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Featured in This Issue

What Are Preparedness Professionals Doing?
By Catherine L. Feinman5

National Preparedness Failure: Hindsight Is 2020
By Michael A. Brown6

Impact of Critical Biosecurity Reports – Uncertainty Remains
By Robert C. Hutchinson10

Post-Hazard Event Airport Recovery
By Gregory Brunelle, Chhabra Jaskanwal, et al.17

Revisiting Face Masks Near the End of a Long Journey
By David Mayfield22

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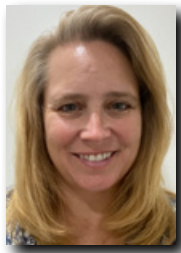
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What Are Preparedness Professionals Doing?

By Catherine L. Feinman

With all the thought, planning, and training that go into disaster preparedness efforts, communities theoretically should be ready for any threat and hazard that they face regularly – severe storms, wildfires, hurricanes, power outages, earthquakes, droughts, mudslides, etc. However, that is not always true. The Federal Emergency Management Agency (FEMA) has already recorded 37 declared disasters in various states so far in 2021. Governors often request federal assistance when their states' resources are insufficient to adequately respond to disasters.



The system generally works well when the communities in need of assistance are scattered geographically and over time. An event like COVID-19, though, changes this dynamic. When resources are depleted in numerous locations, supplies, equipment, and other support that would typically be available from mutual aid partners are no longer obtainable. This raises the demand for federal assistance. In fact, the number of declared disasters cited on FEMA's website more than tripled from 101 declarations in 2019 to 309 in 2020.

When local resources are overwhelmed, states step in to assist. When state resources are insufficient, the federal government is there to help. However, when national resources are depleted or the country lacks strong leadership, the country collectively suffers. It should not have taken a worldwide pandemic to expose the [national preparedness failures](#) that experts had warned about long before 2020. Even small operational disruptions can have significant cascading effects, as were demonstrated in the healthcare industry, [transportation industry](#), and so many others.

With [face mask](#) mandates being lifted and communities racing to return to life as it was before COVID-19, history may repeat itself – again and again if action is not taken to learn from the past in order to better prepare for the future. This pandemic is not the ultimate threat. DomPrep readers know that there can and likely will be disasters with much greater consequences if national preparedness plans, [biosecurity reports](#), and other warnings are not acted upon. Inaction leads to vulnerability.

The nation, states, communities, and individuals need to better prepare. At the individual level is where the cascading effect begins. A lack of preparedness creates an upward dependency on resources. So, the question is, what are preparedness professionals doing to prevent this burden and build resilience? To start with, absorb information – read reports, study lessons learned, review best practices, identify threats and hazards, etc. Then, do something with that information – implement plans and procedures, offer trainings, build resources, ensure compliance among various stakeholders, review and update the plans regularly, etc. Absorbing information is the easy part, which most preparedness professionals have already done. It is now time for the difficult part – do something with that knowledge.

National Preparedness Failure: Hindsight Is 2020

By Michael A. Brown

In February 2021, the Congressional Research Service released an evaluative nonpartisan report on the National Preparedness System (NPS). This report noted problems and difficulties experienced in 2020 during the Coronavirus SARS-CoV-2 (COVID-19) pandemic. For example, lack of personal protective equipment, disorganized logistical distribution, and other issues that demand attention. In essence, the report can be interpreted as revealing the NPS's failure. The report's summary states, "Congress may also consider mechanisms to strengthen the development of preparedness to ensure the National Preparedness Goal can be met."



Presidential Policy Directive-8 ([PPD-8](#)) and the National Preparedness Goals ([NPG](#)) provide an outline for building national sustainable resilience using a [whole community](#) approach, which includes:

- All individuals and families
- Private businesses
- Faith-based and nongovernmental organizations
- Medical/healthcare and educational institutions
- Media and social media platforms
- Federal, state, local, territories, and tribes.

An important part of this national strategy is to gather the collective resources (i.e., strategic stockpiles) and exploit them to benefit and sustain the socioeconomic stability, safety, and security of communities across the country. This ensures the ability to provide much needed resources to areas where capacity is exceeded.

Functions of the NPS

The National Preparedness System ([NPS](#)) is a cyclical process that includes six functions. However, the first of these must be accomplished before any of the other functions can be completed:

1. [Assessment](#) to identify risks as well as potential threats, hazards, and consequences
2. Estimate of required capabilities

3. Enhancement and building of core capabilities
4. Development of best practices for delivering resources and capabilities to partners and stakeholders
5. Testing and validation of resilience and capabilities to ensure their efficacy
6. Assurance that all aforementioned processes are updated and that mitigation is embraced to ensure long-term remedies ... then repeat.

Testing and validation as well as need assessments can be done during responses. This is where the [National Response Framework](#) is important.

According to the National Response Framework, the disaster preparedness system is supposed to follow the [National Incident Management System](#) and its operational jurisdictional scaffolding response under the Incident Command System, which provides for a standardized command and control as well as a coordinated, integrated, and collaborative emergency management effort. The execution of federally led Incident Command System requires, above all, effective communications to ensure a [common operating picture](#) by all partners. The [response to Hurricane Katrina](#) revealed the need for better building of the national response and communications. Additionally, [collaborative emergency management](#) requires that emergency management professionals have strong and trusted managerial leadership skill sets. Further, if *influence* is the main ingredient in [leadership](#), then [collaboration](#) is the cornerstone of emergency management. Expectation by state, local, tribal, and territorial partners was that the federal government would follow the NPS principles and those of the NPG and whole community approach using its *influence* and, through *collaboration*, take the lead for providing guidelines and resources. [COVID-19](#) revealed political and institutional fractures in the U.S. national preparedness and public health infrastructure.

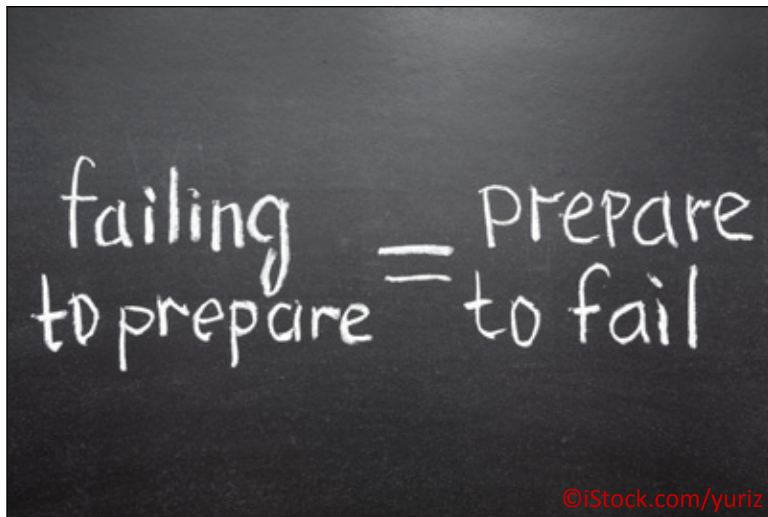
Although necessary for effective disaster preparedness response, communications, coordination, and command and control were lacking in the COVID-19 response.

The NPS Failed

Ineffective and fragmented *communications*, a lack of *coordination* between the federal and subordinate jurisdictions, poor logistical supply chains, and a lack of clear *command and control* – all necessary for [effective disaster preparedness response](#) – were basically absent. The results were socioeconomic disparities, increased political partisan divides, [racial tension](#), [inequities](#) in the distribution of resources, poor public health, and deficiencies in medical

protection and prevention. Leadership in collaborative emergency management networking includes providing coordination, communication, and additional support, but only if a request is elevated from subordinate jurisdictions. This is because the federal government possesses vast resources and is expected to support subordinate jurisdictions when their capabilities are exceeded. In this context, there is an assumption that the capabilities and mutual aid of the [Emergency Management Assistance Compact](#) has been overtaken with the COVID-19 pandemic. This means that the federal government was relied upon to provide resources such as additional medical supplies.

In 2020, the federal government's interpretation, understanding, and implementation of PPD-8, NPS, and whole community approach were not using the same common operating picture with some of states and subordinate governments. Miscommunication ensured all stakeholders and partners were not operating with the same COP, which increased the country's vulnerability. The 2020 COVID-19 pandemic and the failure of the federal government to adhere to the PPD-8 and NPS created cascading anthropogenic happenings in education,



private industry, race relations, healthcare, and sociopolitical interactions. The NPS outlines a process for the [whole community](#) to prepare and build more resilient and sustainable preparedness and achieve NPG.

The failure of some actors to implement the NPS and to allow emergency management and public health professionals to adhere to the six-step process impeded the fiscal year 2020 COVID-19 response. Remember

that communications, coordination, and command and control are key to ensuring effective collaborative networking in Incident Command System and for the NPS/NPG and the whole community approach. Given the complexity of this pandemic, strong leadership is needed. Messaging to the community must be clear, concise, and trustworthy. [Contradictions](#) from persons in leadership positions would cause problems with interoperability and trust. Additionally, the NPS must be adhered to as outlined and followed by the thousands of professionals in disaster and emergency management and healthcare professionals with a common operating picture.

The systemic failures of the federal government to execute the tenets and principles provided in the NPS and the whole community approach leave voids in leadership and questions about NPS's effectiveness and relevance. There was a lack of inclusivity of all persons – those with functional needs, families, private businesses, faith-based organizations, nongovernmental organizations, educational institutions, state, local, territories, and tribal agencies, and the media platforms. This was noted when a [senior advisor](#) to the president argued that the [Strategic National Stockpile](#) was not to be used by the states because it was theirs (federal government). This advisor's interpretation and position was supported by the administration and is contrary to the actual objective and stated use of this national repository.

Actions Needed to Repair the NPS

The nation's buy-in to a whole community approach is a difficult task with a haphazard adherence to the NPS guidelines. DHS/FEMA, Centers for Disease Control and Prevention, and the Department of Health and Human Services must work on restoring and nurturing trust in future national preparedness challenges. Achieving goals such as those outlined in the NPG are made even more difficult given the present uncertainty and challenges that permeate societies domestically and globally. This means there will be resistance and pains felt by the subordinate jurisdictions and other partners to adapt, given the disposition of the outer environment and existential forces – for example, requirements to meet the NPG.

According to the 2021 Congressional Report on NPS, FEMA must take lead to restore trust moving forward. Further, emergency management and public health professionals must be allowed to autonomously and without interference make assessments and provide their expert evidence-based data and empirical premised guidance as FEMA uses after-action reports and lessons learned to improve national preparedness. The same holds true for all levels of government and the whole community if the United States is to strengthen its core capabilities and build resilient and sustainable communities.

Michael A. Brown, Ph.D., is the president of One World One Way, The O.W.O.W. Foundation Inc., a 501c3 policy institute in Atlanta, Georgia. He has taught graduate level emergency management and homeland security at Capella and Park Universities. He served in the United States Air Force as an intelligence and nuclear weapons officer. His national presentations are on diversified topics, such as unmanned aircraft vehicles, social vulnerability of African American males at historically Black colleges and universities, and the need for emergency managers to prepare for radiological dispersal devices and improvised nuclear weapons. He possesses an Associates of Applied Science degree in intelligence and imagery analysis, a B.S. in criminal justice administration, master's in emergency management, and Ph.D. in public safety with a specialization in emergency management. He is certified in critical infrastructure protection from FEMA's Texas A&M Engineering Extension Services (TEEX) program. He is the co-author of the book "Transforming Disaster Response: Federalism and Leadership."

Impact of Critical Biosecurity Reports – Uncertainty Remains

By Robert C. Hutchinson

Domestic Preparedness published an article in 2016 discussing the uncertain impact of several biosecurity reports on national planning and preparedness for biosecurity and pandemic threats. The article focused on the consistent and repeated warnings of the consequences for failing to plan and prepare for a multitude of biosecurity threats. The identified inferior planning and preparedness concerns were as apparent and repetitive as the demonstrated lack of reaction to them in the past. The nation was vulnerable.

One of the most critical reports was released by the Blue Ribbon Study Panel on Biodefense in 2015, entitled *A National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts*. The report was comprehensive and thought-provoking by identifying and re-enforcing numerous vulnerabilities and inadequacies regarding the planning and preparedness for a myriad of biosecurity, biodefense, and public health threats. The blue ribbon panel report identified 33 recommendations and 87 action items for national leaders and policy makers to consider and implement, but any coordinated national response to them remained to be seen in 2016.

From the blue ribbon panel report to several other important public health studies and findings addressing the Ebola virus and other outbreaks discussed in the article, it remained apparent that a whole-of-community approach was required to plan and prepare for these biosecurity threats. The article concluded with:

Time shall tell if we as a nation choose to be proactive or reactive for biodefense, biosecurity and public health threats. The blueprints and frameworks surely exist to educate, support and prepare us for the next serious black swan event. Our failures shall not be from a lack of knowledge or warning, but prioritization, planning and preparedness.

Time did tell. The answer was found in the impact of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the novel virus that caused the COVID-19 pandemic. The nation and world did not demonstrate a sufficient level of planning and preparedness for the novel zoonotic virus and the consequences were staggering on countless levels. Many somber cascading consequences that shall drastically affect lives, economies, and geopolitics around the world are likely still months or years away.

Biodefense in Crisis

The Bipartisan Commission of Biodefense, previously known as the Blue Ribbon Study Panel on Biodefense, issued the report *Biodefense in Crisis: Immediate Action Needed to Address National Vulnerabilities* in 2021. This follow-up report identified the observable results of failing to consider their 2015 observations and guidance. According to the report:

Regrettably, most of the Commission's recommendations were unaddressed or only partially addressed before the COVID-19 pandemic began. Had the government fully implemented A National Blueprint for Biodefense or responded to warnings from experts, the Nation would have been much better prepared for COVID-19. Our recommendations would not have prevented infectious disease, but their adoption would have greatly assisted the federal government and its state, local, tribal, territorial, and non-governmental partners in preventing COVID-19 from becoming a pandemic.

The 2021 report stressed that, five years after the original report, the United States remained at catastrophic biological risk. The report focused its action items on the categories of leadership, coordination, collaboration, and innovation.

Leadership

As clearly demonstrated by SARS-CoV-2, leadership was one of the most lacking areas for the prioritization of focus and resources. There were scores of strategies, reports, studies, and other warnings stressing the need for leadership that were ignored for decades. [National Security Presidential Memorandum 14](#), issued in 2018, was another attempt to coordinate and implement a strategy for national biodefense. The assistant to the president for National Security Affairs was designated as the lead for policy coordination and review along with the secretary of the Department of Health and Human Services chairing the Biodefense Steering Committee. The steering committee was responsible for monitoring and coordinating the implementation of the [2018 National Biodefense Strategy](#). The 2021 report faulted this strategy, citing that it was difficult for one department to successfully direct other independent departments and agencies for the execution of the national strategy. It was yet another example of responsibility without clear authority and power to drive policy and action.

Planning and preparedness for COVID-19 were lacking despite adequate warning. Will the same happen for the next biosecurity threat to include bioterrorism?

The first 2021 report action item was a recommendation for the president to “establish a dedicated Deputy National Security Advisor for Biodefense, overseen by the Vice President of the United States and supported by NSC staff in a Directorate for Global Public Health Security and Biodefense and a Directorate for Domestic Public Health Security and Biodefense.” This recommendation would elevate the importance of the mission and enhance the powers of the assignees to encourage coordination and cooperation.

The Trust for America's Health supported this concept in their report [Ready or Not: 2021 Protecting the Public's Health from Diseases, Disasters, and Bioterrorism](#). The report recommended the creation of “a White House Health Security Directorate, including senior advisors to the president with public health expertise on health security issues. This directorate would oversee the national biodefense strategy and all interagency emergency responses.”

It is unknown if this elevated level of authority would truly create responsibility within the departments and agencies for genuinely successful and coordinated efforts. It has been an enormous challenge as far back as the [National Strategy for Pandemic Influenza](#) and even well before that seminal document.

Coordination

None of the previous processes for the coordination of biodefense strategies and activities over the past decades was overly successful. The 2021 report identified them all as flawed. The recent response to *SARS-CoV-2* only reinforced their observations. The Biodefense Steering Committee reportedly did not possess all of the required stakeholders and subject matter experts to properly address the exploding pandemic – including state, local, tribal, territorial, and private sector partners. An action item was recommended to create a federal advisory committee with other partners to advise the Biodefense Steering Committee. It is unknown if one more advisory committee with vague authorities would be a solution.

It was recommended to establish a broader implementation plan for the National Biodefense Strategy to better achieve its mission, goals, and objectives. The stronger plan would identify tangible activities, milestones, and timelines for completion for each specific goal and objective for enhanced accountability. The report again identified the challenges with coordinated and coherent congressional oversight and recommended for Congress to better focus on the vast and critical subject. As in 2015 and many years before and after, that essential recommendation was easier said than done. In the present political environment, it appears even less likely to succeed.

One of the most important recommendations for future threats may be the subject of biological attribution as demonstrated most recently with *SARS-CoV-2*. *With the stakes being enormously high, the timely and accurate attribution of a biological incident or attack would be critical for the appropriate response. As stated in the report, “the implications of imposing sanctions and embargoes, cutting off diplomatic relations, and declaring war are too important to leave to a loose set of occasional federal players and policies.”* The attempt to identify and confirm the actual origins of *SARS-CoV-2* clearly demonstrated the difficulty of establishing biological attribution. *Attribution can be incredibly difficult in the cyber environment; the physical world may be even more arduous.*

It was recommended for Congress to instruct the executive branch to develop, plan for, and establish a national biological attribution apparatus to inform decision-making. Once again, transitioning from coordination to collaboration on such a complicated subject may be easier said than done – even in a post COVID-19 world.

Collaboration

Beyond coordination, outreach and collaboration with nonfederal stakeholders for biosurveillance are essential according to the report. The National Biosurveillance Integration System was created to aggregate, analyze, and disseminate biosurveillance information from inside and outside the federal government. However, according to the report, too few federal departments and agencies provide information to the system or value the issued products from it. The system and its National Biosurveillance Integration Center (NBIC) were routinely criticized for reportedly failing to meet its designated mandates and responsibilities.

According to a United States Government Accountability Office (GAO) [2009 report](#), NBIC was not fully equipped to carry out its mission because it lacked key resources – including data and personnel from its partner agencies, which created serious challenges. The findings were similar in a [2015 GAO report](#) identifying continued limited participation from its partners for information and personnel. GAO identified five options for the improvement of NBIC. Subsequent reviews have not indicated inspiring progress.

The 2021 report recommends that Congress should direct the Department of Homeland Security to conduct a comprehensive assessment of the National Biosurveillance Integration System to determine its performance and identify any additional authorities required to execute its responsibilities. However, a review of the numerous [biosurveillance reports](#) released by GAO indicated that various assessments have already occurred and identified a variety of options and recommendations for improvement. Another assessment without mandated and tangible actions could just add to the list of disregarded or unimplemented recommendations.

Innovation

Medical countermeasures were identified as another area requiring improvement for development and multi-year funding. For example, [Project BioShield](#) was created in 2004 to accelerate the research, development, purchase, and availability of effective medical countermeasures against weapons of mass destruction – including biological, chemical, radiological, and nuclear agents. The government recognized that pharmaceutical companies were not developing these unique medical countermeasures without an existing and profitable market to underwrite their substantial investments. The companies needed financial encouragement, which Project BioShield and other legislation provided. The 2021 report recommended another comprehensive review of medical countermeasures programs, policies, and assets.

Along with Project BioShield, the 2021 report recognized that the current BioWatch Program technology performed poorly and was far from the deterrence mechanism it was originally intended to be when the program was established in 2003. According to the report, BioWatch detectors, when they work, only provide useful data hours or days after an event.



The [BioWatch Program](#) provides air-monitoring, analysis, notification procedures, and risk assessment support to over 30 jurisdictions across the nation to minimize the catastrophic impact of a biological attack. The BioWatch Program has been discussed in numerous assessments by [GAO](#) and other organizations identifying key areas of concern. The limited number of detectors with uncertain detection capabilities may not be the vital tripwire needed to identify an emerging biological attack. The 2021 report recommended that “Congressional appropriators should deny further funding for BioWatch activities until proven replacement technology is identified and confirmed to meet the needs of the program.”

Report Findings

The Bipartisan Commission of Biodefense provided a review and assessment of the implementation status of the 33 recommendations and 87 action items from their 2015 report. They found that only three of the action items were completed and partial action was taken for 54 action items. Reportedly no action was taken for 24 action items. Due to COVID-19, emergency action was reportedly executed for 6 action items without evidence of permanent policy or planning changes for future threats.

The 2021 report concluded with:

The Commission urges policymakers to learn from the COVID-19 pandemic and address critical gaps in the Nation’s biodefense, without waiting for COVID-19 to disappear, and before we find ourselves facing the next infectious disease pandemic or biological attack.

To further encourage interest and progress, the Bipartisan Commission of Biodefense created an [interactive webpage](#) to track and update the commission recommendations and action items. The proactive measure was a shrewd idea to maintain active focus on the recommendations and action items for prioritization and advancement and not wait until the next report years from now.

The fundamental findings from the 2015 and 2021 reports provide a foundational roadmap for biodefense planning and preparedness. The guidance was not only for public health threats from naturally occurring pandemics but for possibly even more serious threats from bioterrorism and biowarfare from state and non-state actors. The nation’s overall performance for a novel zoonotic disease with a mortality rate of approximately one percent was not impressive. The response to an intentional biological attack with a much more lethal and directed pathogen may be even less impressive without serious motivation and progress.

Beyond Novel Viral Pandemics

From the 2012 [National Strategy for BioSurveillance](#) to the National Biodefense Strategy, the government continued to clearly identify the biosecurity threats to the nation and world. The goals of the National Strategy for BioSurveillance were to achieve a well-integrated national biosurveillance enterprise that saves lives by providing essential information for better decision-making at all levels of government. The [National Biosurveillance Science and Technology Roadmap](#) was released in 2013 to support the strategy by identifying and prioritizing research and development needs with the goal of giving decision-makers at all levels of government more accurate and timely information when biological incidents

threaten health. These strategies were distributed well before the COVID-19 pandemic outbreak without substantial observable preparedness results.

The National Biodefense Strategy addressed deliberate and accidental biological threats along with naturally occurring biological threats. According to the strategy, “nation-states and terrorist groups have found value in pursuing biological weapons, and there can be no confidence that will change in the future.” Through its five goals and linked objectives, the strategy established a layered risk management approach to biological threats. Included in the goals was to disrupt plots, degrade technical capabilities, and deter support for terrorists seeking to use weapons of mass destruction. The current and future threats include a great deal more than naturally occurring epidemics and pandemics.

With technological advancements, the creation of dangerous and lethal pathogens becomes considerably less complicated for researchers with good and bad intentions. The reconstruction of the [1918 pandemic influenza virus](#) in a laboratory was fascinating and frightening at the same time. The ability to create a strain of the [polio virus](#) in a laboratory with publicly available information and materials, along with other similar scientific developments, provide substantial reason for concern and consideration. The expanding scientific advancements are genuine and cannot be ignored.

The amazing capabilities derived from CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) to edit genes shall surely enhance medical advancements and magnify concerns for bioterrorism and biowarfare in the future. Either from an advanced laboratory or a musty basement, the next pathogen may become a much more significant threat to the world than *SARS-CoV-2 with drastically higher morbidity and mortality rates*.

Time Shall Tell

Once again, time shall tell if the nation chooses to be proactive or reactive for biodefense, biosecurity, and public health threats. After *SARS-CoV-2, the correct answer should be obvious*. However, the concerns and signals were evident to many after the previous emergence of SARS, MERS, Ebola, H1N1, and other high-profile pathogenic warning shots over the past two decades with incredibly modest planning and preparedness results.

The previous and new reports, strategies, and frameworks continue to educate, support, and prepare the nation for the next biological black swan event. Bioterrorism attacks and biowarfare may be as close as COVID-19 was less than two years ago – just over the horizon. Once more, future failures shall not be from a lack of knowledge, warning, and recent experience, but prioritization, planning, and preparedness.

Robert C. Hutchinson, a long-time contributor to DomPrep, was the former deputy special agent in charge with the U.S. Department of Homeland Security (DHS), Homeland Security Investigations in Miami, Florida. He retired in 2016 after more than 28 years as a special agent with DHS and the legacy U.S. Customs Service. He was previously the deputy director for the agency's national emergency preparedness division and assistant director for its national firearms and tactical training division. His numerous writings and presentations often address the important need for cooperation, coordination and collaboration between the fields of public health, emergency management and law enforcement. He received his graduate degrees at the University of Delaware in public administration and Naval Postgraduate School in homeland security studies.



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Post-Hazard Event Airport Recovery

By Gregory Brunelle, Chhabra Jaskanwal, et al.

The role airports play in the world is critical. Even a minor disruption to their operations has immediate cascading impacts, which can be familiar to anyone who has experienced a delayed departure and the dreaded “Will I make my connection?” stress that follows. However, airport disruptions create far greater economic and business operations impacts than the occasional need to catch a later flight. Cargo aviation operations provide a critical part of global trade, accounting for the movement of nearly US\$7 trillion worth of goods annually. Additionally, the air transport industry supports 29 million jobs globally and billions of dollars in local economies. Meanwhile, amid the global pandemic, aviation supports critical healthcare operations, carrying doctors and specialists rapidly to areas where they are needed; epidemiological investigators to locations of emerging diseases; and medications valued at more than US\$1 trillion to locations around the world. These examples emphasize the need to ensure that aviation, and its component parts – including airports – remain resilient and functional at all times.



Airports are often referred to as [cities unto themselves](#) as they are composed of highly complicated, intertwined, and highly technical infrastructure. They are also very expensive to operate. With the widespread emergence of COVID-19, governments imposed travel restrictions and passenger [air service decreased](#) more than 60% (see Fig. 1). As a result, revenues generated from retail services within airports, landing and terminal fees paid by airlines, and other revenue sources have greatly reduced.

To offset this unprecedented impact, governments provided economic relief to their flagship airlines. In the United States, two tranches of [funding support](#) in 2020 provided a total of US\$40 billion to its major air carriers. However, despite their symbiotic relationship with airlines, [airports received](#) only US\$4 billion. Even if only providing cargo and limited passenger service, every airport must be fully functional to ensure safe operations. The current crisis has strained airport budgets significantly and will have a lasting impact on their ability to invest in their own infrastructure. As such, smart decision-making that enhances resilience against future disruptions is critically important. Leveraging emerging technology can make these efforts faster, more accurate, and less expensive.

Historic Damage & Recovery

In this light, the team reviewed the damage and recovery of major airports around the world following various past earthquakes, floods, and extreme wind events, in order to

understand the different factors that can potentially impact the recovery process. Six key components identified by FEMA's [HAZUS-MH Risk Assessment](#) guide include the following for focused risk assessment: terminal buildings, air traffic control tower, hanger facilities, fuel facilities, parking, and runways. In addition to these components, the study also focused on: power availability; ease of site access for employees, flight crews, and travelers; and prioritization of the airport usage for rescue and military operations. The hazard events examined included:

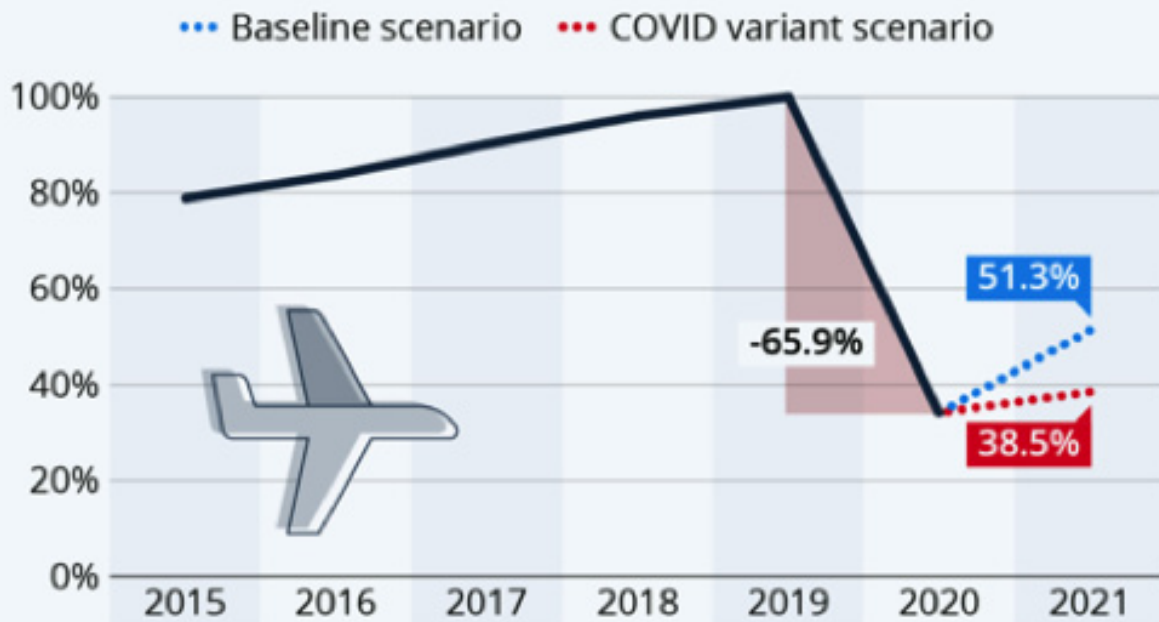
- Earthquake-related damage and recovery
 - 1989 Loma Prieta Earthquake (M6.9), USA – 17 October 1989
 - 1995 Great Hanshin-Awaji Earthquake (Kobe earthquake), Japan (M6.9) – 17 January 1995
 - 2011 Great Tohoku Earthquake (Great East Japan Earthquake) (M9.1) – 11 March 2011
 - 2016 Kumamoto Earthquake, Japan (M7.0) – 16 April 2016
 - 2016 Ecuador Earthquake (M7.8) – 16 April 2016
 - 2020 Salt Lake City Earthquake, USA (M5.7) – 18 March 2020
- Flood-related damage and recovery
 - Typhoon Bart (No. 18), Japan – 24 September 1999
 - Chicago Severe Rain, USA – 12 September 2008
 - Hurricane Harvey, USA – 24 August 2017
 - Typhoon Jebi (No. 21), Japan – 4 September 2018
- Extreme wind-related damage and recovery
 - Hurricane Katrina, USA – 29 August 2005
 - St. Louis Tornado, USA – 22 April 2011
 - Hurricane Sandy, USA – 29 October 2012
 - Phoenix Sky Harbor Airport Thunderstorm/Wind Event, USA – 27 September 2014
 - Hurricane Irma, USA – 10 September 2017

Key Factors to Consider

Based on the review, partial-to-near-full functional recovery of airports after disruptive events is rather quick. Though permanent repair efforts can typically take many weeks to many months, limited operations can be resumed within 24 hours and full/near-full restoration of both cargo and passenger services resumed within a few days. Noteworthy is that many of the hazard events reviewed began with operational reductions due to predicted adverse weather. These actions are necessary and reflective of decades of planning that has resulted in aviation achieving a [period of unprecedented safety](#). Leaders must dedicate attention to minimizing the likelihood of those brief cessations of normal operations, extending for hours beyond the initial lifecycle of the precipitating hazard due to minor damage. The trend to rapid restoration is a testament to the work that has been accomplished. Ultimately, the race to resilience has no finish line. Consistent investment is needed.

Pandemic Causes Historic Decline in Air Passenger Traffic

Global air passenger traffic (revenue passenger kilometers) as a percentage of 2019 traffic



Source: IATA



statista

Fig. 1. The International Air Transport Association's (IATA) air-travel prediction for 2021 compared to previous years (Source: Statista, 2021).

Key factors controlling downtime due to impacts from the assessed natural hazards and some initial considerations include:

Pre-incident closures and/or operational limitations – Integration with alerting authorities (e.g., weather services, emergency management offices) as well as the quality (accuracy, completeness, and timeliness) of alerts received enhances pro-active operational decision-making. These actions may include coordination with airlines, personnel, and travelers, as well as allowing time for securing vulnerable locations and equipment.

Hazard event duration and severity – Planning and investment have been focused on routine events, not extreme incidents. Access to high-resolution rare event scenarios would provide risk managers with a more comprehensive understanding of vulnerabilities.

Runway/taxiway inspection and debris removal – Speed of runway/taxiway inspection and debris removal has a direct correlation to the speed at which operations can be resumed. Plans for rapid equipment deployment are necessary.

Air traffic control (ATC) damage and power restoration – (1) Loss of ATC facilities, partial or complete, is one of the most significant impacts and poses one of the most critical safety issues. ATC facilities have typically been built to withstand known risks; however, older facilities may have significant vulnerabilities. ATC dependencies such as power, telecom, and water

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were identified as repeated points of failure. (2) *Hardening* of existing facilities, securing equipment to resist breakage, ensuring onsite redundancy, and having repair materials on-hand (e.g., cover broken windows), allows for not just rapid restoration but potentially nearly uninterrupted service.

Non-ATC facility power restoration – There is little to no superfluous infrastructure within an airport. All support facilities and services, including security and ancillary aviation services, are critical to operations. Pre-incident storage in safe locations for mobile equipment, hardening against water intrusion, and investing in back-up power generation are highly recommended.

Structural damage inspection and immediate repair – (1) The ability to rapidly conduct inspections for structural integrity issues, as well as having “quick fix” materials stored onsite (e.g., tarps, plywood), enhances the ability of an airport to quickly resume at least partial services. (2) Training staff to conduct rapid inspections supports more quickly arranging for professional repair by external contractors.

Site access – The ability of employees, flight crews, and passengers to access the site can significantly complicate response and recovery. Multiple examples exist of travelers becoming stranded and the airport having to serve as a make-shift shelter. Airport planners should work with regional planners to develop transportation contingencies.

Minimizing Impacts & Discovering New Solutions

Post-hazard impacts can be minimized and recovery times can be expedited by examining the vulnerabilities of various common airport infrastructure factors and focusing mitigation and planning efforts accordingly. Airport executive leaders and emergency managers engage in extensive operational and physical risk assessment and planning activities. However, planning is a time-consuming process that requires considerable effort by various stakeholders across the entire enterprise. It can be difficult to assess the copious amounts of highly detailed data, schematics, and systems, as well as overlay the business and operational processes that rely on them in a holistic manner. In the near future, technology will make this process easier.

Emerging solutions are able to create multidimensional views of both physical and operational systems, assess the impacts of natural hazards on both, and provide detailed predictions of damage, operational disruptions, and business downtime. Newly created machine learning models, in combination with physics-based and observation-based models, can estimate impacts and recovery times much faster, more accurately, and at scale. This scalability



allows for impacts on the broader community as well as impacts to supply chains dispersed over regional and international boundaries to be considered, thus providing the most holistic understanding of vulnerability possible with today's technology.

Critical infrastructure leaders, including those responsible for the world's airports, should be actively monitoring for new solutions to identify those that can support their efforts. Partnering with academic researchers and developers of new technology, in support of studies such as this, is an imperative to ensure the accuracy and usefulness of the research and technological solutions that are developed. Early adoption of innovative solutions (which require real-world practical use for additional development) are key to the common mission: reducing vulnerabilities and increasing resilience.

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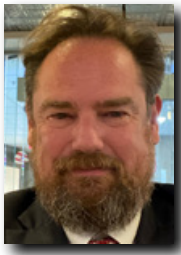
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Revisiting Face Masks Near the End of a Long Journey

By David Mayfield

On 11 March 2021, the world reached a dubious milestone – one year since the World Health Organization (WHO) first declared COVID-19 a global pandemic. Soon after that declaration, a large portion of the world shut down. In the 12 months that followed, community stakeholders have become relatively well-versed in the scientific theories surrounding social distancing, viral load, herd immunity, and transmission of respiratory droplets. However, no topic has likely been more discussed (or more heatedly debated) than the need for and use of face masks.



With three vaccines currently being administered in the United States and [AstraZeneca](#) seeking FDA approval for a fourth, many are starting to see an end of what has been a very long, dark tunnel. Despite the progress being made in the fight against COVID-19, Americans cannot afford to become complacent. In fact, with several new variants of the virus identified and a recent spike in positive cases throughout [Europe](#) and in some parts of the United States, the Centers for Disease Control and Prevention ([CDC](#)) continues to recommend that people wear masks “in public settings, at events and gatherings, and anywhere they will be around other people.” Moreover, effective 2 February 2021, masks are now required on “planes, buses, trains, and all other forms of public transportation traveling into, within, or out of the United States and in U.S. transportation hubs such as airports and stations.”

Masks are being mandated in these and certain other public settings because, in addition to social distancing and basic hygiene protocols (e.g., hand washing), they have been found [effective in preventing the spread](#) of COVID-19. When worn properly, masks keep the majority of a person’s respiratory droplets from being expelled into the air – respiratory droplets that can carry the COVID-19 virus if someone is infected. Certain masks can also help protect the wearer from becoming infected if they are exposed to someone with the virus.

Now is not the time for communities to be complacent. It is time to remind people about the importance and types of masks as well as how to properly wear them.

When the pandemic started, there was a severe shortage of PPE, and masks had to generally be reserved for healthcare and

frontline workers. The United Nations estimated that the demand for surgical masks in 2020 was approximately [2.4 billion](#). However, with face masks currently for sale at nearly every pharmacy and fashion boutique, face masks and the protection they provide are readily available. Although road weary, the nation still has some miles to cover before reaching the

end of this journey, so it is important to revisit the various types of masks available and the proper way to wear and care for them.

Choosing the Right Mask

Experts are quick to point out that the best mask for any individual is one they can wear comfortably and consistently, but there are distinctions.

- *Cloth masks* – Made from a variety of fabrics, cloth masks are available at most retail stores and mall kiosks. According to the [Mayo Clinic](#), a cloth mask is intended to, “trap respiratory droplets that are released when the wearer talks, coughs, or sneezes. It also acts as a barrier to protect the wearer from inhaling droplets released by others.” Furthermore, the [Mayo Clinic](#) advises that the most effective cloth masks are made with several layers of a tightly woven fabric, such as cotton, because layers help prevent respiratory droplets from being inhaled through or escaping from the mask. Cloth masks have become popular during the pandemic because they allow the wearer to reflect their personal style and affinities, but also because they are washable and reusable. Cloth masks can typically be washed by hand or in a washing machine with other laundry.

CDC May 2021 Update

If you’ve been fully vaccinated:

- ***You can resume activities that you did prior to the pandemic.***
- ***You can resume activities without wearing a mask or staying 6 feet apart, except where required by federal, state, local, tribal, or territorial laws, rules, and regulations, including local business and workplace guidance.***

- *Medical masks* – Also called surgical masks, these loose-fitting disposable masks can be purchased at most pharmacies. According to the [Mayo Clinic](#), “They’re meant to protect the wearer from contact with droplets and sprays that may contain germs. A medical mask also filters out large particles in the air when the wearer breathes in.” For a more [form-fitting](#) medical mask, wearers should tighten the ear straps by knotting the loops.
- *N95* – According to the [Mayo Clinic](#), an N95 mask is a type of respirator, thus it offers more protection than a medical mask because it filters out both large and small particles when the wearer inhales. However, because N95 masks have been in short supply throughout the pandemic, the CDC recommends they be reserved for health care providers. Like surgical masks, N95 masks are intended to be disposable, but researchers are testing ways to disinfect and reuse them.

Your Guide to Masks

Do wear a mask that



Covers your nose and mouth and secure it under your chin. Fits snugly against the sides of your face.

How NOT to wear a mask



Around your neck



On your forehead



Under your nose

How NOT to wear a mask



Only on your nose



On your chin



Dangling from one ear



On your arm

How to take off a mask



Carefully, untie the strings behind your head or stretch the ear loops.



Handle only by the ear loops or ties.



Fold the outside corners together.



Be careful not to touch your eyes, nose, and mouth when removing and wash hands immediately after removing.

CDC Dos & Don'ts

The [CDC](#) recommends people choose a mask with the following characteristics: (1) has two or more layers of breathable fabric; (2) completely covers the wearer's nose and mouth; (3) fits snugly against the sides of the wearer's face without gaps; and (4) has a nose wire to prevent air from escaping through the top of the mask.

The CDC does not recommend people wear masks with [exhalation valves or vents](#) – often used in construction to prevent workers from inhaling dust and other small airborne particles, these masks allow virus particles to escape through the valve. As a result, some places have been [banned](#) masks with valves. The CDC also does not recommend [face shields](#), as it is not clear how much protection they provide.

Properly Donning a Mask

A facemask, regardless of its type, is only effective if worn properly. The [Mayo Clinic](#) recommends these steps when putting on, wearing, and taking off a mask:

- Wash and sanitize hands before and after putting on a mask.
- Be sure the mask covers your mouth, nose, and chin.
- Depending on its design, tie or secure the mask to ensure it fits snugly, with no gaps.
- Try not to touch the mask while wearing it; if accidentally touched, wash or sanitize hands right away.
- If a mask becomes dirty or wet, switch to a clean one (put used masks in a sealable bag until they can be disposed of or washed).
- Remove a mask by untying it or lifting the ear loops; do not touch the front of the mask or the face.
- Wash hands immediately after removing a mask.

Twelve months ago, the length of this journey was unforeseen. Now, as the finish line approaches, it could be costly to just coast or presume there are not still twists, turns, and bumps ahead. Vigilance is key – that means observing all recommended safety protocols, including properly wearing protective masks where required.

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Dräger is an international manufacturer of medical technologies, including a variety of facemasks and other PPE. Dräger's X-Plore® series of masks (specifically, the 1700 and 1900) meet all of the CDC's criteria. The X-Plore®™ offers a sound fit and a secure seal. Moreover, the X-Plore's® CoolSAFE™ filter material combines low breathing resistance with high filter performance to offer the wearer the ability to breathe easy no matter how long they need to wear it.

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