed during the coronavirus disease 2019 (COVID-19) pandemic. Reopening dental practices involves unique challenges and provides opportunities to increase focus on prevention and nonaerosol-generating procedures.

What are the implications for public health practice?

Vulnerable populations are at high risk for COVID-19 and oral and other chronic diseases, and they also have less access to health care services. Removing policy, regulatory, workforce, and reimbursement barriers and incentivizing prevention would increase access to oral health care and improve population health.

Abstract

Populations disproportionately affected by coronavirus disease 2019 (COVID-19) are also at higher risk for oral diseases and experience oral health and oral health care disparities at higher rates. COVID-19 has led to closure and reduced hours of dental practices except for emergency and urgent services, limiting routine care and prevention. Dental care includes aerosol-generating procedures that can increase viral transmission. The pandemic offers an opportunity for the dental profession to shift more toward non-aerosolizing, prevention-centric approaches to care and away from surgical interventions. Regulatory barrier changes to oral health care access during the pandemic could have a favorable impact if sustained into the future.

Introduction

On March 11, 2020, the World Health Organization declared the global spread of coronavirus disease 2019 (COVID-19) a pandemic (1). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a new virus with no vaccine or treatment, and the population currently has no immunity. The virus is primarily transmitted by direct or indirect personal contact through airborne respiratory droplets from an infected person (2).

On March 16, 2020, the American Dental Association (ADA), the nation's largest dental association, recommended that dental practices postpone elective dental procedures until April 6, 2020, and provide emergency-only dental services to help keep patients from burdening hospital emergency departments (3). Because of the rise of infections, this recommendation was updated on April 1, 2020, when the ADA advised offices to remain closed to all but urgent and emergency procedures until April 30 at the earliest. As a result, access to dental care substantially decreased. During the week of March 23, 2020, an ADA Health Policy Institute survey indicated that 76% of dental offices surveyed were closed but seeing emergency patients only, 19% were completely closed, and 5% were open but seeing a lower volume of patients (4).

In addition to the lack of widespread COVID-19 testing, point-of-care testing in dental offices also was not available. Because of the inability to test all patients and the fact that asymptomatic or presymptomatic patients could be infectious, ADA guidance shifted in mid-April 2020 as state and local government policies varied regarding criteria for reopening different types of services, including dental services (5). Questions remain about how soon patients will prioritize and resume nonemergency dental care amid other delayed health care services. The full extent of pandemic-related financial strain and loss of dental insurance is not yet clear and will dramatically affect dental care utilization.

In this commentary, we explain why oral health care should be a public health priority in the response to the pandemic and discuss the aspects of dental care that make it challenging to accomplish this. We will also provide opportunities for improvement, such as focusing more on prevention and nonaerosolizing dental proced-



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ures and the means by which to increase access to affordable, more equitable care for vulnerable populations.

Importance of Oral Health

In 2000, the first and only Surgeon General’s Report on Oral Health (the second is in progress) made clear that oral health is part of overall health and well-being (6). The mouth is indispensable to eating, speaking, smiling, and quality of life. The most prevalent oral conditions are dental caries and periodontal diseases, and they are largely preventable (7). Dental caries is the most common chronic childhood disease and continues into adulthood. Among US adults, 2011–2014 national data indicate that 32.7% had untreated dental caries (8). Furthermore, according to weighted averages from 2009 through 2014, 42% of adults aged 30 or older had periodontitis (9). Oral disease is unevenly distributed in the population by race and ethnicity (Table 1). The progression of oral disease can cause pain, infection, and sepsis, and treatment is expensive. In addition to primary prevention, in early stages the progression can be reversed or arrested with appropriate oral hygiene, fluoride exposure, dental sealants, changes in diet, and other measures.

Populations With Oral Health and Chronic Disease Disparities: COVID-19 Puts Both at Increased Risk

Populations at higher risk for many chronic diseases are similar to those at higher risk for developing oral diseases. Common risk factors include stress, poor diet, alcohol and tobacco use, substance misuse, behavioral health issues, domestic violence, and poverty. Many of these factors have been heightened during the pandemic. These and other social determinants of health lead to both exacerbation of chronic disease and poor oral health outcomes (13).

Populations vulnerable to COVID-19, including those in low socioeconomic groups, minority groups, older adults, low-literacy individuals, those in rural areas, and the uninsured are also at increased risk for oral disease and associated systemic health problems (14). Minority populations are especially at risk during the COVID-19 pandemic. The Centers for Disease Control and Prevention (CDC) notes that “non-Hispanic blacks, Hispanics, and American Indians and Alaska Natives generally have the poorest oral health of any racial and ethnic groups in the United States,” (15) and these same populations have disproportionately higher incidence of COVID-19–related infection and death (16).

Among those hospitalized with COVID-19, diabetes and cardiovascular disease are 2 of the most prevalent underlying comor-

bidities, according to the CDC (17). Periodontal disease is associated with diabetes and cardiovascular disease, although causality is difficult to ascertain because of confounding evidence, and few randomized trials or longitudinal studies have been conducted on the effects of treatment (18,19).

Researchers note, “The COVID-19 pandemic has alarming implications for individual and collective health and emotional and social functioning” and that “health care providers have an important role in monitoring psychosocial needs and delivering psychosocial support to their patients” (20). Research suggests a strong association between oral health conditions like erosion, caries, and periodontal disease and mood conditions like stress, anxiety, depression, and loneliness (21). There are other potential connections downstream between COVID-19 and oral health. With the COVID-19 pandemic’s impact on mental health, pandemic-related increases in oral health risk factors, and anticipated declines in per capita dental visits, increasing integrated practice and referrals between dental providers and behavioral health providers will be prudent. Similarly, increased efforts to more effectively integrate dental programs focused on prevention, screening, and risk assessment within primary care, obstetrics and gynecology, and pediatric offices should be pursued to expand access to oral health services for vulnerable populations (22).

COVID-19 and Oral Health Disparities in Access to Care

Access to oral health care is especially limited for populations at high risk for COVID-19. Patients with symptoms of COVID-19 are advised “to avoid nonemergent dental care” (23). Providers are advised, “if possible, [to] delay dental care until the patient has recovered” (23).

More than 49 million US residents live in areas designated by the Health Resources and Services Administration as Dental Health Professional Shortage Areas (24). This shortage has been compounded by the COVID-19 pandemic, which has resulted in limited preventive dental services in the interest of public health safety. Emergency departments, a less-than-ideal but common treatment destination for those facing oral health care access disparities, have also seen a significant drop in visits for health problems unrelated to COVID-19 (25). School-based oral health programs, such as effective dental sealant programs to prevent dental caries — the only source of preventive oral health care for many children in vulnerable populations — have similarly been suspended because of government-mandated school closures (26). Nationally, children in low-income families and at higher risk of caries are less likely to receive sealants than children in higher-income families, at 39% and 46%, respectively (27).

Access disparities are particularly acute for poor and minority populations. Researchers note that “poor and minority children are substantially less likely to have access to oral health care than their nonpoor and nonminority peers” (14). These populations are also more likely to lack dental insurance. A 2020 report notes, “The oral health care safety net is expected to cover . . . one-third of the US population, notably those who are low-income, uninsured, and/or members of racial/ethnic minority, immigrant, rural, and other underserved groups” (28). Many of these populations, which often rely on Medicaid dental benefits, have seen their access restricted or eliminated by reductions in this vital coverage. In 2020 it was reported that “in response to fiscal challenges, many states have reduced or eliminated Medicaid dental coverage over the past decade, with a concurrent 10% decline in oral health care utilization among low-income adults” (28). Among those in at-risk populations who do have dental benefits under Medicaid, the same report notes there is often “difficulty finding Medicaid-contracted dental providers, because only 20% of dentists nationwide accept Medicaid” (28). We can reasonably anticipate a worsening of these trends as the COVID-19 pandemic takes a large proportion of state budgets.

COVID-19 and Dental Care: Aerosol-Generating Procedures Create Risk

Dental professionals have been practicing increased infection control and taking universal precautions since the 1980s HIV epidemic (29). Nevertheless, oral health professionals are among those occupations at the highest risk for COVID-19, as reported by *The New York Times* (30). Dental care personnel face challenges because of their proximity to infected patients. These patients’ mouths are open and unmasked during treatment, significantly increasing the potential for direct and indirect exposure to infectious materials. The Occupational Safety and Health Administration designates the performance of aerosol-generating procedures on known or suspected COVID-19 patients as “very high risk” (31). Shortages of personal protective equipment (PPE) and the use of instruments and equipment that generate aerosols containing oral and respiratory fluids only compound the risk (23). Two of the highest aerosol-creating procedures involve inventions that have been considered major advances in dental practice, because they are faster and less painful for the patient: the high-speed handpiece with its water spray coolant and the ultrasonic scaler used by hygienists to remove hard deposits on teeth (32). These dental procedures have become problematic during the pandemic, providing an opportunity to shift to nonaerosolizing procedures and a greater focus on prevention (23,33).

Going Forward: Opportunities

Focus on prevention and promote nonaerosol-generating dental procedures

Prevention is a cornerstone of public health. The COVID-19 pandemic presents an opportunity for the dental profession to shift from an approach focused on surgical intervention to one emphasizing prevention. Embracing nonsurgical, nonaerosolizing caries prevention and management will be critical in this endeavor. The profession has always supported community water fluoridation, and dental hygienists are considered prevention experts (34,35). However, the dental compensation model is based on providing expensive, restorative procedures that are financially out of reach for many people.

Guidelines have been developed to shift the dental care paradigm to a more preventive focus (36–40). Strategies include reduction in common risk factors such as tobacco and alcohol use, promotion of a healthy diet low in sugars, community water fluoridation, topical fluorides, and promotion of oral health in community settings. These oral health messages and interventions should be integrated into medical sites such as primary care and pediatric offices. Prevention and nonsurgical caries management include many options. Evidence-based materials include dental resin sealants, glass ionomers as sealants or as part of atraumatic restorative treatment performed with hand instruments, silver diamine fluoride, sodium fluoride varnish, and other self-applied and professionally applied topical fluorides (40–42). These materials can be applied without generating aerosols, reducing the risk of viral transmission. These methods present a major opportunity to expand access to preventive and restorative care for vulnerable populations, particularly when combined with policy changes increasing hygienists’ scope of practice, sustainable payment reform, and changes in the education of oral health professionals.

Providers and payers together have a responsibility to shift toward preventive care, particularly as COVID-19 threatens to increase disparities in oral health care access for the United States’ most vulnerable populations. Before the pandemic, Birch et al noted that a review of provider and payer practices made clear that “further work was required on both the provider and payer side to ensure that evidence-based prevention was both implemented properly but also reimbursed sufficiently” (43). As health care compensation moves toward value-based care and a focus on health outcomes, prevention and maintaining oral health and sound tooth structure will shift reimbursement away from the current expensive model of reimbursement for restoration of tooth structure and function (44). In particular, reimbursement policies, which tradi-

tionally have incentivized surgical, high-end restorative procedures like crowns and multisurface fillings, must be revisited to prioritize preventive and nonsurgical, nonaerosolizing treatments and make them more financially sustainable.

Improve communication

Communications concerning patient and provider safety are critical (45). Surveillance and monitoring are needed to confirm whether transmission of COVID-19 occurs in the dental office. According to CDC (27), “There are currently no data available to assess the risk of SARS-CoV-2 transmission during dental practice.” The availability of PPE for dental care should be monitored, and the effectiveness of various types of PPE should be determined. Many oral health care providers are anxious about returning to work, and many patients may be hesitant to enter a dental office. Communication and clarity are critical, especially with low-literacy populations. Messaging should include the importance of maintaining good oral health and its role in overall health.

Protect and enhance Medicaid reimbursement

Dental coverage under Medicaid is mandated for children, but state Medicaid programs’ approaches to oral health services for adults vary significantly, especially in terms of the comprehensive nature of such services (Figure). Only 19 states have “extensive” Medicaid dental benefits for adults (46). Among US adults aged 19 to 64, only 7.4% have Medicaid dental benefits and, alarmingly, 33.6% have no dental insurance benefits (47). The fiscal solvency of dental safety-net clinics will thus remain critical to serving at-risk populations during and after the pandemic. These sites will be needed more than ever, as delayed and postponed treatment increases need for more extensive and urgent care.

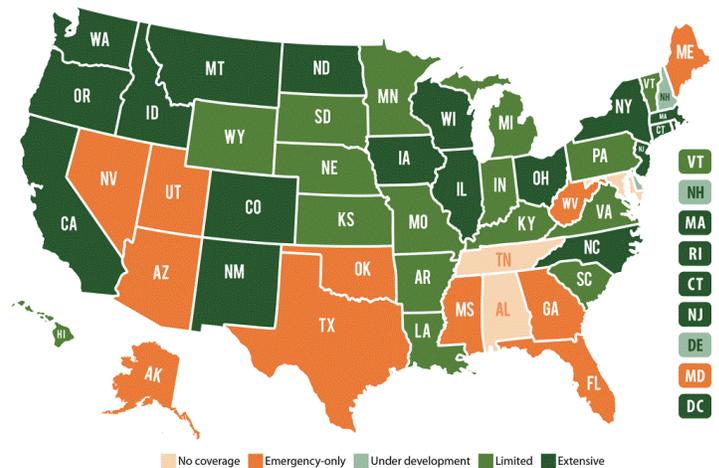


Figure. Extent of Medicaid adult dental benefits, by state. Source: Center for Health Care Strategies (46).

It is widely documented that during economic downturns, Medicaid enrollment increases (48). With unemployment increasing at an unprecedented rate, we can reasonably anticipate the same effect in this pandemic. During times of state budget cuts, dental Medicaid coverage is often at risk (49). In the immediate aftermath of the Great Recession during state fiscal years 2010 through 2012, 19 states reported restrictions in Medicaid adult dental benefits (50). Amidst the pandemic, many states have modified public payment policies to meet the demand of their most vulnerable residents, and it will be important that advocacy efforts secure continuity of these provisional changes. However, given current circumstances, it is imperative that policy makers consider expanding adult dental benefits under Medicaid rather than reducing them. Access disparities will likely increase without expansion of dental benefits under Medicaid.

Ease dental workforce restrictions

Guidance for dental practice during COVID-19 continues to evolve, and regulations vary by state (51). As dental care resumes, it is critical that workforce policies and licensure scope are evaluated to address workforce utilization bottlenecks to respond to communities’ needs more effectively and efficiently.

As of 2019, 11 states did not allow for some form of direct access to preventive oral health services by a dental team member outside of the dentist’s supervision (52). In these states, a dentist must perform an examination before delivery of preventive care by a hygienist. Easing scope of practice and workforce restrictions would increase access to care. Increasing opportunities for dental

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team members like dental therapists, community dental health coordinators, and expanded function dental assistants — all currently in limited supply and restricted by dental practice acts in many states — would help bring needed, more affordable services to underserved communities.

Advance teledentistry to address access gaps

The COVID-19 pandemic has thrust alternative modalities such as teledentistry to the forefront of policy considerations (53). Teledentistry supports the delivery of oral health services through electronic communication means, connecting providers and patients without usual time and space constraints. Teledentistry's unique ability to connect disadvantaged, primarily rural communities and the homebound with dental providers (54) makes this method particularly well-suited to address lack of access during and after the pandemic.

Teledentistry can be used for education, consultation, and triage, allowing providers to advise patients whether their dental concerns constitute a need for urgent or emergency care, whether a condition could be temporarily alleviated at home, or whether treatment could be postponed. When many dental offices are closed and people are largely staying at home, communication and information via teledentistry can help lessen the burden of people seeking dental care at overwhelmed emergency departments and urgent dental care settings. In more usual circumstances, teledentistry can also be used to facilitate access to preventive services and oral health education when members of the dental team can provide such services in community settings, such as schools, without onsite dentist supervision.

Before COVID-19, many states inhibited use of teledentistry through legislative barriers and limited public and private insurance reimbursement. Compared with dentistry, many medical and behavioral health providers have less restrictive regulations and insurance reimbursement policies concerning telehealth. A *Washington Post* report (55) was clear: "Telemedicine was largely ready for the influx." Teledentistry, on the other hand, was forced to play catch-up (56). Emergency reimbursement changes prompted by COVID-19 have brought relief, but post-pandemic, we recommend that legislators, regulatory authorities, and third-party payers consider making permanent the temporary modifications to teledentistry policies to support increased access.

Implications for Public Health Practice: Dental Public Health's Roles

Health inequities are avoidable and unjust. Although SARS-Cov-2 has infected people worldwide, it has disproportionately affected those who are most disadvantaged. In the United States, people

without good access to health care, healthy food, and a safe environment; with underlying health conditions; who live in crowded conditions; or who have become unemployed and homeless are especially vulnerable and at increased exposure to the virus. It is time to recognize the social determinants of health and rectify unjust conditions, systemic inequality, and racism.

Oral health disparities and inequities are part of the larger, cultural picture. There has been a tendency to blame the victim. Mary Otto, health journalist and author of the groundbreaking book *Teeth* (57), stated, "We see tooth decay through a moral lens, almost. We judge people who have oral disease as moral failures, rather than people who are suffering from a disease" (58).

It is perhaps not hyperbole to describe pandemic-related circumstances as creating a "perfect storm" in oral health care in the United States. Risk factors are elevated, access for the most vulnerable is limited, safety concerns are heightened, and the economy presents substantial challenges for patients and providers alike. The effects of COVID-19 are particularly acute for vulnerable populations, and the crisis has made evident the challenges and opportunities for oral health care in the United States. In such a time, oral health care providers and advocates must clearly communicate the importance of oral health to overall health, indicate the steps being taken to ensure patient and provider safety, and promote prevention and nonaerosolizing procedures (Table 2). Oral health should be included in policy considerations, continued research, monitoring, surveillance, and other aspects of health. Advocacy is crucial to make permanent the temporary regulatory changes being implemented to address the immediate crisis, ensure access to oral health care, address disparities and inequities, and improve population health.

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Tables

Table 1. Percentage of COVID-19 Hospitalized Cases in COVID-NET Catchment Areas and Prevalence of Dental and Other Chronic Conditions in the United States, by Race/Ethnicity, 2020

Characteristic	% of COVID-19 Hospitalized Cases	COVID-NET Catchment Area for Comparison	% of Periodontitis (Gum Disease)	% of Untreated Dental Caries (Tooth Decay)	% With Diabetes (Physician-Diagnosed and Undiagnosed)	% of Self-Reported Heart Disease
Population	COVID-NET, 14 jurisdictions	COVID-NET, 14 jurisdictions	US dentate adults aged ≥30 y	US dentate adults aged 20–64 y	US adults aged ≥20 y	US adults aged ≥18 y
Period	As of June 20, 2020	As of June 20, 2020	2009–2014	2011–2016	2015–2016	2017
Source	CDC (10)	CDC (10)	NCHS, NHANES (9)	NCHS, NHANES (11)	NCHS, NHANES (12)	NCHS, NHIS (12)
Non-Hispanic White	32.8	58.8	37.0	22.2	13.0	11.5
Non-Hispanic Black	32.6	17.7	56.6	40.2	19.6	9.5
Hispanic	22.0	14.0	^a	^a	21.5	7.4
Mexican American	^a	^a	59.7	37.1	^a	^a
Other Hispanic	^a	^a	48.5	^a	^a	^a

Abbreviations: CDC, Centers for Disease Control and Prevention; COVID-19, coronavirus disease 2019; COVID-NET, COVID-19–Associated Hospitalization Surveillance Network; NCHS, National Center for Health Statistics; NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey.

^a Studies vary in definitions used for Hispanic ethnicity.

Table 2. Implications of COVID-19 for Oral Health in the United States, 2020

Core Functions of Public Health	Public Health Concerns	Future Opportunities
Assurance	Limited access to dental care compounded by COVID-19; aerosol-generating dental procedures increase risk of transmission	Promote prevention and use of nonaerosol-generating dental procedures; advance teledentistry training and reimbursement and other efforts to reach patients outside of the dental setting
	Regulations in some states limit dental hygienists' and other dental team members' ability to provide care in settings outside of the dental office	Modify state dental practice acts and other regulations for dental workforce reform and to increase access to prevention
	Lack of integration between oral health and the rest of the health care system	Increase integration between oral health care and primary care (ie, locations serving patients who are pregnant, have diabetes or cardiovascular disease)
Assessment	Lack of timely national oral health data and coordinated state and local information	Monitor oral health conditions as a result of delayed dental care during pandemic; include oral health metrics in health care quality measures
	Lack of information about health and safety of dental health care personnel during COVID-19; limited availability of PPE and COVID-19 testing for dental practices	Monitor dental workforce health and safety; increase availability of PPE and COVID-19 tests for dental care settings
	Evidence needed to determine most cost-effective PPE or PPE combinations and other measures to prevent SARS-CoV-2 in dental settings	Further testing of specific PPE and PPE combinations and other measures to protect patient and provider health in dental settings
Policy Development	Potential public and provider unease about seeking and providing dental care during pandemic	Provide clear communication about how to safely obtain and provide dental care during the pandemic
	Oral health not prioritized	Educate about importance of oral health and its relation to the health of the rest of the body; provide parity with health care policies (ie, Medicaid, Medicare)
	Varied state-level adult dental Medicaid benefits	Advocate for sustained dental Medicaid funding and expansion to close coverage gaps
	Reimbursement models incentivize surgical, high-end restorative dental procedures	Modify reimbursement to provide incentives for prevention, maintaining health, teledentistry

Abbreviations: COVID-19, coronavirus disease 2019; PPE, personal protective equipment; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

COMMENTARY

Preparing Students for a More Public Health–Aware Market in Response to COVID-19

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PEER REVIEWED

Summary

What is already known about this topic?

The COVID-19 pandemic has made many people aware of the importance of the public health perspective to the field of health emergency preparedness as a whole.

What is added by this report?

As a result of the pandemic, schools and programs in public health have a new opportunity to recruit, train, and sustain the public health workforce. Interprofessional education and practice-based learning should become an integral part of training, as should recruiting racial/ethnic minority students to address racial/ethnic health disparities in morbidity and mortality.

What are the implications for public health practice?

The fields of public health and academic public health should take this opportunity to advance the recruiting, training, and sustaining of the public health workforce.

Abstract

The COVID-19 pandemic has made the public more aware of public health and the role its professionals play in addressing the pandemic. Schools and programs in public health have a new opportunity to recruit, train, and sustain the public health workforce. Academic public health can further educate the public and prepare students for meaningful careers through interprofessional education and practice-based learning.

Introduction

With the onslaught of coronavirus disease 2019 (COVID-19), the public is now more aware of the field of public health and the role of public health professionals in addressing the pandemic. Public

health officials are in the news daily, and news coverage has made the terms “contact tracing,” “disease transmission,” and “flattening the curve” part of our everyday vocabulary. News coverage has also highlighted the relationship between preexisting chronic diseases and the morbidity and mortality of COVID-19 (1,2). The Centers for Disease Control and Prevention (CDC) reported that nearly 90% of COVID-19 hospitalized patients had one or more chronic conditions, nearly half had hypertension and/or obesity, and more than one-quarter had diabetes and/or cardiovascular disease (3). With a public more aware of public health, no time has been better to recruit a diverse pool of potential public health students into public health training programs and to provide them with the knowledge, skills, and abilities necessary to be effective practitioners (4). Schools and programs in public health have a window of opportunity to expand interprofessional education (IPE) and practice- and service-based learning to prepare students for meaningful, long-term careers in public health.

Recruit, Train, Sustain

A decade ago, CDC’s National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention developed a strategic plan for recruiting, training, and sustaining a public health workforce in their unit, a plan that closely matches broad needs across the field of public health (5). Key elements from that strategic plan remain on target. “Recruiting” implies bringing people into public health who might not have previously been aware of the field and the importance of its work. “Training” implies offering the combination of knowledge and skills that enable graduates to make immediate contributions. And “sustaining” implies training that enables graduates to advance in their careers.

COVID-19 is a public health threat for everyone beyond anything we have experienced in decades. People with chronic diseases and the elderly have been particularly affected. Furthermore, this pandemic has highlighted the disparities in our public and personal health systems and the importance of our diversity initiatives. Racial/ethnic minority populations are more likely to live and work in communities with less ability for social distancing and have less reliable access to health services (6). As a result, members of these



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populations are more likely to be hospitalized when diagnosed with COVID-19 (7,8). In one study, African American patients were less likely to survive hospitalizations for COVID-19, because of older age and a high prevalence of chronic diseases (8). If we are to truly address racial/ethnic health disparities, we must recruit into the public health work force people who represent the communities being served and who are capable of understanding and addressing the needs of their communities (9). Progress has been made in diversifying faculty and students in public health education, yet work remains to establish an academy that reflects the community (10). Schools and programs of public health have clearly stated their commitment to zero tolerance of harassment and discrimination (11). These statements must be transformed into actions for training the next generation of the public health workforce.

With an appropriate pool of students recruited, we turn our attention to training. A key to training is that it should be effective and innovative. To be effective, training should address current areas of greatest need and those projected for the future. Surveys of health departments have consistently indicated the need for leadership positions, epidemiologists, and disease intervention specialists (12). Essential leadership skills include systems, strategic thinking, and change management (13). As we move forward in public health, we need to train leaders who can work across the many sectors that influence the health of populations (14). Beyond the instruction provided to novice students, schools and programs in public health may need to offer more continuing education in advanced skills for active public health professionals. Here, we highlight the need for training through IPE and practice-based learning.

IPE is when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes (15). Public health has long been known to play a key role in population health teams. The Interprofessional Education Collaborative (IPEC), in which the Association for Schools and Programs in Public Health was an inaugural member, established competencies that include population health (15,16). The offering of more IPE experiences that highlight population health is one means by which public health can support the transformation of health systems and improve direct patient care (16,17).

The overwhelming effect that the COVID-19 pandemic is having on our health systems, not to mention our personal lives, will raise the visibility of public health in IPE activities in the near term. It will be up to public health practitioners and educators to sustain the visibility of public health in the long term. As with any public health emergency, the current pandemic not only requires a response to medical hazards but also demands collaboration across

multiple sectors, the application of public health tools, resilience analysis, and an overall systemization of efforts — all of which would benefit from interprofessional training. An interprofessional team could aid in overcoming common challenges related to any public health emergency, including difficulty with data collection, bias, and incomplete data. Training in rapid needs assessment in current public health curricula is designed to improve understanding of how to prioritize, plan, coordinate, address gaps, avoid duplication, and target populations most vulnerable to a public health emergency. Overall, IPE provides the groundwork in all phases of response, in particular, preparedness. Crucial relationships need to be established before an event to build trust and understand the existing health needs of the community, including identifying people with chronic disease vulnerabilities. In addition, these relationships allow for clear communication among interprofessional team members and between team members and communities, including how best to keep communities informed of new developments. IPE, along with practice and service learning, allows students to develop the necessary skills to be an effective member of the team and determine how to best contribute to planning and response to these emergencies.

In 2014, the Louisiana State University Health Sciences Center (LSUHSC) initiated a large-scale annual IPE event for all first-year students as a way of meeting accreditation standards and achieving IPE learning objectives (18). In the 2019–2020 academic year, we developed a case study on pediatric immunizations based on the 2016 IPEC report (19). The case study presented a new vision for health education and brought public health into a leadership role in discussions among students. The perceptions of the importance of population health and teamwork improved among first-year students (20). By using a population health focus in IPE activities, students learned and applied collaborative practice skills along with recognizing the importance of promoting overall health and well-being instead of just health care. As part of the case study, students considered how the medical, nursing, physician assistant, and public health professions traditionally provide immunizations and related education. Then the questions arose: “What would the impact on health be if more health professionals intentionally participated in the promotion of health through immunization education and support? What if each health professional asked the immunization status of their patients/clients during the medical history review?” Although these questions are certainly being asked in some disciplines and locations, asking these nontraditional questions about the delivery of health care services as part of a national routine might lead to health system transformation. In addition, the evaluation measures of the IPE experience at LSUHSC include not only quantitative metrics on student perceptions of readiness for collaboration and teamwork but also qualitative reflections on their own stereotypes and

how they plan to address them. The true measure will be following up after graduation to determine the external career effects of IPE training. Preliminary data from practice-based IPE projects show the potential effect through feedback from a volunteer community member: “It was my pleasure to interact with you over the last few months. In each of the meetings, I found a sincere interesting focusing on my specific health care issues and the means and encouragement to benefit me now and in the future. If the students I met with in this program are any indication of what the public can expect in their future health care providers, then we all will be served better than we are today.”

We define the field of public health by the needs of practice, meaning that practice-based learning is essential to a well-prepared workforce (21). Accredited public health programs require practice in public health through some combination of internships, practicums, fieldwork, practice-based learning, and service learning experiences. There is a role and place for each type of experience, and a responsibility of faculty and practice to know the differences. Internships and related experiences involve immersion in public health, often in an unstructured manner, enabling the student to observe and feel what it means to work in public health. Practice-based learning and service-learning experiences add an explicit academic foundation to a discipline or subject and use practice sites as the laboratory in which skills are honed, work products for public health are prepared (22), and services required for the delivery of a public health program are completed (23).

Early-career public health professionals indicate that experiences in practice are essential to acquiring needed skills and developing mentors and role models (13,24). The presentation of products generated by practice-based courses and the delivery of services through service-learning experiences can also strengthen academic–practice relationships and improve training of the next generation of the public health workforce by establishing connections in the field. These connections further the goals articulated in the late 1990s for merging the “pragmatic needs of the practitioner and the academic quest to advance understanding” (25). These connections also allow for a solid foundation of trust between academic and practice partners, a foundation that can only be built through years of working together toward common goals. By maintaining the ultimate focus of public health on the public and practitioners, academic institutions can better prepare for events such as the current COVID-19 pandemic through the synthesis and dissemination of research findings and training products along with moving new knowledge, particularly as it applies to preparedness and response, from research to practice and policy.

Sustaining the public health workforce is a joint responsibility of academic public health and our state and local health departments

and related organizations. Academic public health can recruit and train students through foundational education and opportunities for life-long learning. Advances in public health research can provide practitioners with an expanded set of tools that improve public health outcomes and create on-the-job satisfaction. IPE and practice-based learning provide skills that advance careers, especially in an environment of Public Health 3.0 (14). Public Health 3.0 adds to the core of public health and emphasizes cross-sector collaboration, systems-level action, and other practices (14). Collaboration between public health professionals and professionals in related fields will be essential for sustaining the interest of practitioners in public health and career advancement.

Implications for Public Health

We echo the call for sustaining the CDC’s Prevention Research Centers and the Health Resources and Services Administration’s Public Health Training Center program (26) and go further to support pandemic preparedness. Shortcomings in pandemic preparedness are attributable to numerous factors, of which a lack of funding for operating public health programs and a lack of funding for training future public health professionals are just two components. We further recognize the importance of making training available to current public health professionals who may lack the full complement of knowledge and skills required to optimally respond to the COVID-19 pandemic and prevent future pandemics. Of course, training is important, but training alone will not resolve all problems. With greater understanding of roles and responsibilities across the health care sector, collaboration efforts would improve. For example, a team with representation across medicine, pharmacy, basic sciences, epidemiology, health care administration, and community health would allow data collection, interpretation, and action to occur seamlessly within the entire scope of the health care community. The expertise of such a team would allow discussions on the status of relief efforts, casualties, availability of essential supplies and personnel, and exposure to physical and psychological stressors.

The COVID-19 pandemic has made many people aware of the importance of the public health perspective to the field of preparedness as a whole. Incorporating the inner workings of emergency preparedness and response into public health academic training will provide students with a stronger foundation and an evidence-based voice. This voice will advocate for creating a role for public health in any emergency planning or response teams at the municipal, state, and federal level. As we have seen with the COVID-19 pandemic, public health training, tools, and skills can provide invaluable perspective on public health emergencies, including how best to prevent them. We can add to the number of trained public health professionals not only by attracting people previously inter-

ested in public health but also by recruiting people newly aware of the importance of public health, and we can provide them with the knowledge, skills, and abilities necessary to be effective practitioners.

Finally, we recognize the challenge in the fields of public health practice and academic public health to ensure that resources made available by COVID-19 are used wisely and effectively. We should not waste this time in the spotlight: we should take this opportunity to advance the public health workforce for many years to come. We should be honest with ourselves in assessing the implementation of training programs and be prepared to change directions to optimize the investments of everyone in having a well-prepared workforce (27). Evaluation of how well we do in recruiting, training, and sustaining a public health workforce will be essential, with a focus on how well IPE and practice- and service-based learning contribute to the knowledge and skills of graduates and enable them to sustain effective careers in public health. We can hope and work to ensure that future pandemics are minimized and managed as best as possible.

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COMMENTARY

The COVID-19 Response in Nebraska: How Students Answered the Call

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PEER REVIEWED

Summary**What is already known on this topic?**

Emory University and The University of North Carolina were 2 of the first schools of public health with student response teams using the expertise of graduate students in the control and containment of outbreaks.

What is added by this report?

The University of Nebraska Medical Center (UNMC) College of Public Health established a Student Response Team (SRT) in 2015 that expanded upon these models and positioned the SRT to assist Nebraska's coronavirus disease 2019 (COVID-19) response.

What are the implications for public health practice?

The UNMC SRT demonstrates how students can increase the public health surge capacity of local health departments while gaining applied experience during public health emergencies.

Abstract

The Student Response Team at the University of Nebraska Medical Center answered the statewide call to assist local health departments during the coronavirus disease 2019 (COVID-19) pandemic. As a voluntary student-led effort, the SRT assisted health departments to conduct contact tracing, monitor social media, and educate the public. Their experience demonstrates how students can increase the public health surge capacity of local health departments while gaining applied experience during public health emergencies. This call-to-action commentary proposes that SRTs should be formed, trained, and deployed through academic institutions across the nation and the globe, during and beyond the current pandemic.

Introduction

Emory University (1) and the University of North Carolina (2) were among the first schools of public health that created programs to use the expertise of graduate students in the control and containment of outbreaks (3). In 2002, Emory University created the Student Outbreak and Response Team (SORT) to provide students with hands-on experience in emergency response through a collaboration with the Centers for Disease Control and Prevention (3). Team Epi-Aid was created in 2003 at the University of North Carolina School of Public Health, presenting its students with opportunities to support local and state health departments and gain practical skills (3).

In the spring of 2015, the co-director (S.M.) of the Center for Biosecurity, Biopreparedness, and Emerging Infectious Diseases established the University of Nebraska Medical Center (UNMC) Student Response Team (SRT). She believed that public health students were equipped to assist in more areas than traditional teams had ventured into, so the UNMC SRT was created for 3 specific scenarios: 1) an epidemiology outbreak team to assist local health departments with outbreak investigation and control (eg, conduct case and contact interviews, data entry), 2) a points-of-dispensing (POD) assistance team to assist public health emergency response coordinators with mass dispensing or immunization clinics (eg, serve as greeters, screeners, dispensers, immunizers), and 3) a digital response team to assist volunteer agencies in systematic monitoring of social media (eg, conduct data mining, data verification, and geomapping) (3). Local health departments could rely on an increased workforce to augment their epidemiology staff in an outbreak and their emergency preparedness staff with POD operations either in an actual mass dispensing or immunization event or for annual exercises (trainings very close to a real-life event, typically conducted by public agencies). A global volunteer group, the Standby Task Force, partnered with the UNMC SRT in 2017 to offer training and volunteer opportunities in actual disasters across the world to monitor social media and to geomap distress calls and other information.



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The coronavirus disease 2019 (COVID-19) pandemic in 2020 would provide the most extensive response involvement that UNMC SRT had experienced to date. In the 2019–2020 school year, 33 public health students joined the SRT as members, and 17 members volunteered to assist health departments with the COVID-19 response. Additionally, 20 public health students who were not members of the SRT answered the call for volunteers. We present here some background information on this SRT and its activities related to COVID-19 in Nebraska communities.

Recruitment, Governance, and Training

The SRT recruits students from the College of Public Health (3), including those in the certificate, master's, and doctoral programs. New students in these programs initially learn about the SRT at the orientation before the fall semester begins. Officers and other members of the SRT give a presentation to students, highlighting trainings that take place during the year and potential volunteer opportunities. The SRT also recruits students at the Student Involvement Fair during the first week of the fall semester (3). In recent years, most of the recruited students were enrolled in the Master of Public Health (MPH) program, typically with a concentration in health promotion or epidemiology. Regular member meetings, which usually have around 20 students in attendance, provide platforms for informing members, training for deployments, and recruiting new members. If the SRT needs to activate at any time, current members are notified first, because they have received essential information during training sessions (3).

SRT activities are possible with the support of the SRT's faculty advisor (S.M.) and its collaboration with members of the executive board. Each year, students are nominated for positions on the executive board: president, vice president, secretary, and treasurer. Together, the executive board organizes training opportunities and coordinates potential deployments. The board also promotes regular member meetings through fliers, emails, and announcements to their classmates during in-person class sessions. Member meetings are used as training sessions for the team. At these meetings, the executive board assists the health departments and other guest speakers with the trainings. The executive board also meets monthly to plan for trainings. A training is planned for each semester to prepare volunteers for immediate deployment to assist health departments in case of an emergency (Table 1).

Trainings are implemented to prepare SRT volunteers to assist health departments with an outbreak investigation, POD assistance, and digital response. Although the topics of these trainings may vary, depending on the needs of the community, the goal is to provide students with information needed for immediate deployment. In epidemiology outbreak training, a guest speaker, usually

a member of a local health department, explains fundamental epidemiologic concepts and demonstrates how to apply these concepts in the field. Multiple health departments also conduct POD training for students. The interactive simulation teaches students how to assist with the mass dispensing of medications or vaccinations during a public health emergency. This training is especially important because local health departments would work with the SRT and other health professionals during an emergency event to ensure that the correct medical countermeasures are given to the community in a timely manner. The digital response training involves acquainting students with the process of accessing, data mining, and coding various social media platforms, particularly Twitter and Facebook, to find information pertaining to a specific public health emergency. In the past, the SRT partnered with the Standby Task Force to monitor and analyze tweets during hurricanes in the Gulf of Mexico. The ultimate goal of aggregating the data was to enable local responders to help those in affected areas. Recently, the SRT monitored social media to better understand the public's perception of COVID-19.

Historical Deployments

SRTs at UNMC have deployed in epidemiology outbreak teams, POD teams, and digital response teams (3). The experiences with POD operations have been the most frequent. Several surrounding county health departments have enlisted the students to assist with annual full-scale exercises, not as health personnel but in greeter, screener, dispenser, and educator operational roles. Students were able to experience an actual modified POD operation in 2016, when it was used to implement mass testing of hundreds of students for latent tuberculosis after a positive case was identified at a local school.

In 2017, the SRT was activated by the Standby Task Force to assist with monitoring social media for distress calls in the Houston area during Hurricane Harvey. Messages were geotagged by providing latitude and longitude coordinates for the originating location or address and were uploaded to a document shared with the Standby Task Force. Records for calls and associated location points were shared with the US Coast Guard and provided valuable data for rescue operations. From 1,000 miles away, SRT members worked together as a group and individually, contributing lifesaving information to responders on the ground. More recent teams were able to offer similar assistance during Hurricane Dorian.

COVID-19 Deployments

In February 2020, SRT members discussed the idea of monitoring social media to capture sentiments and opinions of Nebraskans

about the imported cases of COVID-19 to Camp Ashland and the UNMC quarantine unit. As events evolved and the city of Omaha reported community-transmitted cases, the SRT took the initiative to collect information biweekly on Facebook and Twitter. The SRT used 2 keywords in data collection: *Nebraska* and *coronavirus*. The data that were collected informed the SRT and health department partners of the nature and quality of information that circulated in the community. Thus, it helped health departments in Nebraska address misinformation and rumors and give the population accurate health advice and guidance.

On March 10, 2020, the SRT received a call for volunteers from the Douglas County (Omaha) Health Department (DCHD) to support contact tracing, symptom tracking, test result notification, and social media monitoring. The volunteers were trained to assist the epidemiology team immediately. Volunteers were provided with information about the current epidemic situation in the city of Omaha and the state of Nebraska and received instructions on the different activities that they could join. The volunteers made telephone calls to inquire about the health status of people who came in contact with confirmed coronavirus cases and provided instructions on how to self-quarantine. Volunteers used Research Electronic Data Capture (REDCap) (Vanderbilt University) for symptom monitoring and EpiInfo software (Centers for Disease Control and Prevention) to enter patient information and COVID-19 test results, providing a valuable opportunity to gain technical skills in public health software applications.

Following the work that SRT volunteers accomplished with DCHD, the SRT received calls for volunteers from other health departments across the state in March and April 2020 (Table 2). In addition to activities described above, volunteers participated in public education and outreach about chronic disease and COVID-19. During contact tracing, volunteers provided quarantine recommendations to COVID-19 patients and fielded questions and offered advice about managing comorbidities such as diabetes, asthma, and high blood pressure. Some volunteers counselled people with confirmed cases about staying current with their medications and ensuring that their supplies would last through their isolation period. Some volunteers also helped to address concerns of the population through managing health department social media accounts by replying to messages and comments that the departments received.

The SRT's role in public education and outreach also included identifying and supporting the most vulnerable and underserved populations in their communities during the COVID-19 response. Bilingual volunteers helped translate education materials, create infographics, and liaise with communities speaking Arabic, Kurdish, and Spanish, in rural and urban parts of the state. Some volunteers worked to generate reports on the outbreak magnitude among

meatpacking plant workers. Outreach included a presentation to an audience of high school students by an SRT volunteer and the team's faculty advisor about COVID-19 and the SRT's role in the response. At the peak of activities, 34 students were deployed to 11 health departments across the state.

Student Perspectives

A feedback assessment survey was deployed (by A.C.) to 50 individuals listed in the SRT COVID-19 volunteer registry. Fifteen volunteers responded (30%). The survey asked volunteers to list their degree type and concentration area and to respond in open text boxes about why they were attracted to the SRT, which work with the team resonated with them the most, how they assisted the COVID-19 response, how SRT volunteer experiences affected them academically and professionally, and whether they engaged any aspects of chronic disease management during the COVID-19 response. Volunteers were also invited to offer suggestions for how to integrate chronic disease management in emergency-oriented work and how students at other institutions could pursue similar opportunities. Text inputs were analyzed by coding responses to compare commonalities within the following categories: attraction, resonance, academic impact, professional impact, and chronic disease management.

Of the 15 volunteers responding, 9 studied for an MPH degree, 3 for a doctoral degree, and 2 for a certificate in public health. One volunteer was a medical student. Nearly half of the volunteers studied epidemiology, and one-third studied health promotion. The remaining respondents studied health services research and administration, general public health, or medicine. All of the survey participants volunteered during the COVID-19 response.

Students were attracted to volunteer with the SRT for 4 main reasons: to contribute to their communities, to gain specific pandemic experience, to participate in trainings, and to gain professional exposure. In the spirit of volunteerism, they were "attracted to the idea of helping the community in a time of need." Those motivated specifically by the opportunity to "contribute to the pandemic" also cited the attraction to "get immediately involved." While many volunteers responded to the SRT's call specific to COVID-19, some joined the SRT earlier after attending trainings such as POD for public health emergencies. The experiences offered through the SRT, volunteers emphasized, are a "complement to the area of public health I wanted to work in."

Volunteers also said they found resonance in the community-based and practice-based aspects of SRT opportunities. Some said engaging in social media monitoring helped them "feel more prepared to address the COVID-19 sentiments among friends and family and within the community." Another volunteer, noting how

“public health is always present but only acknowledged during health crisis,” gained “an added level [of] gratitude and appreciation for public health workers who had to mobilize and organize education efforts in rural Nebraska.” Several volunteers were fulfilled in assisting multilingual or refugee communities, some of which they belong to themselves. A volunteer serving a Latino community affected by chronic diseases, including cancer, diabetes, cardiovascular disease, and obesity, noted that many of its members were not aware they were considered to be high risk. “As a member of this community I felt that it was my responsibility to inform, educate, and provide accurate information,” the volunteer said. Volunteers also articulated an understanding that health departments, many of which are underfunded and under-resourced, were strained during the COVID-19 response. As one volunteer explained, “Despite having the training and skills to help, I felt impotent in the face of the early chaos of our response to the pandemic. I hoped I could lend my time to worthwhile efforts to contain the devastation by volunteering with the Student Response Team.”

In terms of academic impact, epidemiology student volunteers recalled how the response aligned with coursework in outbreak investigations and allowed them to observe “[a] team go through all the investigation steps that we weren’t actively participating in ourselves.” Where their opportunities to participate in real-time data collection had previously been limited, volunteers were afforded experience in this aspect of the epidemiologic response and through social media monitoring. One volunteer, whose experience inspired them to take a SAS (SAS Institute Inc) programming class as an elective, said the exposure “added to my understanding of the need for data collection and for innovation in determining how and what to collect.” Other volunteers learned how to use REDCap and EpiInfo for the first time. For one medical student, medical knowledge provided advantages in educating people about their illness while new insights gained from contact tracing “will aide my clinical skills.”

Volunteers felt the experience was rewarding in terms of professional development as well, through working with multidisciplinary teams and being exposed to public health practice. In their varied experiences integrating into teams that were already functioning at health departments across the state, volunteers practiced how to collaborate within an organization firsthand. In many cases, this work was conducted remotely. With this early professional exposure to remote working environments, volunteers felt the ability to communicate and coordinate with senior staff and organizations regardless of location was greatly strengthened. Volunteers also celebrated how they learned “the art-part of public health” in making clear and acceptable communications in uncertain times. As a contact tracer, a volunteer shared how “it was a

new experience for me to be a calm, knowledgeable authority to strangers that were nervous and unsure. I think it helped me grow as a leader and a communicator and will stay with me throughout my career.” Working directly with health departments also created opportunities and connections for career development. Some volunteers aim to one day work for local health departments, and others graduated during the response and were employed as contact tracers at the departments where they volunteered. For graduating students facing challenges with job availability and hiring freezes, volunteering with the SRT “helped bridge the gap between being a student and finding full-time work in public health.”

Public Health Implications

The UNMC SRT is a student-led initiative that seeks to expand the capacity of local public health departments and provide students with opportunities to gain applied public health experience in emergencies. During Nebraska’s COVID-19 response, the UNMC SRT provided opportunities for applied practice experience and professional development of the future public health workforce. Furthermore, activities increased recognition of the public health role and value among other health professions and community engagement in health emergency response. The SRT calls all students and universities to consider establishing response teams and offers the following recommendations and insights:

- **SRTs provide applied practice opportunities for the future public health workforce (2).** As a student-led effort, SRTs encourage autonomy and empower creativity of future health professionals. Serving on an SRT is a unique opportunity for students to apply the knowledge acquired in academic settings and gain field experience that facilitates employability after graduation. The implementation and training of SRTs prepare students for deployment in case of public health emergencies, regardless of their educational background. For this approach to be successful, it is crucial to ensure the availability of public health leadership and quality training of the health workforce in local communities. SRTs are an accelerated learning platform for public health programs and one that future employers — health departments, public and private institutes, foundations, and others — can support through partnerships with degree-granting institutions.
- **SRTs promote visibility of public health leadership in health emergencies.** SRTs can expand resources and networking opportunities for students. Because students with any background can be trained to perform in key areas, SRTs provide a platform for interprofessional collaboration. Collaborating with different health professions like medicine, pharmacy, nursing, and others promotes interprofessional teamwork and knowledge exchange.
- **SRTs can focus on communities in response efforts.** During COVID-19, having direct contact with community members through telephone calls presented an opportunity for the UNMC SRT to help health departments better serve rural and marginalized populations. This contact also facilitated the

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dissemination of health information in various languages, given that some volunteers are multilingual or are willing to serve in their home communities. After volunteering with communities that were more severely affected by the challenges of COVID-19 and chronic disease in tandem, some volunteers raised concerns about addressing social determinants of health and health disparities at the early stages of emergency response. In the future, SRTs could undertake more long-term and preventive postures in lieu of their response activities. Accordingly, community ties should be maintained beyond emergencies, and their perspectives should be the focus when planning training and response activities. For example, training sessions could include risk communications specific to managing chronic disease and comorbidities in emergencies.

- **Strategies to improve and sustain SRTs.** Following the example set by North Carolina's Epi-Aid (2), SRTs are recommended to evaluate their efforts across the breadth of recruitment, training, and volunteer activities. When not responding to a public health emergency, SRT members can participate in planning and evaluation efforts that provide yet another opportunity for students to practice foundational public health competencies.

The UNMC SRT provides early evidence on how students can increase the public health personnel resources of local health departments, particularly during periods considered a national emergency. This commentary provides insight into ways to prepare public health students, integrate students into the workflow of health departments, and evaluate the contributions of students in achieving overall program goals. Lesson learned from the UNMC SRT experience can serve as a foundation that other academic institutions can adopt to meet the needs of both their students and collaborating health departments.

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Tables

Table 1. Student Response Team Training and Deployments, University of Nebraska Medical Center, 2020

Area of Focus	Competencies/Skills	Training Frequency	Historical Deployments
Epidemiology outbreak	Assisting health departments with <ul style="list-style-type: none"> • Contact tracing • Symptoms monitoring (Research Electronic Data Capture [REDCap]; Vanderbilt University) • Social media monitoring 	One-hour training, once a semester	2020 COVID-19 pandemic response
Points of dispensing	Assist with mass dispensing or immunization clinics	One-hour training, once a semester	Mass testing of students for latent tuberculosis in 2016 after a positive case was identified at a local school
Digital response	Systematic monitoring of social media during natural disasters (eg, hurricanes): <ul style="list-style-type: none"> • Data mining • Data verification • Geo-mapping 	One-hour training, once a semester	Assisted with monitoring social media for distress calls in the Houston area during Hurricane Harvey in 2017

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Table 2. Health Department Requests for Student Response Team Assistance During Coronavirus Disease 2019 (COVID-19) Response, Nebraska, 2020

Requesting Organization	Type of Assistance Requested	Number of Volunteers ^a
Health department 1	<ul style="list-style-type: none"> Social media monitoring and content editing 	4
Health department 2	<ul style="list-style-type: none"> Data entry into Research Electronic Data Capture (REDCap) (Vanderbilt University) Telephone assistance and routing 	3
Health department 3	<ul style="list-style-type: none"> Telephone follow-up on exposures 	5
Health department 4	<ul style="list-style-type: none"> Data entry into a simple screening tool Telephone coverage 	6
Health department 5	<ul style="list-style-type: none"> Active monitoring of travelers and positive confirmed cases Daily (2 times) check-in for symptoms for any traveler or positive confirmed cases 	2
Health department 6	<ul style="list-style-type: none"> Contact tracing and potential telephone triage Patient monitoring 	2
Health department 7	<ul style="list-style-type: none"> Social media monitoring and replies Data entry and analysis Education material development 	9
Health department 8	<ul style="list-style-type: none"> Contact tracing 	10
Health department 9	<ul style="list-style-type: none"> Contact tracing Social media monitoring and dissemination 	3
Health department 10	<ul style="list-style-type: none"> Contact tracing and telephone follow-up on exposure 	8
Health department 11	<ul style="list-style-type: none"> Remote assistance 	1

^a Some volunteers may have volunteered with more than 1 health department.