

“Lessons from the Frontline: Covid-19’s Impact on American Health Care.”

Written testimony submitted by Megan L. Ranney MD MPH
 Emergency physician, Rhode Island Hospital
 Professor of Emergency Medicine
 Academic Dean, School of Public Health, Brown University

I.	Introduction	1
II.	Hospitals and Emergency Departments Beyond Their Limits: Causes and Consequences	5
III.	Our Dependence on Timely Data	15
IV.	Continued Failures of Supply Chains	21
V.	Public mistrust in governmental and public health institutions	23
VI.	Solutions	28
VII.	Conclusion	34

I. Introduction

Chair Pallone, Ranking Member Rodgers, and Members of the Committee, thank you for the invitation to participate in this hearing. I am submitting this testimony on the third anniversary of the first Covid case at my hospital system. I was working in the Emergency Department that night, and have continued to work throughout the pandemic on the front lines of Covid-19 response. I am therefore honored to present this testimony from my interwoven perspectives as a practicing, board-certified emergency physician; public health researcher; academic dean of the School of Public Health at Brown University; and a mother of two school-aged children.

At each phase of the pandemic, we have confronted a new set of challenges. And, not surprisingly, as we enter this third year of grappling with this deadly virus, our nation is wrestling yet again with what comes next.

In so many ways, we are in a better space than we were a year ago, much less two years ago. The development and quick rollout of multiple vaccines and multiple therapeutics — in combination with public health measures such as masking, testing, ventilation, and social distancing — has placed us in a much stronger position than last year. Thanks to rapid scientific discovery and dissemination, the innovation of healthcare providers and public health professionals, and the intrepidity of citizen-scientists, we have rapidly expanded our knowledge about how Covid-19 spreads, how it sickens people, and its long-term consequences. Despite ever-emerging, novel variants of the SARS-CoV-2 virus, we now have a solid understanding of how to both prevent the spread and treat this airborne disease. With this knowledge, we have decreased death rates from Covid-19; have collectively committed to getting our kids back to in-person school (huge kudos to my former Governor, Gina Raimondo, who made in-person schooling possible in my state of Rhode Island in September 2020); and have made huge improvements in protecting our most vulnerable citizens. We also have improved the transparency and utility of data.

At the moment that I submit this testimony, cases, hospitalizations, and deaths from the Omicron variant are dropping rapidly. Yet - and this will be the theme of my testimony - despite immense progress, now is not the moment to declare “the pandemic is over.” Instead, we should consider this a respite - and a moment to address many of the problems that got us here in the first place.

I was honored to join the House Select Committee on the Coronavirus Crisis in May 2020 to testify about challenges with access to personal protective equipment for healthcare workers. We have, in many ways, fixed this issue. But in other ways, the situation in healthcare facilities has deteriorated to new lows. As an emergency physician, the continued lack of medical supplies and resources, in combination with the mistreatment and loss of staff, have impeded our ability to provide the best-possible care to our patients. Rates of vaccination and boosters have dropped, putting us at increased risk should a new variant emerge. Access to critically important real-time data on cases, transmission, and hospitalizations remains limited. Distrust or misunderstanding of proven prevention and treatment strategies are high. And we are facing a new wave of consequences from delayed care during the pandemic. Each of these issues has real implications for healthcare providers, the healthcare system, and most of all, for our communities. The decisions we make today will determine whether future variants of SARS-CoV-2, never mind pandemics to come, once again inflict a horrific level of illness, death, and societal dysfunction.

Our healthcare system is both a public good, a private good, and a source of national security. Our emergency departments, in particular, are a safety net, meant to provide just-in-time-treatment to protect our populace from illness and death; in fact, we are mandated by the Emergency Medical Treatment and Labor Act (EMTALA) to provide care to all, and we are the only place in the healthcare system where anyone can receive care, 24 hours a day, seven days a week, 365 days a year.ⁱ Unfortunately, Covid-19 has shown us the holes in this net. They existed long before the virus hit our soil, but have worsened over the last three years.

As an emergency physician, I cannot say this strongly enough: although I thrive on solving problems, I also know that the best solution is to keep people out of the emergency department (ED). We cannot continue to wait until a pandemic surge hits to force creation of hasty, short-term solutions to well-known underlying structural constraints. As my colleague Dr. Anthony Cirillo testified before the Senate in 2007, we need a “culture of preparedness” to effectively manage national disasters.ⁱⁱ And today — for the first time in the Covid pandemic — we have the chance to leverage what may be a fleeting window of opportunity, to create much-needed improvements in our health care and public health infrastructure, enabling us to effectively manage this pandemic and prevent those to come.

We must start by acknowledging and addressing: (1) first and foremost, the profound impact of Covid on accelerating pre-existing staff shortages, resultant hospital and ED overcrowding, and the effect of these shortages on providers, patients, and communities alike; (2) the interdependence of our healthcare system with our public health infrastructure, and, in particular, the danger presented by a dearth of accurate, timely, and actionable data to inform our pandemic response (whether in prevention or treatment); (3) the continued dependence of the healthcare system’s supply chain on other sectors, and the degree to which limitations in this supply chain continue to impede care; and (4) the effect of public mistrust in governmental and public health institutions on prevention, treatment, and frontline healthcare workers; and the necessity of proactive community engagement, a commitment to equity in access to and understanding of treatments, and a responsible dialogue with the American public to accommodate their dynamic needs.

I am therefore honored to testify about the very real continued effects of Covid-19 on our healthcare systems and providers, particularly the emergency care system; to describe its effects on our patients and communities; and to outline a path forward to both improve care today and tomorrow.

II. Hospitals and Emergency Departments Beyond Their Limits: Causes and Consequences

This was my discussion with my charge nurse on a Friday evening this January: “Right now I am 10 nurses short and I have to close down multiple assignments. I've been begging people to stay all day long, offering double time and double incentives, but the nursing staff is very burnt out. They don't want to pick up any more. So that's what I'm working with right now. They're having the same problem on the floor...the inpatient gets capped off because of nursing ratios, so they close beds in the hospital, and it trickles down to the emergency department...”

As I write this testimony, almost two months later, Covid cases may have decreased - but the underlying staffing shortages continue. Although national health care staff shortages and emergency department overcrowding are not a new problem, the Covid-19 pandemic accelerated the trend, leading to huge problems in patients' and communities' ability to access timely, high-quality care.

IIA. Causes of Staffing Shortages

The US Bureau of Labor Statisticsⁱⁱⁱ estimates that the healthcare sector has lost nearly half a million workers since the start of the pandemic in February 2020 (this number does not

include the number of people who have stayed in healthcare, but moved from bedside care into administrative positions). A survey from Morning Consult found that 18 percent of healthcare workers have quit since the pandemic began, while another 12 percent have been laid off (many of them early in the pandemic, when overall hospital volumes decreased).^{iv} Resultant staffing shortages affect not just emergency departments like mine, but also inpatient care, operating rooms, clinics, nursing homes, skilled nursing facilities, first responders, primary care offices, and more.

Current staffing shortages are caused by a combination of factors. The first, and most important of these factors, is the mental and emotional effect of repeated Covid-19 surges on health care providers: doctors, nurses, and the people who work with them.

Burnout among healthcare providers, like many problems that I will highlight in my testimony, existed prior to the pandemic, but has worsened over the last two years.^v More than 75 percent of US physicians^{vi} and 40 percent of nurses^{vii} had already reported at least some symptoms of burnout prior to the pandemic. Since the beginning of Covid-19, rates skyrocketed among many specialties; in particular, the proportion of emergency physicians experiencing burnout increased from 43 to 60 percent.^{viii} The emotional exhaustion and depersonalization that typify burnout both affect the individual healthcare provider, and hurts the quality of patient care.^{ix}

In addition to high rates of burnout and general exhaustion, hospital staff are reporting “moral injury” — a concept that originated in studies of soldiers at war, and that is defined as

“perpetrating, failing to prevent, or bearing witness to acts that transgress deeply held moral beliefs and expectations [that] may be deleterious in the long-term, emotionally, psychologically, behaviorally, spiritually, and socially.”^{x, xi} Physicians, nurses, emergency medical technicians, and others have experienced this “moral injury”, as they have repeatedly been unable to care for patients as they have been trained to do - due to lack of supplies, lack of beds, or lack of treatments. Unfortunately, the causes of moral injury – and its terrible impacts – continue. As a nurse told me recently, describing working in the ED: *“You kind of feel like you’re in front of the firing squad. It feels like the entire hospital is resting on your shoulders, because we don’t get to close our doors. The ED gets the brunt of it as far as the amount of people.”*

Correspondingly, physicians, nurses, and other healthcare professionals are reporting skyrocketing rates of mental distress. Even prior to the pandemic, physicians faced one of the highest suicide rates in the country^{xii}, with one physician on average taking their own life every day.^{xiii} This has only gotten worse. A recent survey from the American Hospital Association found that six in every ten healthcare workers reported that their mental health had been harmed due to the pandemic.^{xiv} A study from December 2021 reported that more than one-third of surveyed doctors, nurses, and first responders had symptoms of post-traumatic stress disorder.^{xv} Additional surveys between fall 2020 and winter 2021 reported that 75 percent of healthcare workers had symptoms consistent with depression and 50 percent were planning to leave the profession.^{xvi} According to another survey, another 30 percent currently report that they are considering leaving their profession in the near future due to the distress that they sustained during the pandemic.^{xvii}

As one emergency department nurse from New York told me: “I’ve wrapped [untold] bodies. When I’m assigned 20 patients, I have old, sweet patients who lay in their feces for hours and ask me really kindly (which you know in the emergency department is rare) to clean them but I can’t because someone is in [supraventricular tachycardia] or a stroke note is coming or someone needs something more essential. I got into this too because I genuinely care about people. Having so many months of having up to 30 patients at a time, I’m a shell of a person. Did you know a [hospital redacted] nurse walked off his shift recently and they found his body in the River? They have not ruled it a suicide but ask any nurse — we know it was.”

Another cause of departures is workplace violence. Over the course of the pandemic, rates of patient and family violence against health care workers have reportedly increased. Even prior to the pandemic, 47 percent of emergency physicians and 74 percent of emergency nurses reported having been personally assaulted in the emergency department.^{xviii, xix} But according to a study of an academic emergency department during early Covid waves, when the number of Covid patients increased, the number of workplace violence incidents also increased^{xx}. In a survey conducted in September 2021, 31 percent of all nurses reported an increase in workplace violence during the pandemic.^{xxi} Multiple studies - as well as personal experience - suggest that the mis- and dis-information that has sadly propagated throughout our communities is a contributing factor.^{xxii} My colleagues across the country have had patients spit at them, bite them, scratch them, punch them, throw things at them, and worse, often after giving a diagnosis of Covid-19.

The second cause of staff shortages is retirement — again, an issue that was brewing prior to Covid-19, but that has been hastened by the pandemic.^{xxiii} Among nurses, 500,000 nursing retirements are expected by 2022^{xxiv}, which will leave the country with a nursing shortage of approximately 1.1 million.^{xxv} The United States will need 158,000 nurse graduates every year for the next decade to compensate for these retirements.^{xxvi}

The third cause is that nurses and other support staff have left their primary site of practice for better-paid travelers' positions.^{xxvii} Although I would never begrudge a fellow healthcare provider the ability to be adequately compensated for their work, their departures leave massive holes in the systems that they leave - and provide an expensive band-aid to the systems to which they travel to temporarily join.

IIB. Consequences for Patients and Providers

The consequences of these staff shortages are far-reaching. The frustrating part, for me and other healthcare providers, is that they were predictable.

In my own state, Rhode Island, we have been operating for months under extreme conditions due to a combination of staffing shortages and rising numbers of hospitalized patients. Since December 2021, we have been performing below normal standards of care, due to lack of staff and rising numbers of sick hospitalized patients.^{xxviii} During the Omicron surge in January 2022, Kent Hospital — a community hospital close to the town where I live — had only enough medical personnel to staff 199 of their 350 inpatient beds.^{xxix} Their emergency department was operating with fewer than half of the nurses they had normally. The result was long waits for

emergency department evaluation, insufficient ability to triage patients, insufficient ability to treat pain, and potential harm to patients (as well as worsening moral injury for those still working). To quote Dr. Dina Himelfarb, the President of the Rhode Island American College of Emergency Physicians, “*Imagine patients dying while waiting to be seen by a doctor who is 50 feet away and, because of lack of staff and thus capacity, [the doctor is] simply unable to treat them,*” Himelfarb wrote. “*This is a true tragedy that is currently unfolding for citizens of Rhode Island.*”^{xxx}

Although I am most personally familiar with these staffing shortages and their effects in my home state, similar situations exist across the United States.^{xxxi} Rural communities have been disproportionately affected: prior to the Delta wave, rural regions made up 60 percent of areas facing shortages of health professionals.^{xxxii, xxxiii} Prior to the Omicron surge, hospitals in Louisiana said they needed at least 1,000 more nurses to address staff shortages. None of these shortages were addressed in a sustainable fashion.^{xxxiv} Due to staffing shortages, as of January 2022, more than 6,000 National Guard members had been called to provide direct support to hospitals, care centers and other medical facilities across all 50 states.^{xxxv} This support was not limited to patient care; it also filled gaps in areas like patient transport and security, which are equally critical parts of the healthcare system’s infrastructure.

A key thing to understand here is that a well-functioning emergency department, clinic, or operating room works similar to a military battalion or airplane flight crew – losing well-trained team members slows down our process, increases the likelihood of errors, and reduces job satisfaction. So the departure of each team member has huge negative downstream effects.

Better teamwork can save nearly \$3.50 per ED patient visit, dramatically reduce errors by a factor of more than seven (from 30.9 percent to 4.4 percent), and improve staff satisfaction and reduce burnout.^{xxxvi} But training physicians, nurses, certified nursing assistants, emergency medical technicians, and unit assistants to work as a team takes time. For example, most emergency departments require at least two years of experience prior to allowing new graduates to work in the ED. Trust among team members is created over weeks and months, not hours.

Moreover, every missing staff member has a “knock on” or domino effect on other parts of the healthcare system. If there are shortages in nursing homes or home healthcare agencies, the hospital is affected; and vice versa. For example, some patients admitted to the hospital stay for far longer than medically necessary because of lack of nursing home beds; this extended stay has negative consequences for that patient, as well as for patients in the emergency department waiting for beds upstairs.^{xxxvii} In turn, lack of home healthcare services restricts nursing homes’ ability to discharge patients home: at one home health agency, they turned down 20 percent of referrals due to shortages.^{xxxviii}

As tertiary care centers get crowded due to patients being admitted faster than discharged, they stop being able to safely accept patients who need to be transferred from outlying hospitals. For example, a fellow emergency physician working in a rural emergency department in the Midwest had a patient suffer cardiac arrest after waiting for hours in the waiting room for care. She was able to resuscitate him from near-death, but he then needed a higher level of care than she could provide. She had to call more than 20 other hospitals to find someplace with space for

her critically ill patient. These efforts were necessary, to save this patient's life — but took her away from the bedside of countless other patients, who also needed her.

In an attempt to maintain hospitals' ability to provide emergency care despite increased hospital bed utilization and decreased staffing, healthcare systems across the country - ranging from Wisconsin, to Illinois, to New York - restricted or stopped non-emergency procedures during Covid surges.^{xxxix xl xli} These are not cosmetic, but rather are procedures such as colonoscopies, heart surgeries, and brain surgeries. These decisions were not made lightly - they have enormous financial consequences for hospitals as well as negative effects for patients. To protect patient confidentiality, I am paraphrasing a surgeon who talked to me about the impact of closures of these surgeries on his patients: *“A patient had a mass found during an ED visit. It was likely cancer, but we couldn't be sure. It wasn't life-threatening at the moment, but if left for too long, it would grow, causing permanent damage to vital organs. And if it was indeed cancer, it needed to be removed as soon as possible, to reduce the risk of spread. Because of staffing shortages the surgery wasn't possible. There weren't enough hospital or ICU beds — too many were taken up with Covid patients and other serious illnesses. The ORs were being saved for the very worst traumas and immediately life-threatening emergencies. We knew that the surgery would likely need to be delayed for a month, or maybe longer. In the meantime, we could only offer the patient medicine that would reduce the pain and swelling, and a promise that we'd fit them in 'as soon as possible'. Everyone thinks that elective surgeries aren't important. But they are.”*

We need to face the truth that the ability of emergency departments to provide timely, high-quality care for patients is impaired, even as Covid surges recede. Over the course of the pandemic, average United States ED wait time has increased from about 22.4 minutes prior to the pandemic, to 62 minutes in 2021.^{xlii} These delays in care have harmful health consequences for patients and providers alike. Emergency department overcrowding was already an issue before the pandemic, but as of August 2021 (despite most EDs not being in the midst of a Covid surge), 83 percent of chairs of emergency departments reported that boarding [the retention of admitted patients in emergency department beds, due to lack of an inpatient bed] was “worse” and one third reporting it was “much worse”. Although some of this overcrowding can be linked to inefficiencies in EDs, much of it follows as a direct consequence of the muddled economic incentives driving our health care systems, particularly tendencies to prioritize care for those patients who deliver the highest margins.^{xliii} Yet overcrowding has been linked to higher rates of severe outcomes in patients, and higher rates of physician burnout^{xliv} across multiple clinical studies.^{xlv} My colleagues and I have taken care of patients who waited for a half-dozen hours in the waiting room before being diagnosed with appendicitis, brain bleeds, and heart attacks - simply because there was no room and no staff to take care of them earlier.

Finally, there is a paradoxical effect of overcrowding on patients: when we publicize that hospitals are crowded, the number of ED visits goes down — but the number of out-of-hospital deaths from common illnesses like heart attacks, strokes, and more, goes up. Studies show that rates of at-home cardiac arrest, delayed stroke care, and other serious outcomes skyrocket during times of decreased or delayed ED utilization, including during pandemic surges.^{xlvi} Moreover, as we “return to normal”, we expect to see ED visits spike up from delayed care for previously

preventable or treatable illnesses. Over 40 percent of Americans have delayed or avoided medical care, including 12% who reported having avoided urgent or emergency care, during the pandemic.^{xlvi} These delays directly link to higher mortality rates in patients.^{xlviii} As one emergency physician from the Midwest told me this month, *“I have, on average, been telling one [patient] every shift that their cancer is back, they have cancer, or their cancer has spread. In 20 years, I’ve never had this experience.”* Unfortunately, every month delayed in cancer treatment can raise the risk of death between 6 to 13 percent.^{xlix}

A story from a local emergency department, summarized by one of the treating doctors, epitomizes the larger effects of staff shortages and hospital overcrowding - which, again, was a consequence of but will continue after Covid surges - on patients and families:

“An elderly woman with mild dementia was brought to the hospital after a fall during a Covid surge. As per protocol, she had a cervical collar on - a hard piece of plastic to keep her from moving her neck, in case of broken bones. The EMTs dropped her off; the triage nurses determined she wasn't in immediate danger; and she was transferred to a stretcher, to wait. No family member was allowed with her, because of Covid.

Unfortunately, due to overcrowding, the wait was 6 plus hours long. The patient was experiencing increasing pain from the cervical collar, but was unable to advocate for herself due to her dementia. She urinated on herself. By the time she was finally evaluated, she was agitated and in pain, and required sedation to calm her down so that the doctors could adequately examine her and administer needed tests.

What should have been a simple 1-2 hour ED visit - a good physical exam, a couple of CT scans and xrays, some pain control - turned into a day-long saga that the patient and her family are still recovering from, several months later. This case was no single person's fault - it was the fault of the overstretched system."

In sum: our healthcare system is in a crisis which has only worsened over the last 24 months. Mortality rates directly correlate with staffing levels.¹ The healthcare workers who left are not coming back. This is the moment to invest in real solutions, to keep not just our emergency services functioning, but to protect patient and community health.

III. Our Dependence on Timely Data

Although adequately supported staff are the *sine qua non* of a functioning healthcare system, more is needed. In particular, a functioning public health system demands access to information and data. We learned this early in the pandemic, when we lacked not just tests, but also data (on cases, hospitalizations, shortages of personal protective equipment). I remember, early in the pandemic, having to depend on fax to order and get results from Covid tests.

Inconsistent, inaccurate, or missing data makes it harder for our health care systems to identify what's needed and then meet those needs. This lack of information, along with the perception that information is being withheld, engenders public mistrust in the scientific community and our governmental institutions. As a result, our already overstretched medical

professionals and public health agencies remain on the back foot — being forced to adapt and improvise to make decisions with limited information.

Over the course of the pandemic, we have seen numerous nonprofits, universities, and specialty societies (e.g., American College of Emergency Physicians, Infectious Disease Society of America) step up to accomplish what should have been basic public health data functions. A few examples: The Covid Tracking Project was created by The Atlantic to provide timely data on cases and deaths.^{li} GetUsPPE, which I'm proud to have founded, originated to get front-line health care workers the protective equipment they needed, but quickly turned into the nation's leading source of data on personal protective equipment needs for non-hospital settings.^{lii} More recently, facing the absence of accurate, reliable real-time data on hospital capacity, a group of physicians and scientists created a website to track exactly hospital overcrowding.^{liii} And here at Brown University, we created and maintained the MyCovidRisk.app to help digest real-time data on Covid rates for individuals, to help them make informed decisions about the relative safety of different activities.^{liv} These are all functions that should have been - and could be - served by the federal government.

Of course, the news is not all bad. Over the last two years, federal investment^{lv} has helped us begin to create a more robust public health workforce, supply system, and data stream. In particular, the Centers for Disease Control and Prevention (CDC) and Department of Health and Human Services (HHS) have been granted access to important data streams as the virus has evolved, making many of the “citizen science” efforts listed above, unnecessary. In June 2020, the HHS issued guidance for the Coronavirus Aid, Relief and Economics Security Act (CARES)

to streamline Covid-19 laboratory data reporting.^{lvi} In specifying how and what to report, they aimed to, “track the spread of COVID-19 and identify areas that are highly impacted by the disease” on both a nationwide level as well as a state and jurisdictional level.^{lvii} Although this work was and continues to be painstaking, requiring collation of patchworked data from thousands of jurisdictions across hundreds of data platforms up to a single nationally representative file, it is transformative. Most public health professionals and physicians now rely on the CDC’s Covid Tracker pages. Unfortunately, it remains unclear whether or how even these preliminary collaborations will be maintained or retooled in the aftermath of the pandemic. What I and others deeply fear is loss of these hard-won data gains.

The CDC still has no legal authority over the direction and distribution of data flows from thousands of state public health departments; the CDC must negotiate data use agreements within each jurisdiction. When the public health emergency ceases, the CDC will lose access to data on millions of cases, hospitalizations, and more. This will have catastrophic effects on all aspects of healthcare.

As a frontline healthcare provider, I and others depend on accurate, digestible data to guide decision making about public health precautions, supply chain, and more. A few examples of how data backlogs and omissions hurt our healthcare system:

The value of high-quality, timely data on the basic epidemiology of Covid, as well as co-occurring medical and injury epidemics, cannot be overstated. If we can track increasing (or decreasing) numbers of Covid cases, as well as the situations surrounding them, we can more

quickly design and implement precision public health interventions.^{lviii} For example, with better data, we could have more quickly answered important questions such as: 1) when and how is it safe for children to return to school; 2) can people safely gather in a bar, restaurant, or religious institution; 3) should we wear masks in public spaces and outdoors, when can we safely take them off, and when should we put them back on; 4) where are PPE resources most needed?^{lix} We also can more accurately answer key questions about co-occurring disorders, such as medical problems, injury, and mental health disorders. One example among many is the debate over the relative incidence and causes of mental health crises among children. A recent analysis by the CDC suggests that pediatric ED visits for mental health emergencies were generally stable during the pandemic, although they have been increasing as pandemic restrictions are lifted, and limited access to outpatient care has caused unprecedented ED crowding; hypotheses for the reasons for the increases in certain demographics remain to be explored.^{lx} Core metrics which answer questions such as these can also warn us of new case waves, alert us to health system capacity bottlenecks, alert us to new co-occurring issues, and identify supply chain needs and shortages. Importantly, these data streams are valuable both in times of crises and in times of stability.

Local health departments are also struggling, with some terming themselves “data-rich and information-poor” because of the overwhelming volumes of Covid-related data which agencies have neither the bandwidth nor technical capacity to digest.^{lxi} Without this data and the expertise required to interpret it, I fear that we will continue to be reactive rather than proactive in identifying new variants, incipient surges, and when we can safely relax Covid mitigation measures.

Data on hospital staffing shortages and capacity issues are also much needed. Multiple physician organizations have called for “load leveling”, as described in the Office of the Assistant Secretary for Preparedness & Response’s (ASPR) Draft Guidelines for Regional Health Care Emergency Preparedness and Response Systems, as the ability to distribute patients throughout healthcare systems according to capacity.^{lxii} For example, such a load-leveling system was set up during the first surge in Massachusetts, based on unprecedented collaboration among hospital systems in the state, and has been continued in subsequent surges. This dynamic movement of patients across healthcare systems is an essential part of not just managing the end of this surge, but also preparing for new variants of Covid, or other national disasters. Currently, the HHS is tracking hospital capacity across the country, allowing for reporting of weekly capacity and admissions data, as well as inpatient bed utilization by state, but the HHS is limited in its ability to accurately track staffed beds.^{lxiii, lxiv}

Accurate data also allows us to estimate supply chain shortages, and facilitate timely and equitable allocation of vaccines and medications, as I will discuss here later. One example of how the lack of data hurts us when it comes to therapeutics: When the drug, Paxlovid, first came out, it was nearly impossible to find, and many doctors, physician assistants, and nurse practitioners were unaware of how to prescribe it. We know, from the deployment of monoclonal antibodies, that these advanced treatments often go to White and upper-income patients first.^{lxv} The HHS “treatment finder” webpage was an important step to mitigate these inequities - but more is needed, to facilitate awareness of and access to potentially life-saving treatments among not just healthcare workers but also patients with Covid symptoms.^{lxvi}

Data should also allow us to identify - and then address - structural barriers^{lxvii}, particularly those due to race, ethnicity, income, or geography. Data invisibility in minority populations has been worsened by a lack of standardized metrics on race and ethnicity, gender and sexuality, and income status.^{lxviii} The CDC currently has race/ethnicity data for only 70 percent of our nation's reported vaccinations, due to lack of reporting by states.^{lxix} According to KFF, only 35 US states holistically report vaccinations by race (for Asian, Black, White, American Indian, and Hispanic communities), and only 25 report ethnicity data.^{lxx} This invisibility is directly rooted in a history of exclusion and structural racism in our healthcare systems.^{lxxi} And ethnic minorities are not the only group suffering from data invisibility. We have also lacked high-quality national pediatric data throughout the pandemic. Even in the midst of the pandemic, while 49 states provide data on pediatric Covid cases, only 25 do so for hospitalizations.^{lxxii} Organizations such as the American Academy of Pediatrics have had to jump in and fill the void.^{lxxiii} To overcome these biases, we will need to prioritize the standardized collection of core demographics: race/ethnicity; age; sexual orientation; gender identity; and income. North Carolina has already achieved a documentation rate of over 90 percent for race/ethnicity data related to the state's vaccination efforts.^{lxxiv} This is a challenge that can be overcome.

Lastly, we must recognize that cracks in our pandemic data infrastructure are both fueled by and serve to exacerbate other structural barriers referenced throughout this testimony. A vicious cycle of information asymmetry fails to adequately represent the realities of vulnerable communities, and thus challenges the decision-making capacity of our overstretched health

professionals struggling on the ground. Even this far into the pandemic, we cannot be fully confident in where the virus is spreading, because we still lack routine, reliable testing representative of community members. This is likely particularly the case in minority communities, who still lack access to local testing facilities and high-quality hospital care.

Again, we know what we need to do. Now is the moment to create the systems that help us to do it - to protect all of us from future pandemics.

IV. Continued Failures of Supply Chains

As I highlighted for the Congressional Briefing on Heroes of Coronavirus Response for the House Select Committee on the Coronavirus Crisis in May 2020, when our nation first needed Covid-19 tests, PPE, and ventilators, our supply chain could not mobilize to meet national demand. The Strategic National Stockpile had yet to be replenished from the 2009 H1N1 flu pandemic^{lxxv} and only contained between 12,000 and 13,000 ventilators^{lxxvi}, many of them not meeting the requirements^{lxxvii} to treat SARS-CoV-2. When the first Covid-19 variant reached our shores, community volunteers and the “maker community” jumped in to meet our PPE production needs.^{lxxviii} Despite these admirable, local-driven efforts, distribution was still not adequate for much of the pandemic. It was shortages such as these that motivated me to take action, co-founding “GetUsPPE”, a national nonprofit dedicated to getting donated personal protective equipment to those who need it most.^{lxxix} Our organization used internally developed algorithms to connect available supplies with those in need in settings ranging from hospitals to clinics, nursing homes, and shelters.^{lxxx} We closed our doors in July 2021, once the acute crisis had passed.

However, the impact of the pandemic on supply chains that are essential to the provision of quality health care extends far beyond PPE shortages in hospitals. We face new and worsening supply shortages in key therapeutics and laboratory equipment for both Covid and non-Covid related care. The life-saving work of clinical professionals like myself is heavily affected by the repeated swings in supply for these items. One example among many: there are currently 118 drugs on the FDA's drug shortage list.^{lxxxii} As a result, we are constantly forced to substitute one preferred medication for another less preferred one. And sometimes there is no substitute. Essential medications like vecuronium (used to paralyze patients who need to be on a ventilator) and intravenous formulations of dextrose (an essential treatment for patients in a diabetic crisis, for patients who have overdosed on certain medications, or for patients in cardiac arrest or with acute kidney failure) are in short supply. Instead of using our standard medications, we are forced to substitute. This presents a very real danger of errors during the provision of critical care - and often means that patients are forced to accept less effective medications.

We face similar shortages of disposable and durable medical equipment. In September 2021, equipment like exam tables, heart defibrillators, crutches, and IV poles were reported to take up to five months to reach their destination, according to Reuters.^{lxxxiii} The testing shortage our nation experienced in early January 2022 continuously impacted the ability of labs and hospitals, including my own to conduct tests for Covid and non-Covid illnesses.^{lxxxiii} Other shortages included supplies for sexually transmitted infection testing, detection of routine bacteria like strep throat, and mycobacteria testing (including tuberculosis). The uncertainty of this pandemic has resulted in large swings of domestic and global demand, and our supply networks are not yet up to the task. This has contributed to larger, connected issues of rationing

health care and healthcare staffing shortages — and induces stressful environments for medical practitioners who lack the tools they need to administer care.

An important part of the problem is our cultural and social conception of the medical system. We have treated the medical supply chain as any other part of the US economy. It is not. Our medical infrastructure, more so than any other sector, should be a concern of national security and health. We must place the same weight on healthcare systems as we do on the military and defense, or energy and utilities. We must move from a just-in-time system to a preventative one, a system that is resilient and agile rather than reactive and stagnant. Importantly, we must make these changes to supply practices and the physical environments of our supply chains while also improving the necessary hard and soft infrastructure to support them.^{lxxxiv} This means embracing data-driven, digital solutions for end-to-end supply chain management, and investing funding into the training and recruitment of high-skill laborers who work in and manage these systems.

V. Public mistrust in governmental and public health institutions

“We are a pediatric clinic and treat everyone who comes through the door. One of the frustrations has been parents not taking COVID seriously, and even lying during the screenings, putting our high-risk team members at risk. We’ve had universal masking policies since day one, but have had incidents that even required security due to adults refusing to follow our clinic rules. I have a few high-risk kids whose parents disagree about whether to vaccinate them, and the cases are going to court, putting the kids at risk in the meantime. Thankfully, I haven’t had any patients die, but one teenage patient ended up with severe complications of COVID and

extensive hospitalization; his parents didn't believe in the vaccine. His life has been changed forever." - A pediatrician working in the Rocky Mountain West

Covid itself, as well as the policies and practices it demanded (masks, social distancing, vaccines, and so on), have become increasingly politicized as the pandemic progressed -- encouraging mis- and disinformation and deeply cutting public trust in health care and Covid prescriptions. This increasing politicization, misinformation and mistrust has had a deep impact on healthcare workers, public health, and the quality of care provided.

In spring 2020, healthcare workers were celebrated as healthcare heroes, with frequent public displays of appreciation. Nearly two years later, healthcare workers find themselves questioned, underappreciated, targets of verbal and physical abuse, and struggling to understand the behavior of our fellow Americans unwilling to follow basic mitigation measures during Covid surges. We find ourselves spending time combating misinformation instead of treating disease. This increasing mistrust is adding insult to injury for an already demoralized workforce.

Today, only 34 percent of Americans believe that the public health system adequately protects us from health threats – an almost 10 percent decrease compared with 2009.^{lxxxv} Only half of Americans have a positive view of key public health institutions (including the CDC, FDA, and the National Institutes of Health). Around eighty-five percent of Americans trust their physicians and nurses - but the public's trust in the healthcare system, itself, has eroded during the pandemic.^{lxxxvi}

How our leaders communicate plays a key role in building or breaking trust. Unfortunately, many prominent politicians, celebrities, and other public figures have chosen to spread misinformation instead of accurate data. They frequently trivialize the risks of Covid^{lxxxvii}, question the safety of vaccines^{lxxxviii}, and promote unproven treatments (for example, ivermectin).^{lxxxix} Misinformation from these sources represents about 20 percent of false statements that circulate in our information environment, according to a Reuters Institute study – but they make up for 69 percent of total engagement.^{xc} Many, many people are paying attention to what prominent misinformers are saying.

If these public figures choose to share misinformation, the impact is felt acutely by those of us in health care: three-quarters of healthcare workers say that misinformation negatively influenced both patients’ decisions to get vaccinated against COVID-19, and patient care.^{xcii} Indeed, studies suggest that misinformation is a major driver of our country’s relatively low overall vaccination rates in the U.S., compared to other Western nations – which in turn puts a strain on our healthcare system as too many people remain vulnerable to more severe outcomes from Covid.^{xcii}

The consequences are clear to anyone who has walked a hospital floor in the past year. Our ICUs have been filled with people who decided against getting the vaccine based on low quality information and mistrust, only to fiercely regret that decision as they fall seriously ill.^{xciii} Whether our patients “just didn’t get around to it” or were vehemently distrustful of the vaccine, almost all of my unvaccinated patients - at the moment of severe illness landing them in the hospital - wished that they had made a different choice about getting vaccinated. These are

avoidable illnesses and deaths, and they are exhausting our healthcare workforce. Take the case of Tennessee radio host Phil Valentine.^{xciv} Valentine played down the risks of Covid, claiming that his chances of dying from Covid-19 were “less than one percent”, only to be hospitalized and later die from the virus in 2021. While in critical care, Valentine expressed his regret and encouraged his followers to get vaccinated.^{xcv}

Another example of the very real impact of misinformation on health: Following a misleading statement in 2020 regarding the possible use of disinfectants administered internally to treat Covid-19, for example, the CDC reported an increase in calls to poison centers regarding exposure to household disinfectants.^{xcvi} My toxicology colleagues were working overtime combatting this misinformation - again, taking them away from other patients who needed them. Information doesn't have to be accurate to change people's behavior and hurt the system.

Misinformation and dwindling trust in public health have also been tied to increasing rates of online, verbal, and even physical violence against healthcare workers.^{xcvii} In the fall of 2021, a Chicago hospital was inundated with threatening phone calls and emails after admitting a patient associated with anti-vaccine and anti-mask movements.^{xcviii} Hospital workers across the country have had to drive by anti-vaccine protests on their way to care for Covid patients.^{xcix} And many of us have been subject to targeted harassment and threats online.^c

Misinformation has also, tragically, resulted in increasing distrust from minority groups, who are often specifically targeted by disinformation agents hoping to sow mistrust. These same groups confronted (and still confront) a disproportionate burden of disease and economic loss in

this pandemic.^{ci} An entire Twitter hashtag - #BlackWhysMatter - has been created by Black physicians to try to combat misinformation and misunderstandings about Covid, Covid vaccines, and Covid treatment. As one of my fellow emergency physicians, Dr. Eugenia South, has written: “ Shaming people who have questions will not encourage uptake. Skepticism is especially salient for Black people, for whom centuries of mistreatment and harm from systems meant to serve and protect have engendered mistrust.”^{cii} Yet (as you can see at the #BlackWhysMatter hashtag) she, I, and hundreds of other healthcare professionals have stories of how respectful listening and information-sharing changes minds. One pediatrician told me a story about how an in-depth discussion with a parent led to not only her oldest kid getting vaccinated against COVID, but also the rest of the family getting their vaccines.

What we need to understand is this: Trust is easy to break and hard to regain. It is also a key driver of resilience in a pandemic. We can have the best scientific advancements, tests, vaccines and treatments, but they will not allow us to move past a crisis if people don’t trust us enough to make use of them. As physicians, we have high rates of vaccine uptake after one-on-one counseling - but this takes time and distracts from care of other patients. Better yet would be increased trust in their government and public health officials, which correlates with greater adoption of evidence-based preventative measures.^{ciii civ cv} This, in turn, leads to better options for reducing infection, mitigating surges, and preventing the breakdown of healthcare systems.

It is encouraging that many Americans still do trust their physicians and nurses^{cvi}, and are open to engage with health care providers with whom they have an established relationship.^{cvi} We also need better ways to build trust with Americans who do not currently have access to

primary care. As healthcare workers who are trained to provide quality information to people who face important decisions about their health, we understand the importance of conversation and relationships in this process; and of working with the community. To rebuild trust, and our nation's pandemic resilience overall, we need to engage deeply, as individuals and as institutions, with the people we care for.

VI. Solutions

This written testimony focuses primarily on the pandemic-related harms wrought on our healthcare system, our healthcare workers, and our communities. But the greatest harm of all has been our lack of solutions. As Americans, we have a long history of transforming crisis into opportunity, including for health and public health outcomes. Our inability to do so, despite two years of Covid-19 surges, is both our most abject failure - and our largest opportunity.

One of the most oft-cited examples of success in both emergency medicine and public health was the dramatic reduction in motor vehicle fatalities in the United States from the 1970s to today. Using a comprehensive public health approach, we first studied the patterns underlying fatal car crashes, then introduced multimodal solutions that intertwined public health and healthcare. We developed the Advanced Trauma Life Support course (ATLS)^{cviii} and a standardized verification process for Trauma Centers, to ensure that injured patients received the highest quality care.^{cix} We created the National Highway Traffic Safety Administration (NHTSA), to centralize data collection and analysis on car crashes; the Fatality Analysis

Reporting System (FARS)^{cx} and the National EMS Information System allows professionals to quickly and professionally address emerging hot spots and improve care.^{cx} We redesigned cars - requiring seatbelts and airbags - to drastically reduce on-scene injuries and deaths.^{cxii} We passed evidence-based policies, ranging from mandating seat belts to drunk driving laws.^{cxiii} Finally, we have engaged communities - working with organizations ranging from Mothers Against Drunk Driving (MADD) to the National Latino Children's Institute - to improve adherence to key safety measures, like car seats. And we change our education and our policies as causes of crashes change, such as addressing distracted driving. Through these efforts, car crash deaths have decreased by more than 70 percent over the last 50 years.

The history of health and public health tells us that we can do the same, to rebuild from the Covid-19 pandemic. A limited list of potential solutions to the problems raised in this testimony, follows:

1. **We must create a new public health data infrastructure, and intertwine it with our healthcare system.** Over the last two years, we have witnessed a new wave of innovation in data science, and a commitment to data collation jointly shared and shaped through critical private-public partnerships. These collaborations have fueled an explosion in unconventional data sources, enabling healthcare workers, policymakers, and community members to make rapid decisions in the absence of traditional, high-frequency health data. Examples of useful tools generated through these partnerships include the use of aggregated, anonymized mobility trends^{cxiv} and restaurant or event reservations^{cxv} to determine adherence to public health measures; the analysis of syndromic and vaccine-

related search trends to track behavioral patterns^{cxvi}; and the surveillance of wastewater^{cxvii} as an early warning sign to identify emerging Covid-19 hotspots. Others have focused on expanding equity in data collection and reporting, to shine a light on the holes in the healthcare system that were previously ignored.^{cxviii} **Some of this data is already being integrated into federal systems of data collection and reporting, and can form the skeleton of our future public health data infrastructure.** This data system begins with, but must go beyond, current federally reported data types.^{cxix} Importantly, it needs to be developed with an eye toward accurate measurement of not just age and gender, but also race, ethnicity, geography, and more. Access to accurate information supports all of our futures as human beings — regardless of our race/ethnicity, age, religion, gender or sexuality, political affiliation, geographical location, or income. We need good data to make good decisions. In the midst of a crisis, this data may translate to millions of additional lives saved. And in a moment of recovery, this data can inform transformative policies which seek to address the other structural barriers and inequities referenced throughout this testimony.

2. **Healthcare workers need mental health support on an individual level - and need to remove restrictions and stigma around accessing behavioral health care.** The Dr. Lorna Breen Health Care Provider Protection Act (H.R. 1667) was a critical step forward. We also need nationwide changes in medical licensing laws^{cxx} and credentialing procedures, so that physicians and other healthcare professionals do not have to fear that seeking help will endanger their job. Innovative treatment modalities, such as Penn Medicine's COBALT platform, may further reduce stigma and improve access to

treatment.^{cxxi} Of note, **some of these innovations for healthcare workers may be applicable to the general population**, who are also dealing with unprecedented stress and anxiety after the loss of children, parents, and neighbors to this pandemic. We could have created these supports early in the pandemic^{cxxii}, but now is better than never.

3. **Systemic fixes to the healthcare system** are desperately needed, as the preponderance of evidence shows that individual level interventions are insufficient to reduce burnout or overcrowding. Maintaining nursing staffing ratios should be a minimum standard for hospitals.^{cxxiii cxxiv cxxv} Other evidence-based strategies can be used to decrease well-known factors that drive healthcare provider burnout.^{cxxvi} Supporting healthcare workers' right to a violence-free workplace, such as Representative Joe Courtney's "Workplace Violence Prevention for Health Care Workers and Social Service Workers" (HR 1195), is also essential.^{cxxvii} Forward-thinking investments in our emergency care system, such as have been outlined by ASPR^{cxxviii} and others, are also essential to ensuring that we have a resilient system that can adequately respond to future Covid surges or other disasters. Federal support for tracking and ensuring access to key supplies - ranging from medications to personal protective equipment - is needed to protect healthcare workers and the American public during future variants or other disasters. The Murray-Burr Bill currently under consideration by the Senate HELP committee is a strong, but still incomplete, element of these changes.^{cxxix}
4. We must **invest in training all types of healthcare workers** (physicians and resident physicians, nurses, but also other much needed professions including but not limited to

certified nursing assistants, social workers, and emergency medical technicians). Bills such as the Future Advancement of Academic Nursing Act (FAAN Act) can support nursing programs in schools to increase the number of nursing faculty and students.^{cxxx} Expansion of federally-funded residency spots for physicians-in-training is essential to meeting the workforce needs for physicians. We must also retain those already on the job.^{cxxxi} **Forgiving student debt** from health-care workers fighting Covid-19 may also help retain existing, trained staff. US medical students and physicians have on average a \$200,000 debt when they finish school.^{cxxxii} Congresswoman Carolyn Maloney introduced the Student Loan Forgiveness Front Line Healthcare Workers Act to establish a federal and private student loan forgiveness program, depending on how big a contribution has been made depending on the hours a healthcare worker has worked, the care they have given to patients and the medical research on Covid-19 they have contributed to.^{cxxxiii} The Bill is in the introduction stage, but it could provide much-needed relief to healthcare workers who have spent 2+ years at the frontlines.

5. As patients who have chosen or been forced to delay care, begin to seek treatment again, we must **ensure that all Americans continue to have access to needed prevention and treatment services, whether for physical or mental health.** In addition to shoring up staffing and data, American Rescue Plan-funded investments in National Health Service Corps, Nurse Corps, and Substance Use Disorder Treatment and Recovery programs - providing scholarship and loan repayment funding for healthcare graduates in exchange for a service commitment in hard-hit and high-risk communities - are helpful in improving access to care in underserved communities.^{cxxxiv} So are programs like the

Covid-19 Community Corps.^{cxxxv} American Rescue Plan-funded subsidies of health insurance and of healthcare providers were critical to allowing Americans to access much-needed care in the first two years of the pandemic.^{cxxxvi} Unfortunately, many of these innovative programs are slated to expire, just as we face dramatic upswings in care needs; their refunding is therefore critical to Americans' health, and to my ability to care for them. This moment also demands that we continue to invest in **new models of healthcare and public health** that can permanently improve health for all. Telehealth, digital health, and innovative community-based care modalities allow patients to access prevention and treatment services in a timely fashion, when designed and implemented in ways that enhance equity.^{cxxxvii} These new forms of treatment can unburden emergency departments, extend the limited workforce, and help patients avoid long trips, long waits, or potential exposures to Covid-19.

6. Finally, rebuilding our healthcare system requires **rebuilding trust**.^{cxxxviii} Numerous solutions exist - most of all, around improving communication, equity, and community involvement. We must also ensure that those very few healthcare providers who are active purveyors of misinformation (often to their own financial benefit) are appropriately disciplined.^{cxxxix} And we must develop community-centered public health campaigns, using the medium and the messengers that are most trusted.

VII. Conclusion

Every American wants to be able to show up in an emergency department and get timely, appropriate care, regardless of the problem that brought them there. Right now, most can't. Let's get back there.

As I wrote last month,^{cxl} *“There’s an old adage in public health about a village by a river. Every few days, the story goes, villagers hear cries for help coming from the river and pull out people who are drowning. This cycle repeats itself, over and over. The village builds floats; it trains search and rescue teams. But as time passes, people continue to drown, and it feels like an impossible battle to win. Some people in the village start to say, “We should just let them drown.” Arguments ensue, until one day they realize the drowning people are all coming from rapids upstream. When villagers put up a sign warning boaters about the rapids, boats stop capsizing — and drowning passengers stop drifting down into the village.”*

Throughout the pandemic, we have relied too heavily on stopgap solutions — on the floats and rescue teams — instead of issues at the source: the rapids upstream. To move forward - within the context of the Covid-19 Pandemic as well as society as a whole - is to think bigger.

So what does a more resilient American emergency care, public health, and healthcare system look like?

It is one that not only addresses the immediate problems that have been made apparent during this pandemic, but one that also addresses the fundamental issues - of staffing and systems, data, supply chains, equity, and community engagement - that plague our systems. Within the context of healthcare staffing - one that not only ensures proper staffing when needed, but also seeks to guarantee that such staffing shortages are no longer possible, and that approaches emergency care as the public good that it is. One that treats the healthcare supply chain with utmost importance; that provides a robust and transparent data ecosystem. A public health and healthcare environment that puts communities at the forefront of its strategy, and enables us to not just treat, but also prevent, disease, injury, and illness.

By investing our time and resources to implement these practices and establish a sustainable and resilient American public health and healthcare system, we work to address the issues ‘upstream’ and ensure more effective means of addressing crises as they arise, during the Covid-19 pandemic and beyond. We are entering our third year of this pandemic. Let’s work to ensure that there’s not a fourth.

ⁱ <https://www.cms.gov/Regulations-and-Guidance/Legislation/EMTALA>

ⁱⁱ <https://www.govinfo.gov/app/details/CHRG-110hhrq48967>

ⁱⁱⁱ <https://www.theatlantic.com/health/archive/2021/11/the-mass-exodus-of-americas-health-care-workers/620713/>

^{iv} <https://morningconsult.com/2021/10/04/health-care-workers-series-part-2-workforce/>

^v <https://www.usnews.com/news/health-news/articles/2021-11-15/us-faces-crisis-of-burned-out-health-care-workers>

^{vi} <https://thehill.com/opinion/healthcare/572905-to-support-physicians-mental-health-we-need-a-systemic-overhaul?rl=1>

^{vii} <https://www.myamericannurse.com/my-nurse-influencers-the-dauntless-nurse-nurse-burnout/#:~:text=A%20recent%20study%20by%20the,change%20because%20they%20are%20impersonal.>

^{viii} https://www.medscape.com/slideshow/2022-lifestyle-burnout-6014664?uac=85323SN&faf=1&sso=true&impID=3962382&src=wnl_physrep_220122_Burnout2022

^{ix} <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8237033/>

^x <https://www.cnn.com/2020/11/18/opinions/health-care-workers-covid-19-burnout-ranney-gold/index.html>

-
- xi <https://pubmed.ncbi.nlm.nih.gov/19683376/>
- xii <https://www.washingtonpost.com/lifestyle/2020/10/06/doctor-suicide-coronavirus-covid/>
- xiii <https://thehill.com/opinion/healthcare/572905-to-support-physicians-mental-health-we-need-a-systemic-overhaul?ri=1>
- xiv <https://www.aha.org/fact-sheets/2021-11-01-data-brief-health-care-workforce-challenges-threaten-hospitals-ability-care>
- xv <https://link.springer.com/article/10.1007/s11606-021-07252-z#Sec7>
- xvi <https://link.springer.com/article/10.1007/s11606-021-07252-z>
- xvii <https://www.aha.org/fact-sheets/2021-11-01-data-brief-health-care-workforce-challenges-threaten-hospitals-ability-care>
- xviii <https://www.emergencyphysicians.org/globalassets/files/pdfs/2018acep-emergency-department-violence-pollresults-2.pdf>
- xix <https://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-18-2013/No1-Jan-2013/Stressful-Incidents-of-Physical-Violence-against-Emergency-Nurses.html#Table1>
- xx <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8457914/>
- xxi https://www.nationalnursesunited.org/sites/default/files/nnu/documents/1121_WPV_HS_Survey_Report_FINAL.pdf
- xxii <https://jamanetwork.com/journals/jama/fullarticle/2779310>; <https://khn.org/news/article/are-you-going-to-keep-me-safe-hospital-workers-sound-alarm-on-rising-violence/>
- xxiii <https://www.npr.org/sections/health-shots/2022/01/06/1069369625/short-staffed-and-covid-battered-u-s-hospitals-are-hiring-more-foreign-nurses>
- xxiv <https://fortune.com/2021/05/18/nurse-shortage-retirement-crisis-covid-training-leadership/>
- xxv <https://fortune.com/2021/05/18/nurse-shortage-retirement-crisis-covid-training-leadership/>
- xxvi <https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/22/vice-president-harris-announces-historic-funding-to-bolster-equitable-health-care-during-pandemic-and-beyond/>
- xxvii <https://www.npr.org/sections/health-shots/2022/02/11/1077687493/for-travel-nurses-jobs-at-home-cant-come-close-to-pay-they-get-on-the-road>
- xxviii <https://www.bostonglobe.com/2021/12/27/metro/mckee-issues-executive-order-protecting-hospitals-health-care-workers-civil-damages/>
- xxix <https://www.washingtonpost.com/health/2022/01/19/covid-emergency-room-omicron/>
- xxx <https://www.bostonglobe.com/2021/12/18/metro/ri-health-care-system-is-currently-collapsing-emergency-doctors-warn/>
- xxxi <https://www.latimes.com/california/story/2022-01-18/strain-of-covid-surge-turns-scheduling-at-california-hospital-into-frustrating-game-of-tetris>; <https://www.candgnews.com/news/staffing-concerns-covid19-continue-to-put-strain-on-emergency-medical-service-personnel-122759>; <https://www.wpbf.com/article/florida-hospital-association-calling-for-more-resources-help-strained-health-care-systems/38760728#>; <https://www.local10.com/news/local/2022/01/03/staffing-shortage-amid-covid-surge-shuts-down-labor-and-delivery-unit-at-holy-cross-health/>; <https://www.thenewstribune.com/news/coronavirus/article257289597.html>
- xxxii <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2021/09/01/rural-hospitals-cant-find-the-nurses-they-need-to-fight-covid>
- xxxiii <https://www.cms.gov/files/document/fy-21-improving-health-rural-communities508compliant.pdf>
- xxxiv <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2021/09/01/rural-hospitals-cant-find-the-nurses-they-need-to-fight-covid>
- xxxv <https://www.nationalguard.mil/News/Article/2900042/national-guard-helps-medical-facilities-with-covid-19-peak/>
- xxxvi [https://pubmed.ncbi.nlm.nih.gov/10459096/#:~:text=An%20average%20of%208.8%20teamwork,quality%](https://pubmed.ncbi.nlm.nih.gov/10459096/#:~:text=An%20average%20of%208.8%20teamwork,quality%20)

- [2C%20and%20reduce%20litigation%20risks;](https://pdfs.semanticscholar.org/dc75/49411d78848447947287b8b6bdab4de17e2b.pdf)
<https://pdfs.semanticscholar.org/dc75/49411d78848447947287b8b6bdab4de17e2b.pdf>
- xxxvii <https://www.forbes.com/sites/howardgleckman/2022/02/17/how-nursing-home-staff-shortages-are-hurting-hospital-care/?sh=2b24736437eb>
- xxxviii <https://www.forbes.com/sites/howardgleckman/2022/02/17/how-nursing-home-staff-shortages-are-hurting-hospital-care/?sh=2b24736437eb>
- xxxix <https://www.nbc15.com/2022/01/06/madison-health-systems-postpone-non-emergent-surgeries-amid-peak-capacity/>
- xl <https://www.wglt.org/local-news/2021-12-30/pritzker-urges-hospitals-to-delay-non-emergency-surgeries-as-mclean-county-sets-new-covid-records>
- xli <https://www.fiercehealthcare.com/hospitals/hospitals-postpone-elective-surgeries-amid-omicron-surge>
- xlii <https://health.usnews.com/health-care/patient-advice/articles/2018-10-26/why-do-i-have-to-wait-so-long-to-be-seen-in-the-emergency-room!>; <https://www.boston25news.com/news/local/25-investigates-patients-waiting-12-hours-be-seen-some-ma-hospital-emergency-rooms/ZGPCDGHGNEJZIDPGWF7BXGF5A/>
- xliii <https://catalyst.nejm.org/doi/full/10.1056/CAT.21.0217>
- xliv [https://www.mayoclinicproceedings.org/article/S0025-6196\(18\)30938-8/fulltext;](https://www.mayoclinicproceedings.org/article/S0025-6196(18)30938-8/fulltext;)
<https://www.sciencedirect.com/science/article/abs/pii/S0736467911011486>
- xlv <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203316;>
<https://www.sciencedirect.com/science/article/abs/pii/S0736467915005235;>
<https://link.springer.com/article/10.1007/s11739-011-0702-8;>
<https://www.sciencedirect.com/science/article/abs/pii/S019606440900239X;>
<https://catalyst.nejm.org/doi/full/10.1056/CAT.21.0217>
- xlvi <https://www.cidrap.umn.edu/news-perspective/2020/06/studies-note-more-home-heart-attacks-delayed-ed-visits-pandemic>
- xlvii https://www.cdc.gov/mmwr/volumes/69/wr/mm6936a4.htm?s_cid=mm6936a4_w;
https://www.cdc.gov/mmwr/volumes/69/wr/mm6936a4.htm?s_cid=mm6936a4_w
- xlviii [https://www.bjanaesthesia.org/article/S0007-0912\(17\)30523-8/fulltext](https://www.bjanaesthesia.org/article/S0007-0912(17)30523-8/fulltext)
- xliv <https://www.bmj.com/company/newsroom/every-month-delayed-in-cancer-treatment-can-raise-risk-of-death-by-around-10/>
- I
- <https://www.sciencedirect.com/science/article/pii/S0020748921000936#:~:text=Results,%25%20CI%201.07%E2%80%931.13%5D;> [https://www.bjanaesthesia.org/article/S0007-0912\(17\)30523-8/fulltext](https://www.bjanaesthesia.org/article/S0007-0912(17)30523-8/fulltext)
- li <https://covidtracking.com/analysis-updates/inside-the-covid-tracking-projects-volunteer-organization>
- lii <https://getusppe.org/>
- liii <https://alexanderjxchen.github.io/circuitbreaker/>
- liiv <https://mycovidrisk.app/>
- liv <https://www.nejm.org/doi/full/10.1056/NEJMp2104881>
- lv https://www.cdc.gov/csels/dls/locs/2020/hhs_issues_new_cares_act_guidance.html
- lvii <https://www.cdc.gov/coronavirus/2019-ncov/lab/reporting-lab-data.html#faqs>
- lviii <https://jamanetwork.com/journals/jama/fullarticle/2769563/>
- lix <https://www.sciencedirect.com/science/article/pii/S0268401221000451>
- lx <https://stacks.cdc.gov/view/cdc/114477;>
https://www.cdc.gov/mmwr/volumes/71/wr/mm7108e2.htm?s_cid=mm7108e2_w;
<https://www.cdc.gov/media/releases/2022/s0218-children-wellbeing-covid-19.html;>
https://www.cdc.gov/mmwr/volumes/71/wr/mm7108a5.htm?s_cid=mm7108a5_w&ACSTrackingID=USCDC_1228-DM76476&ACSTrackingLabel=2020%20Suicide%20Rates%20Decline%20Overall%20for%20Second%20Consecutive%20Year&deliveryName=USCDC_1228-DM76476
- lxi <https://www.healthaffairs.org/doi/10.1377/forefront.20220113.723542/>

-
- lxii <https://aspr.hhs.gov/Pages/Home.aspx>
- lxiii <https://protect-public.hhs.gov/pages/hospital-utilization>
- lxiv <https://insidemedicine.bulletin.com/omicron-broke-many-us-hospitals-why-didn-t-the-federal-government-report-that/>
- lxv https://www.cdc.gov/mmwr/volumes/71/wr/mm7103e1.htm?s_cid=mm7103e1_w&utm_source=pocket_mail
- lxvi <https://covid-19-therapeutics-locator-dhhs.hub.arcgis.com/>
- lxvii <https://covid19pvi.niehs.nih.gov/>
- lxviii <https://www.nytimes.com/2021/05/07/health/coronavirus-lgbtq.html>;
<https://www.tandfonline.com/doi/abs/10.1080/15265161.2020.1870767?journalCode=uajb20>;
<https://www.nature.com/articles/s41586-021-04198-4>;
<https://www.nytimes.com/2021/05/07/health/coronavirus-lgbtq.html>;
<https://www.tandfonline.com/doi/abs/10.1080/15265161.2020.1870767?journalCode=uajb20>;
<https://www.nature.com/articles/s41586-021-04198-4>
- lxix https://covid19mprdashboard.shinyapps.io/Rockefeller_Covid_PRPH/
- lxx <https://www.kff.org/other/state-indicator/covid-19-vaccinations-by-race-ethnicity/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>
- lxxi <https://researchdata.wisc.edu/data-equity/the-impact-of-data-invisibility-and-the-need-for-disaggregation/>; <https://www.frontiersin.org/articles/10.3389/fsoc.2021.617895/full>;
<https://www.theguardian.com/us-news/2020/apr/24/us-native-americans-left-out-coronavirus-data>;
<https://www.hcn.org/articles/indigenous-affairs-the-erasure-of-indigenous-people-in-us-covid-19-data>;
- lxxii <https://downloads.aap.org/AAP/PDF/AAP%20and%20CHA%20-%20Children%20and%20Covid-19%20State%20Data%20Report%202.17.22%20FINAL.pdf>
- lxxiii <https://www.aap.org/en/pages/2019-novel-coronavirus-covid-19-infections/children-and-covid-19-state-level-data-report/>
- lxxiv <https://www.healthaffairs.org/doi/10.1377/forefront.20220113.723542/>
- lxxv <https://www.sme.org/technologies/articles/2020/march/what-supply-chain-players-are-learning-from-the-pandemic/>
- lxxvi <https://www.centerforhealthsecurity.org/resources/Covid-19/Covid-19-fact-sheets/200214-VentilatorAvailability-factsheet.pdf>
- lxxvii <https://www.reuters.com/article/us-health-coronavirus-ventilators-insigh/the-u-s-has-spent-billions-stockpiling-ventilators-but-many-wont-save-critically-ill-covid-19-patients-idUSKBN28C1N6>
- lxxviii <https://jamanetwork.com/journals/jama-health-forum/fullarticle/2766118>
- lxxix <https://getusppe.org/>
- lxxx <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7846564/>
- lxxxi <https://www.accessdata.fda.gov/scripts/drugshortages/>
- lxxxii <https://www.reuters.com/world/the-great-reboot/covid-creates-shortages-an-array-us-medical-supplies-2021-09-20/>
- lxxxiii <https://asm.org/Articles/2020/September/Clinical-Microbiology-Supply-Shortage-Collecti-1>
- lxxxiv <https://www.brookings.edu/techstream/how-to-build-more-secure-resilient-next-gen-u-s-supply-chains/>
- lxxxv https://cdn1.sph.harvard.edu/wp-content/uploads/sites/94/2021/05/RWJF-Harvard-Report_FINAL-051321.pdf
- lxxxvi https://www.norc.org/PDFs/ABIM%20Foundation/20210520_NORC_ABIM_Foundation_Trust%20in%20Healthcare_Part%201.pdf
- lxxxvii <https://www.nytimes.com/interactive/2020/03/18/us/trump-coronavirus-statements-timeline.html>
- lxxxviii https://apnews.com/article/fact-checking-761312111015?utm_medium=APFactCheck&utm_source=Twitter&utm_campaign=SocialFlow
- lxxxix <https://www.washingtonpost.com/politics/2021/08/24/how-rights-ivermectin-conspiracy-theories-led-people-buying-horse-dewormer/>

-
- cxxv <https://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2821%2900768-6/fulltext>
- cxxvi <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6825380/>
- cxxvii <https://www.congress.gov/bill/117th-congress/house-bill/1195/text>
- cxxviii <https://www.phe.gov/Preparedness/legal/pahpa/Pages/default.aspx>
- cxxix <https://www.help.senate.gov/chair/newsroom/press/murray-and-burr-release-discussion-draft-of-bipartisan-pandemic-and-public-health-preparedness-and-response-bill>
- cxix <https://www.aha.org/fact-sheets/2021-05-26-fact-sheet-strengthening-health-care-workforce>
- cxixi <https://www.aha.org/fact-sheets/2021-05-26-fact-sheet-strengthening-health-care-workforce>
- cxixii <https://blogs.bmj.com/bmj/2021/06/03/cancelling-student-debt-in-the-us-is-one-way-to-reduce-medicines-financial-inequities/>; <https://www.thedailybeast.com/doctor-shortages-in-the-us-after-covid-are-creating-a-looming-healthcare-crisis>
- cxixiii <https://www.congress.gov/bill/117th-congress/house-bill/2418/text>
- cxixiv <https://www.whitehouse.gov/briefing-room/statements-releases/2021/11/22/vice-president-harris-announces-historic-funding-to-bolster-equitable-health-care-during-pandemic-and-beyond/>
- cxixv <https://wecandothis.hhs.gov/covidcommunitycorps>
- cxixvi <https://www.kff.org/health-reform/issue-brief/how-the-american-rescue-plan-act-affects-subsidies-for-marketplace-shoppers-and-people-who-are-uninsured/>; <https://www.hhs.gov/about/news/2021/12/14/hhs-releasing-9-billion-in-prf-payments-to-support-providers-affected-by-covid-19.html>
- cxixvii <https://www.ruralhealthinfo.org/toolkits/telehealth/2/care-delivery/specialty-care>;
<https://nam.edu/digital-health-covid-19-impact-assessment-lessons-learned-and-compelling-needs/>;
<https://www.cityblock.com/>
- cxixviii <https://abimfoundation.org/what-we-do/rebuilding-trust-in-health-care>
- cxixix <https://www.nbcnews.com/think/opinion/covid-vaccine-treatment-misinformation-medical-malpractice-it-should-be-punished-ncna1287180>
- cxli <https://www.nbcnews.com/think/opinion/how-fight-next-new-covid-variant-after-omicron-plan-it-ncna1288649>