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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 769

A Guide for Public Transportation Pandemic Planning and Response

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in cooperation with the Federal Highway Administration

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2014
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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

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The Transportation Research Board of the National Academies was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

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The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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FOREWORD

By Stephan A. Parker
Staff Officer
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NCHRP Report 769: A Guide for Public Transportation Pandemic Planning and Response provides support to transportation organizations as they prepare for pandemics and other infectious diseases such as seasonal flu. While primarily intended for small urban and rural transit organizations, this guide can be used by all types and sizes of transportation agencies and organizations with different levels of preparedness for pandemics.

A pandemic can be described as a global disease outbreak. Depending on the characteristics of the disease, it may spread easily, there is little or no immunity to the disease, no vaccine is available, and there is a high rate of people getting sick and/or dying. Pandemics cause significant absenteeism, change patterns of commerce, have limited immediate medical solutions, and interrupt supply chains. Addressing decision-making challenges in pandemic response in the transportation context is a multi-dimensional task, involving not only transportation/transit organizations, but health organizations, emergency management agencies, and communications outlets as well. This guide is designed to outline broad guidance on dealing with pandemic preparedness planning, not detailed procedures. It provides information, tools, tips, and guidance on where to find up-to-date recommendations from federal agencies and other resources, prior to and during a pandemic.

Under NCHRP Project 20-59(44), Abt Associates was asked to develop a pandemic planning guide for use by all transit agencies with emphasis on (a) small urban and rural transit agencies; (b) human service transportation providers; and (c) the state DOTs that provide oversight for grant recipients in both categories. The project team undertook a multi-media, phased approach to gather information to develop the guide. First, they conducted a literature review of publications, websites, and other information posted by transportation, health, and other relevant agencies. Next, they developed and issued a survey to gather information on the extent to which pandemic planning is occurring; the level of interagency collaboration taking place for transportation pandemic planning; policies and procedures to continue transportation operations in a pandemic; and barriers to pandemic planning. The survey and initial interviews targeted relevant local, state, and regional agencies with emergency management and response responsibilities; transportation managers; state transportation agency personnel; and other entities with a role in transportation planning and response in a pandemic. The survey and interviews were aimed at not only the rural and small urban transit systems but also larger organizations to assist in identifying key issues and current practices.

The team used the information obtained through the literature review, survey, and initial interviews to develop a draft outline of the guide. Then, the team engaged key stakeholders based on the guide's target audience: local, state, regional, tribal, and federal representa-

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tives who have responsibility for integrated pandemic planning and response. Finally, the team received comments from the NCHRP Project 20-59(44) panel on key deliverables in each stage of the guide development. These comments were integral to shaping the initial research process, the structure and content of the guide, and the methodology for receiving stakeholder feedback.

In addition to the guide, a methodology report and a PowerPoint presentation describing the entire project are available on the TRB website at http://www.trb.org/Main/Blurbs/170529.aspx.

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SUMMARY

A Guide for Public Transportation Pandemic Planning and Response

What Is a Pandemic?

A pandemic is a global disease outbreak where there is little or no immunity to it and no vaccine.

How Could a Pandemic Impact a Small Urban and/or Rural Transportation Organization?

Pandemics cause significant absenteeism, change patterns of commerce, have limited immediate medical solutions, and interrupt supply chains—all of which can have devastating effects on the operations and sustainability of small transportation organizations. Planning in advance will help small transportation organizations be ready to address the issues that arise specifically related to transit.

Why Is it Important to Plan in Advance? (Won't the Centers for Disease Control Give Direction on What to Do?)

During a pandemic, the Centers for Disease Control and Prevention (CDC) and local public health departments will provide information, but they will not give instructions to specific types of organizations. Transportation agencies that lack an understanding of pandemics and do not take specific preparedness actions will likely struggle to respond safely and effectively.

How Will All-Hazards Preparedness Help Us?

Basic emergency management infrastructure and an all-hazard preparedness approach are essential for organizations to be able to manage a pandemic. However, additional hazard-specific activities are also required to ensure both continuity of operations and safety of staff and riders.

What Won't All-Hazards Preparedness Do?

All-hazards preparedness may slow but not prevent the disease and lessen but not eliminate the impacts of a pandemic.

How Resource Intensive Is Preparing for a Pandemic to a Rural Transportation Agency?

Pandemic planning requires minimal acquisition of equipment and supplies for response operations—possibly disinfectants, personal protective equipment, and other supplies used

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during a disease outbreak. The major commitments will be executive time for policy direction and decisions and staff time for planning and coordination.

How Is Pandemic Preparedness Different than Other Potentially Catastrophic Hazards (e.g., Earthquakes, Hurricanes, Hazardous Materials Spills, etc.)?

Most disasters impact infrastructure and cause physical damage to people and structures. Pandemics impact human resources and society.

What Is the Role of Policy Makers in Preparing for Pandemics?

Policy makers must provide the executive support to prepare for a pandemic, including planning, training, exercising, and acquiring materials that may be needed during a pandemic (e.g., disinfectants, personal protective equipment). Policy makers must be able to make decisions during a pandemic to protect workers, minimize impacts to the organization, and provide an appropriate level of service based on capabilities, capacities, and hazards.

What Is the Role of Emergency Planners in Preparing for Pandemics?

Planners should incorporate infectious disease planning into overall emergency management plans, maximizing the commonalities (all-hazard) while addressing the hazard-specific nature of pandemics. Transportation emergency planners should obtain executive support and fully integrate their activities with those of the local community, regional, tribal, and state organizations within transportation and with external disciplines.

How Does the National Incident Command System and/or Organizational Use of the Incident Command System Relate to a Pandemic Outbreak?

The National Incident Management System (NIMS) and its variants (e.g., the Incident Command System—ICS) is the organizational structure used to manage all emergencies in the United States. Planning, training, and exercising activities should incorporate NIMS in all documents and activities. For more information, a helpful source is the FHWA's Simplified Guide to the Incident Command System for Transportation Professionals (available at http://www.ops.fhwa.dot.gov/publications/ics_guide/).

What Will this Guide Do for its Users?

This guide is designed to outline the 'what' of pandemic preparedness planning for small urban and rural transportation agencies. The focus is on collaborative planning to work through complex and sometimes controversial issues related to workforce, safety, services, and public communication.

What Won't this Guide Do for its Users?

This guide is NOT designed to provide the 'how' or detailed procedures. It does however, in many areas, provide references to additional appropriate resources that may provide specificity.

How Exactly Does a Small Urban and/or Rural Transportation Agency Prepare for a Pandemic?

Transportation organizations are best prepared when they have (1) a robust overall emergency management program (planning, training, and exercising) that is coordinated with

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other transportation agencies and organizations that will be engaged in response; (2) a means to communicate with riders before and during an outbreak; (3) developed various plausible scenarios and actions to be taken and acquired appropriate resources; and (4) policy makers that are able and willing to make reasoned decisions.

Transportation agencies prepare for a pandemic by understanding the threat of a pandemic: What constitutes a pandemic, how it will likely impact the organization, and who has a role in responding to it. It is critical to know what can be done to mitigate the impact, what decisions about service will have to be made, and what tools and resources are available to help.

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CHAPTER 1

Introduction

This chapter provides an overview of pandemics and their impacts to transportation organizations.

Exhibits in this Chapter

1 *Size of Agency and Level of Emergency Management Experience*
2 *Example of Additional Resources Placed Throughout Guide*
3 *Document Organization*
4 *Pandemic Impacts to Transportation Organizations*
5 *Seasonal Flu versus Pandemic Influenza*
6 *How Pandemics are Unique*
7 *Sample Pandemic Activation Matrix*

How to Use this Document

NCHRP Report 769: A Guide for Public Transportation Pandemic Planning and Response has been developed to provide support to transportation organizations as they prepare for pandemics and other infectious diseases. While primarily intended for small urban and rural transportation organizations, this guide can be used by all types and sizes of transportation agencies and organizations that may have achieved different levels of preparedness for pandemics.

A pandemic can be described as a global disease outbreak. For example, when a new influenza virus emerges, flu pandemic can occur. (See http://www.cdc.gov/flu/avianflu/influenza-a-virus-subtypes.htm for information on types of influenza viruses.) Depending on the characteristics of the disease, it may spread easily, there is little or no immunity to the disease, no vaccine is available, and there is a high rate of people getting sick and/or dying. This guide relies on this basic definition of pandemic (i.e., the disease is novel, easily spread, there is little or no immunity, and there is no vaccine). Pandemics cause significant absenteeism, change patterns of commerce, have limited immediate medical solutions and interrupt supply chains—all of which can have devastating effects on the operations and long-term sustainability of small transportation organizations.

This guide provides information that small and rural transportation systems can use for good decision making, actions, and outcomes for a global pandemic, which is also useful for seasonal flu and other disease outbreaks. The guide and its tools are intended to be used by rural and small urban transit organization planners, planning committees, and administrative personnel, and can also be used by systems of any size. It provides information, tools, tips, and guidance on where to find up-to-date recommendations from federal agencies and other resources prior to and during a pandemic. It is valuable both for those who read from start to finish and those who are looking for specific resources.

The guide will assist transportation agencies in internal planning and working with allied organizations to:

- Enhance their ability to address pandemics in particular;
- Improve their approach to minimize the impact of all infectious diseases; and
- Improve overall emergency management capabilities.

During an actual pandemic, there will likely be a lot of information available through the media, social media, and from the CDC and local public health agencies. Federal, state, and regional

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transportation organizations may also provide information and guidance. Transportation agencies that do not develop an understanding of pandemics and take specific preparedness actions (policy and operational) will likely struggle to respond safely and effectively in a timely manner.

This document has been designed for use based on the objectives described below.

Allow Different Sized Transportation Agencies to Use the Guide in Targeted Ways

Many of the issues remain the same regardless of the size of the community and transportation agency. What changes with community size is the scope of the challenges and the resources to address planning issues. Exhibit 1 provides guidance on how to use this document depending on the organization size and emergency management experience level.

Serve as a Centralized Resource Rather than Regurgitating Other Guidance Documents

There is a wealth of information available from various resources to assist transportation agencies in general disaster preparedness and provide general information on pandemic preparedness. Over time, additional valuable information and guidance becomes available from varied sources. This guide is designed to bridge that gap and provide pandemic preparedness guidance specifically for transportation agencies.

Rather than replicating resources, this guide provides references to other documents available in the public domain that can provide additional information on specific topics. These are placed throughout the guide; Exhibit 2 is an example of what these look like.

Provide Guidance to Both Policy Makers and Emergency Planners in a Single Document

Most disasters that cause major impacts to the transportation system are caused by severe weather or geological factors. In contrast, a pandemic's cause is invisible; disease-causing organisms that travel from person to person (sometimes through an intermediary host) create impacts

		EMERGENCY MANAGEMENT EXPERIENCE	
		Low	**High**
SIZE OF TRANSPORTATION AGENCY	**Large**	Users are encouraged to read the entire document and access resources listed to provide a basis and context for developing organizational emergency management programs for pandemics and "all-hazards."	Users are encouraged to review the information on pandemics if current planning efforts do not address infectious diseases.
	Small	The checklist and planning tools are best used in conjunction with the text and cited resources as references for addressing emergency management as well as infectious disease planning.	The checklists and planning tools can be used to guide discussion and measure progress on effective pandemic planning.

Exhibit 1. Size of agency and level of emergency management experience.

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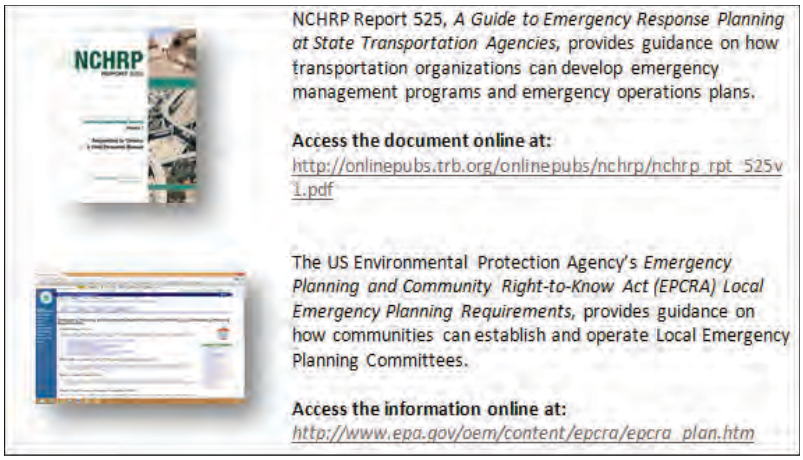

Exhibit 2. Example of additional resources placed throughout guide.

on transportation that are human related rather than structural. As such, pandemics can create serious ethical, logistical, and operational challenges that are best addressed in advance by the organization and community policy makers, emergency planners, and department managers.

This guide has been developed to aid individuals in all these roles simultaneously. Issues that must be resolved at a policy level are highlighted in the following areas:

- Chapter 3: Decision Making and Partnerships (see page 18).
- Decision Making and Partnership Planning Tool (see page 44).

Organize the Document to Minimize Narrative and Maximize Tools

For a planning guide to be useful it must include a combination of narrative and hands-on tools for its users. The first chapter is primarily narrative as it provides background on what a pandemic is and what it means to an agency. Subsequent chapters provide basic narrative to describe the content area; provide a series of tables, diagrams, tools, and checklists; and direct users to additional resources.

Tools and checklists are referenced in each chapter but are shown in full at the end of the document. Likewise, complete references to the additional resources identified in each chapter are included at the end of the document. Exhibit 3 summarizes how each chapter balances narrative with tools and checklists

What Is Important to Know About Pandemics?

Pandemics are just one of the many calamities with which humans may be confronted. Unlike hurricanes, earthquakes, and industrial accidents, which are localized and damage infrastructure, pandemics are global and do not cause physical damage to infrastructure. Rather than one geographical area responding and other areas lending aid, many communities will have to respond to a pandemic at the same time, so resources may not be able to be shifted. Widespread absenteeism and challenges in containing the disease will disrupt how communities work, socialize, and travel.

Rural and small urban transportation organizations may be especially hard hit with dramatic worker absenteeism, ongoing and additional need for services, disruptions from their supply

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Contents	Chapter Objective	Tools	Checklist	Additional Resources
Chapter 1: Introduction	Provides an overview of pandemics and their impacts to transportation organizations.	X		
Chapter 2: How Prepared Is an Organization for a Pandemic?	Provides an overview of all-hazards emergency management and provides tools designed to help transportation organizations identify their vulnerabilities to pandemics and begin to address them.	X		X
Chapter 3: Decision Making and Partnerships	Discusses the importance of decision making and coordinating with like and allied organizations prior to and during an emergency.	X		X
Chapter 4: Preventing the Spread of Disease	Discusses the public health disaster containment strategies and how transportation organizations can adopt and adapt them internally.		X	X
Chapter 5: Providing Services During a Pandemic	Outlines the process for defining essential functions and determining how services may be utilized differently.		X	X
Chapter 6: Workforce	Outlines the process for identifying and addressing potential workforce challenges during a pandemic.		X	X
Chapter 7: Crisis and Emergency Risk Communication	Outlines the actions all transportation organizations should take in order to prepare for the demands of communications during a pandemic.		X	X

Exhibit 3. Document organization.

chain, and a confused and scared public. Preparing for pandemics focuses less on more common mitigation and emergency preparedness activities such as hardening structures, learning how to use new equipment, or practicing response to a mass casualty trauma incident. Rather, the focus is on planning through complex and sometimes controversial issues related to workforce, safety, services, and public communication.

Urban transportation agencies, with more resources and staff than their rural and suburban counterparts, may seem to be better positioned for pandemic planning. However, rural and suburban organizations typically offer a more targeted set of services. Planning effectively for pandemics can be time consuming and challenging, but can help planners and their transportation organizations prepare for all highly infectious diseases and other types of disasters since the focus is on the continuity of operations planning, staffing, crisis communications, and safety. For small urban and rural transportation organizations, this means targeting their specific set of services and developing plans to address the results of a pandemic.

While there have been numerous outbreaks over the millennia, the most notable pandemics in history are the Black Death (bubonic plague) in the 14th Century and the 1918 Spanish Flu. Other diseases that have caused widespread morbidity and mortality (the rates of disease and death) include smallpox, malaria, HIV/AIDS, cholera, and typhus. Vaccines and treatments have been developed for many of these widespread killers. However, over time diseases may evolve, medications may become less effective, or new diseases may emerge.

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Characteristics of a Pandemic	Impact to Transportation Organization
Widespread workforce shortages	• Significant absenteeism amongst employees • Disruption to supply chain • Lack of resources/mutual aid support from surrounding communities and like organizations • Change in required services and operations
Confusion and fear amongst public and employees	• Increased need for public information about services, changes to procedures, restrictions • Coordination of messages with other local agencies • Safety concerns regarding sick passengers and their impact on the workforce
Implementation of public health strategies to limit transmittal of the disease (e.g., social distancing, personal protection)	• Challenges implementing containment and control strategies • Increased need of scarce personal protection supplies (e.g., gloves, masks, hand sanitizer)

Exhibit 4. Pandemic impacts to transportation organizations.

The diseases that may become pandemics often have one or more of the following origins and characteristics:

- Currently in existence but not widespread (e.g., Ebola);
- Novel diseases:
  - Current diseases that go through significant changes (known as shift) and become more dangerous (e.g., Avian influenza)
  - New diseases that were previously unknown (e.g., SARS, MERS-CoV)
- Populations may have little or no resistance or immunity to these diseases; and
- No vaccine or pharmacological intervention is currently available.

Transportation organizations will be both directly and indirectly impacted by a pandemic occurring within their community with the effects potentially lasting from weeks to extended periods (see Exhibit 4).

Case Study: Pandemic Influenza

Pandemic influenza is an example of a disease, but not the only disease, that this guide can help address. Recognizing the ongoing concern regarding various types of non-seasonal influenza that emerge periodically, this section will help those engaged in infectious disease planning. (A highly virulent influenza outbreak would test any organization; thus, using influenza as a model for pandemic planning is appropriate.) Exhibit 5 summarizes the differences between a seasonal flu and pandemic influenza.

Pandemic influenza will likely include a more severe version of seasonal flu symptoms such as a fever of 100°F or higher, cough, sore throat, runny or stuffy nose, headaches, body aches, chills, and fatigue. More common in children are the added symptoms of nausea, vomiting, and/or diarrhea, although adults may also suffer from these symptoms, depending on the virus strain and individual.

Rates of serious illness, hospitalization, and deaths will depend on the specific virus. It is impossible to predict which risk groups are most likely to see more severe and fatal infections, but they are likely to include infants, the elderly, pregnant women, and persons with chronic

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Seasonal Flu	Pandemic Influenza
Happens annually and usually peaks in January or February.	Rarely happens (three times in 20th century).
Usually some immunity built up from previous exposure.	People have little or no immunity because they have no previous exposure to the virus.
Usually only people at high risk, not healthy adults, are at risk of serious complications.	Healthy people may be at increased risk for serious complications.
Health care providers and hospitals can usually meet public and patient needs.	Health care providers and hospitals may be overwhelmed.
Vaccine available for annual flu season.	Vaccine probably would not be available in the early stages of a pandemic.
Adequate supplies of antivirals are usually available.	Antivirals may be in limited supply and may not be effective.
Seasonal flu–associated deaths in the United States over 30 years ending in 2007 have ranged from about 3,000 per season to about 49,000 per season.	Number of deaths could be high (the U.S. death toll during the 1918 pandemic was approximately 675,000). The virulence of the disease and effectiveness of medical support measures is unknown.
Symptoms include fever, cough, runny nose, and muscle pain.	Symptoms may be more severe.
Usually causes minor impact on the general public, some schools may close and sick people are encouraged to stay home.	May cause major impact on the general public, such as widespread travel restrictions and school or business closings.
Manageable impact on domestic and world economy.	Potential for severe impact on domestic and world economy.

Exhibit 5. Seasonal flu versus pandemic influenza. *Adapted from* http://www.flu.gov/pandemic/about/index.html

or immunosuppressive medical conditions. Sometimes, as in the 1918 influenza pandemic, the virus hits young healthy adults.

Pandemic influenza, much like the seasonal flu, can be a highly contagious virus spread from person to person through coughing, sneezing, talking, and breathing. The virus can land on surfaces (called fomites) including skin and then be transmitted to others through physical contact such as shaking hands.

For transportation organizations with even robust emergency management programs in place, addressing the needs of a pandemic will require a shift in thinking. Most potential threats and vulnerabilities that emergency management focuses on are very different in their nature than a pandemic. Many of the planning assumptions normally incorporated into plans and efforts will be different. It is important to understand how pandemics are different from other hazards such as tornados, earthquakes, and mass casualties. (See Exhibit 6.)

Pandemics threaten to overwhelm routine capabilities and disrupt essential services and operations both domestically and internationally. The best place for transportation agencies to begin preparing for pandemic influenza is to understand what an outbreak would look like and how it varies from other hazards.

Why a Pandemic Plan Is Needed

Unless there is an outbreak of a highly infectious disease that originates in an organization's community, there will generally be a period of time where events unfold and the disease is distant (known as a "rising tide"). Taking a measured and tiered approach to response is generally

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Most Disasters	Why Pandemics are Different	Impact to Transportation Organization
Most disasters strike a specific geographical area (e.g., tornado, extreme weather, blackout) while sparing surrounding areas, which then often provide assistance.	Pandemics are global and local.	• When a pandemic emerges, expect it to spread around the world. • Some countries or regions may try to delay the pandemic's arrival through border closings and travel restrictions. • Expect that the pandemic will hit both globally and locally at the same time or in geographical waves. • Whatever challenges are faced by communities and transportation systems will likely be shared by many others, leading to a lack of mutual aid and shortage of transportation, medical, and safety supplies. o Transportation organizations will likely not benefit from mutual aid as nearby agencies will probably be experiencing similar issues.
Worker absenteeism may occur initially but not extend past a week or two.	Dramatic worker absenteeism will have broad and deep impacts.	• In a severe pandemic, absenteeism attributable to illness, the need to care for ill family members, and fear of infection may reach 30% or more during the peak weeks of a community outbreak, with lower rates of absenteeism during the weeks before and after the peak. • Certain public health measures (closing schools, isolation, quarantining household contacts of infected individuals) are likely to increase rates of absenteeism. • The high level of absenteeism will have a direct effect on the transportation organization's workforce and also impact vendors, supply chains, infrastructure, and society as a whole.
The assumption when planning for most major disasters is that there will be damage to structures and/or critical infrastructure (e.g., hurricane, fire, and floods) with injuries as a secondary impact.	Significant impact without structural damage.	• Pandemics are a public health emergency where the primary impact is the health of individuals within a population. o Pandemics cause no damage to structures or equipment. • Organizations must be prepared for significant workforce challenges which, depending on rates of disease and death, can also require long-term recovery strategies. • Pandemics may require routine and periodic disinfection of vehicles and equipment.
The assumption when normally planning for a disaster is that the response time will usually be anywhere from a few hours to a week. Response to the disaster is typically rapid.	Response time is in months, not hours or days.	• Organizations often have foreknowledge of potential impact by the disease. • Planning for workforce shortages that may last a week is very different than shortages that may last for months. o Epidemics require different thinking as they are expected to last six to eight weeks in affected communities. • Multiple waves (periods during which community outbreaks occur across the country) of illness are likely to occur. o Each wave may last two to three months when the communities and their residents are already compromised.
Healthcare providers and hospitals can usually meet the needs required by infectious diseases such as the seasonal flu.	The healthcare system will be overloaded for months without the benefit of mutual aid between facilities.	• With little or no immunity to a pandemic microorganism, infection and illness rates will soar, sending more people to the hospital than hospitals have the beds, staff, ventilators, or supplies to effectively provide care. • Death rates may be high depending on the number of people infected, the strength of the virus, the underlying characteristics and vulnerability of affected populations, and the effectiveness of preventive and supportive measures.

Exhibit 6. How pandemics are unique.
(continued)

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Most Disasters	Why Pandemics are Different	Impact to Transportation Organization
		• The disease may disproportionately impact healthcare workers, further reducing the availability of medical services.
Modern medicine can normally address disaster-caused medical issues immediately following a disaster.	Inadequate medical interventions available.	• Pandemics require medicines and/or vaccines that may not be available in the early stages of a pandemic or effective. o Once a potential pandemic microorganism's characteristics are identified, it will take considerable time (e.g., 6-8 months) before a vaccine could be widely available, if at all. o Many of those hospitalized with severe respiratory symptoms will require ventilators that are in limited supply despite emergency caches.
Some communications systems may be operational during a disaster. Using the available communications systems and clear messages tailored to employees and customers will prevent confusion in the long-term.	The massive scope of a pandemic combined with rarely used disease containment strategies will make the need for consistent and accurate information essential.	• Transportation agencies will likely need to alter services that will require constant communication with employees as well as those who use the services. o Smaller transportation organizations may not have staff trained to deal with this time-intensive activity.
Traditional first responders (e.g., police, fire, search and rescue) normally take the lead in disaster response.	Public health agencies are the lead response agency.	• The robustness of public health support services varies greatly around the nation. o The clear trend is that rural public health agencies have difficulty providing even the basics expected in a comprehensive public health program due to demographics, funding challenges, population density, existing chronic diseases, and long distances. • While all disasters have a public health component, pandemics will clearly impact the ability of public health to prevent and treat widespread disease outbreaks. • In many jurisdictions, the local public health department is tasked with operational responsibilities such as managing and staffing alternate care sites (ACS, places that provide medical care when hospitals are full) and points of distribution (POD, places to distribute medicine), which are often beyond locally available resources.
People don't need to be 'policed' on how they interact and congregate.	Public health at the federal, state, and local levels has the power to require individuals to take specific actions to protect public health.	• In addition to providing medical care to those already afflicted with a pandemic disease, several strategies recommended or ordered by health departments will attempt to limit social interactions and disease spread in order to reduce illness and death. • Many of the key disease containment strategies (e.g., isolation, quarantine, social distancing, closing places of assembly, and/or furloughing non-essential workers) create challenges for transportation agencies whose workforce may work in close proximity to one another (e.g., cubicles) and interact directly with the public; and transports individuals positioned closely together. • Modifying normal operations to create distance and the use of personal protective gear will alter how operations are run.

Exhibit 6. (Continued).

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prudent. Having a plan that sets forth roles, responsibilities, and policies will help assure that organizations can make good decisions.

Whether transportation organizations address a pandemic in the main emergency operations plan as an annex (recommended) or as a standalone plan (not recommended), the document should include an activation section that provides leadership with guidance on when to activate specific actions within the plan and make operational decisions.

The following examples demonstrate a reasoned escalation to an infectious disease outbreak that has impacts on a transportation organization:

- **Standby/alert/monitoring.** When an infectious disease outbreak occurs somewhere in the world that causes concern to public health officials, transportation agencies should take notice and follow events as they evolve. This may involve tracking developments (known as situational awareness) by monitoring media reports, public health alerts, and communications from state and federal transportation agencies. Emergency plans should be revisited, contact lists and agreements updated, perhaps a tabletop exercise planned, and active participation with local emergency management and public health functions should be reinforced.
- **Minor impact.** Even if the disease has not been found within a jurisdiction, concerns about contracting a disease that has arrived in close proximity may disrupt ridership patterns, absenteeism may rise, supply chains may be interrupted, and mental health issues may increase. At this level, efforts should be made to ensure transition to the next level of impact.
- **Moderate impact.** The disease has arrived. Riders and employees have contracted the disease. While the community and organization are impacted, day-to-day activities are still occurring with some modifications such as changes in routing, scheduling, and frequency.
- **Major impact.** The community is deep within the throes of the outbreak. Staffing within the organization is problematic, ridership patterns are significantly different than normal, and providing service is challenging. Both full-time and part-time employees are impacted.
- **Catastrophic impact.** Society has broken down to the point that basic food, clothing, shelter, and access to medicine are not readily available. Transportation organizations severely curtail or halt service. *(Note: This guide does not address a catastrophic impact in detail.)*

Activation of different levels of response should be coordinated with local emergency management, public health, and regional/state transportation agencies. See Exhibit 7 for a description of the sample pandemic activation matrix available at the end of this Guide.

This tool is included on page 42 of Chapter 7.

Purpose: *Provide a sample activation matrix for a pandemic plan/annex.*

Directions: *Customize the chart to a transportation organization and include the Activation Matrix in a pandemic plan/annex.*

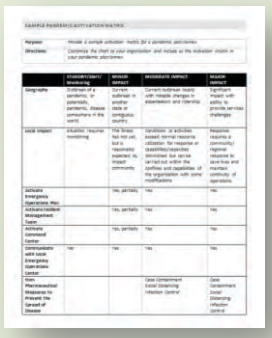

Exhibit 7. Sample pandemic activation matrix.

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CHAPTER 2

How Prepared Is an Organization for a Pandemic?

This guide is based on an "all-hazards" approach to emergency management, the national standard within the emergency management field (see Exhibit 8). The all-hazards approach provides a consistent set of practices for preparing for and responding to a wide variety of hazards (natural, technological, and manmade). Pandemic response is built on a foundation of emergency management as many of the steps in the emergency management process are shared with other types of hazards (e.g., geological, weather, or hazmat).

Preparing for a pandemic is most efficient when a robust emergency management program is in place and key components within a transportation organization's all-hazards response plans have been discussed, documented, trained, exercised, and tested.

A pandemic is only one of many hazards that may impact a transportation organization or may require the organization to support the community. All organizations should have a robust emergency management program crafted for all-hazards. Exhibit 9 describes how all-hazards disaster management can support pandemic response.

Exhibit 9, which is adapted from an article from the World Health Organization, depicts how all-hazards disaster management practices and principles apply to pandemic planning and response.

This chapter provides an overview of all-hazards emergency management and provides tools designed to help transportation organizations identify their vulnerabilities to pandemics and begin to address them.

Exhibits in this Chapter

8 *Traditional Components of a Comprehensive Emergency Management Program*
9 *How All-Hazards Disaster Management Supports Pandemic Response*
10 *Key Actions for Preparing for a Pandemic*
11 *Additional Resources for Developing Emergency Management Competency*
12 *Pandemic Vulnerability Assessment Tool*

Exhibit 8. Traditional components of a comprehensive emergency management program.

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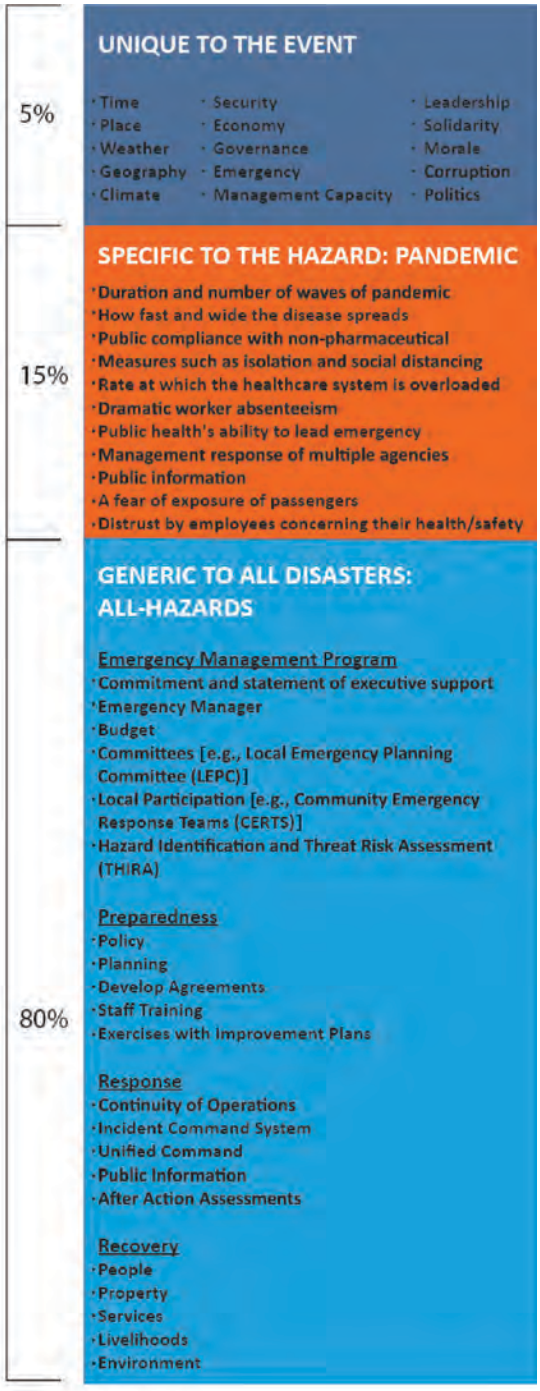

Exhibit 9. How all-hazards disaster management supports pandemic response. *Adapted from* http://www.who.int/hac/techguidance/tools/WHO_strategy_consecpts_in_emegency_management.pdf

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Preparing for a Pandemic

For pandemic planning, the transportation organization must take several key actions. Exhibit 10 lists these actions and the relevant tools provided in Chapter 7. Exhibit 11 describes additional resources for developing emergency management competency.

Identifying Organizational Vulnerabilities During a Pandemic

In order to prepare for pandemics, transportation organizations must grapple with several complex challenges that prevent business as usual.

- Pandemics are global and can last for months.
- Stopping the spread of disease will require individuals to change their habits (e.g., washing hands more frequently, not gathering with others, etc.) which will likely be tough to enforce amongst the American public.
- The healthcare system will be overloaded.
- Dramatic worker absenteeism will have far-reaching impacts.
- Coordination with other agencies, especially public health, will be required.
- Public information will be essential and challenging.
- A fear of exposure to an infectious disease may significantly curtail ridership and/or increase rider anxiety (this will also affect employees).
- Modification of normal operations for the transportation organization may be necessary to support community needs.
- Legislative and administrative issues (e.g., occupational safety and health, Social Security, benefits, and employment status) for employees may require special attention.

Preparing for pandemics is more time consuming than expensive, but efforts can have multiple benefits such as more comprehensive all-hazards plans, preparedness for other infectious diseases, improved preparations for addressing sensitive workforce issues, and improving the robustness of services during a disaster.

Actions	Relevant Tools
Conduct a comprehensive Hazard Vulnerability Assessment and develop comprehensive, usable, relevant emergency plans.[1]	Pandemic Vulnerability Assessment
Develop strong relationships with community and allied organizations through meetings, training, and exercising.	Decision-making and Partnership Planning Tool
Develop agreements (e.g., mutual aid agreements, service agreements) that are validated prior to an emergency.	
Acquire equipment that may be needed during an emergency.	Providing Services During a Pandemic Checklist
Conduct regular internal and external exercises to identify organization and community strengths and shortfalls; and enhance confidence, competence, and problem solving.	Exercise design, deliver, and evaluation training and tools (e.g., Homeland Security Exercise Evaluation Program)

[1] See the CDC Influenza Risk Assessment Tool (IRAT): http://www.cdc.gov/flu/pandemic-resources/tools/risk-assessment.htm

Exhibit 10. Key actions for preparing for a pandemic.

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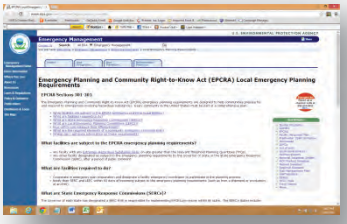
A Guide to Emergency Response Planning at State Transportation Agencies
NCHRP Report 525: Surface Transportation Security, Volume 16: *A Guide to Emergency Response Planning at State Transportation Agencies*, provides guidance on how transportation organizations can develop emergency management programs and emergency operations plans.

Access the document online at:

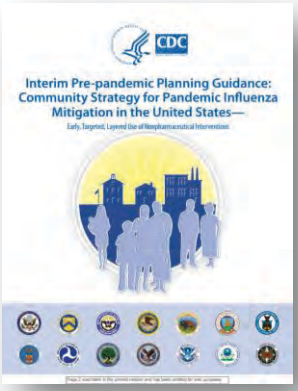
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_525v16.pdf



Emergency Planning and Community Right-to-Know Act (EPCRA) Local Emergency Planning Requirements
The U.S. Environmental Protection Agency's (EPA) *Emergency Planning and Community Right-to-Know Act (EPCRA) Local Emergency Planning Requirements* provides guidance on how communities can establish and operate local emergency planning committees.

Access the information online at:

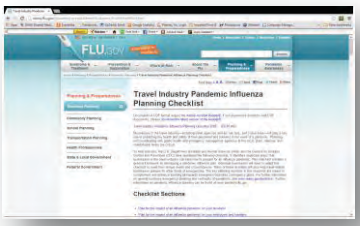
http://www.epa.gov/oem/content/epcra/epcra_plan.htm



Interim Pre-pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States—Early, Targeted, Layered Use of Nonpharmaceutical Interventions
The CDC's *Interim Pre-pandemic Planning Guidance: Community Strategy for Pandemic Influenza Mitigation in the United States—Early, Targeted, Layered Use of Nonpharmaceutical Interventions* provides interim planning guidance for state, territorial, tribal, and local agencies that focuses on several measures other than vaccination and drug treatment that might be useful during an influenza pandemic to reduce its harm.

Access the information online at:

http://www.flu.gov/planning-preparedness/community/community_mitigation.pdf



Travel Industry Pandemic Influenza Planning Checklist
The CDC's *Travel Industry Pandemic Influenza Planning Checklist* provides a simple check-off list relevant to rural transportation organizations.

Access the information online at:

http://www.flu.gov/planning-preparedness/business/travelchecklist.html

Exhibit 11. Additional resources for developing emergency management competency.

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This tool is included on page 43 of Chapter 7.

Purpose: *Assist transportation organizations in identifying vulnerability to a pandemic.*

Directions: *Use this assessment to facilitate an internal discussion about where the organization's vulnerabilities are and how to best address them with limited time and budgetary resources.*

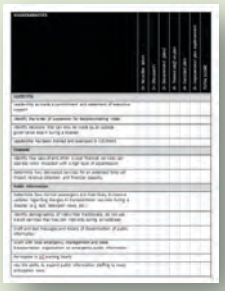

Exhibit 12. Pandemic vulnerability assessment tool.

The primary impacts of pandemics are widespread absenteeism (~15%–40%) across all sectors for an extended period of time. As a result, all organizations including rural and small urban transit organizations will need to function with fewer staff, which will impact transit service lines, maintenance and repair, local critical infrastructure, and vendors that help transit function. Since rural and small urban transit agencies often provide the sole or primary transportation options for their passengers, better understanding of the organizations' vulnerabilities is key to ensuring that essential services can continue.

All the major vulnerabilities transportation organizations are likely to have during pandemics stem from (1) a lack of preparedness, (2) across the board workforce shortages, or (3) responses to public information and/or public health strategies to limit transmittal of the disease. The pandemic-specific hazard vulnerability assessment tool (Exhibit 12) helps agencies identify areas for improvement.

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CHAPTER 3

Decision Making and Partnerships

This chapter discusses the importance of decision making and coordinating with like and allied organizations prior to, and during, an emergency.

Exhibits in this Chapter

13 *Decision Making and Partnership Planning Tool*
14 *Additional Resources for Developing Partnerships*

The oft repeated phrase, "It's all about relationships" is never truer than during emergencies. Knowing the other organizations and their capabilities, resources, competencies, and limitations is key to working together effectively in a pandemic.

Situational awareness and analysis are among the most difficult components to maximize in emergency management. Good decisions, appropriate actions, and accessing needed resources are tied to a firm understanding of what has occurred, what may happen, and what is being done to make the circumstances better (or worse). Information is not just collecting data; it is analyzing the data and concurrently sharing relevant organizational impacts, needs, and projections. Information sharing takes many forms, including formal and informal means of communication.

Decision Making

Along the continuum of any emergency, decisions must be made at many levels. As part of emergency planning, prior clarity regarding responsibility and authority to make decisions and commit resources will improve organizational effectiveness. In general, delegation of authority to the lowest appropriate level is preferred.

In small urban and rural transportation systems, the persons charged with managing emergencies may be "wearing several other hats." Further, decisions made within the organization may have far-reaching effects. Communication and coordination with local emergency management, public health, and other transportation organizations is imperative.

Good decisions are made based on good information (situational awareness and analysis) and the development and implementation of objectives, strategies, and tactics that support organization and community goals. Using tested emergency management techniques and systems will aid leaders in decision making.

Emergency management has evolved significantly in recent times, with much more consistency in organizational structure, nomenclature, communication, and coordination. Even with these advancements, response to an emergency is often less than ideal, especially when the hazard is as infrequent and inherently ill-defined as a disease outbreak.

At the national level, the NIMS provides a comprehensive, nationwide approach to incident management. This system includes components for preparedness, communications and information, resource management, command, and maintenance. Field responders, emergency managers, and medical response personnel typically use organizational structures and processes

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This tool is included on page 44 of Chapter 7.

Purpose: *Assist transportation organizations in breaking down decision making and inter-agency partner issues.*

Directions: *Use this planning tool to determine how specific planning issues translate to a response using the ICS.*

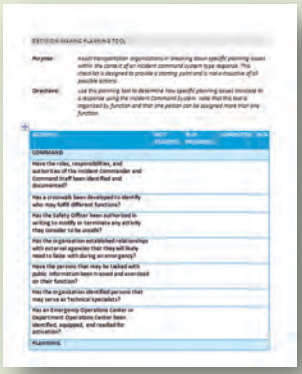

Exhibit 13. Decision making and partnership planning tool.

based on the ICS, the field version of NIMS. For example, hospitals use the Hospital ICS. (See details from the California Emergency Medical Services Authority at: http://emsa.technicate.com/disaster_medical_services_division_hospital_incident_command_system_hics).

Disrupting the normal routine—even when policy is in place—requires a great deal of planning to ensure people know what to do, understand what is going on, and have the tools required for the job.

The NIMS/ICS are used for response and as helpful tools for organizing how preparedness, inter-agency coordination, and decision making will take place. A decision-making planning tool (see Exhibit 13) has been included in Chapter 7 to help organize planning challenges using the ICS. This tool helps identify what needs to be addressed in plans, procedures, inventory, and infrastructure to implement the policy when the time comes. This matrix uses the five functions of incident command as a foundation for brainstorming and is not all-inclusive.

Working with Partners

No organization functions in a vacuum. Each entity is interdependent and even more so during an emergency. The time to establish relationships with allied organizations is well before an event occurs.

Transportation organizations are part of an overall community and will likely play a key role in pandemic response. To be an effective partner, a transportation agency should:

- Communicate the transportation organization's capabilities and resources to local emergency management and public health agencies;
- Convey the transportation organization's needs to response agencies; and
- Understand how inter-agency communication will work in a pandemic to ensure effective information exchange, coordination, and decision making.

Partners in a pandemic response can include:

- Other transportation and transit organizations (e.g., regional and state transportation agencies and authorities; similar and complementary services; and transportation providers in contiguous areas);

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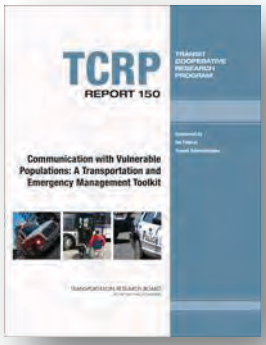

Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit

TCRP Report 150: Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit provides a complete process for developing partnerships with other agencies and organizations for the purposes of emergency planning and response.

Access the document online at:

http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_150.pdf

Exhibit 14. Additional resources for developing partnerships.

- Local public service agencies;
- Emergency management;
- Public health;
- Suppliers and vendors; and
- End users (e.g., clients, rider advisory groups, and labor organizations).

Being an active participant in community pandemic planning will enhance the transportation organization's ability to function and support community response efforts. Transportation organizations can be active in pandemic planning by:

- Becoming familiar with forums, such as the LEPC and emergency councils, regional transportation associations, and public health emergency committees to better understand how pandemic response will be managed and how to effectively work with partnering entities.
- Participating in or initiating community exercises of all types, including internal training, drills, and exercises.
- Forming agreements in advance of a pandemic, such as mutual aid agreements, memoranda of understanding/agreement, and service contracts, to facilitate efficient use of personnel and equipment.
- Establishing personal relationships with key players across the decision-making and response spectrum.

Exhibit 14 describes additional resources for information on developing partnerships.

Emergency Operations Center

State and local emergency management organizations are usually organized around an emergency operations center (EOC). It is important for transportation organizations to understand the EOC structure and be prepared to communicate with emergency managers within the EOC framework.

A public transit agency may want to establish a department operations center (DOC), which is often a subunit of a jurisdiction's EOC. Smaller organizations might adapt their dispatch centers into a smaller-scale version of a DOC to coordinate with emergency management, public health, and other response agencies.

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Information Exchange

Communication refers to:

- The physical ability to convey and exchange information (e.g., voice, data, electronic communications) within an organization and to entities outside of the organization; and
- The actual exchange of information.

Transportation organizations that are part of a local emergency management system should review their communications capabilities and equipment (telephone, e-mail, satellite phone, dynamic message signs) as part of the pandemic planning process. This information should be shared with other response agencies, such as emergency management and public health.

Exchanging comprehensive, timely, and relevant information has benefits for the organization and the overall emergency management system. Transportation organizations should:

- Develop strategies to receive emergency management and public health information such as situation reports and health alerts.
- Be prepared to share emergency management and public health information, as appropriate. Such information would be shared with staff for planning and response purposes. Information would be shared with customers to further explain steps the transportation agency may plan to take in response to the pandemic.
- Be prepared to communicate information to emergency management and public health agencies. Such information may include: levels of ridership, absenteeism, readiness, personnel and needs for equipment and supplies for response operations, and anticipated changes in service.

Role of Policy Makers

The capabilities, capacities, and robustness of an organization's emergency management program is determined, in large part, by executive support. A real demonstrable, long-term, substantive commitment of executive support helps to establish emergency management within and outside of the organization. Making provisions and resources available for planning, training, and exercising leads to competencies within the organization. The decision makers must be competent themselves. This includes participating in training and exercising; and understanding where, when, and how decisions are made in solving problems and modifying policies during an emergency. Organization members look to their leaders for decisions, support, and morale, especially during times of crisis. Organizations with full executive support are invariably better prepared for emergencies than those where emergency management has diminished standing and resources.

For example, contrast the anticipated outcomes from (1) a seasoned, trained, and exercised leader who maintains good situational awareness and (a) knows when and how to activate the emergency plan, (b) knows how to open the DOC at an appropriate moment, and (c) knows when to escalate the level of response along the event timeline with (2) an organization where the leadership is untrained and has not addressed the necessary components of an effective emergency management structure.

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CHAPTER 4

Preventing the Spread of Disease

This chapter discusses the public health disaster containment strategies and how transportation organizations can adopt and adapt them internally.

Exhibits in this Chapter

15 *Measures that Prevent the Spread of Disease*
16 *Preventing the Spread of Disease Checklist*
17 *Three Types of Control Measures*
18 *Characteristics that Determine the Effectiveness of Non-Pharmaceutical Community Mitigation Activities*
19 *Non-Pharmaceutical Containment Measures: Definitions, Examples, and Considerations*
20 *Additional Resources for Preventing the Spread of Disease*

Public health departments (local, state, federal) will likely provide guidance on specific measures that transportation organizations should implement during a pandemic. These measures are initiated in coordination with public health agencies before explosive growth of the epidemic and, in the case of severe pandemics, are maintained consistently during an epidemic wave(s) in a community.

This guidance will be transmitted either directly or through a controlling body such as a county commission, city council, or parent organization.

Specific measures transportation organizations may implement based on public health recommendations at the time of a pandemic are designed to help prevent the transmission of communicable diseases (see Exhibit 15).

To effectively implement these measures requires:

- Coordination with and advice from technical experts in the community (e.g., physicians, environmental health experts) who understand how to interpret recommendations and address related challenges
- Supplies and equipment purchased prior to a pandemic
- Policies outlining what measures will and will not be taken
- Protocols for taking extraordinary measures to prevent the spread of disease
- Workforce training and education

Public health agencies at the federal, state, and local level have wide ability to determine what actions people must take to protect the public welfare. These police powers can have a significant impact on transportation systems, including ordering the cessation of service. At the local level, especially in rural areas, public health may not have extensive resources nor experience in emergency management and the exercise of those police powers. Transportation organizations should consult with local public health and emergency management officials and be able to articulate specific information and direction and control requirements for the transportation organization.

Exhibit 16 describes a checklist with specific activities for preventing the spread of disease.

Non-Pharmaceutical Interventions

The CDC coordinates a surveillance system internationally with the World Health Organization and domestically with state and territorial health departments. The state health departments coordinate data and information with local (e.g., county, city, tribal) health departments

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Measures	Examples
Engineering Controls	Separate people from the contamination (e.g., Plexiglas barriers for drivers and ticket sellers)
Administrative Controls	Training, plans, policies, and procedures that articulate and enforce means to reduce infection
Personal Protective Equipment	Gloves and respiratory protection to reduce contamination
Hand hygiene	Hand washing, waterless hand sanitizer
Environmental hygiene	Cleaning (e.g., steam cleaning, disinfectants) of stations, vehicles, and workplaces to minimize surface contamination (fomites)
Social distancing	Maintain a space of 3-6 feet between persons to minimize contamination from aerosol and droplets (e.g., sneezing and coughing); canceling church, schools, declaring "snow days" when everyone stays home. (It is important to note that social distancing decisions must be made in collaboration with all organizations that will be impacted. For example, if a small town is significantly impacted, a collaborative decision may be made to close schools, shopping centers, churches, non-critical medical facilities and government offices. This in turn would have direct impacts on the extent of need for transit.
Ventilation	Control heating, ventilation, and air conditioning to reduce the spread of contamination

Exhibit 15. Measures that prevent the spread of disease.

and healthcare providers. It is through this system of reporting cases, conducting disease (epidemiological) investigations and performing laboratory tests that agencies can predict and understand new pandemic diseases.

Non-pharmaceutical community mitigation activities will be the principal means of mitigating the progression and impact of the pandemic until adequate supplies of vaccine or medications are available (which may be 6 to 8 months). The non-pharmaceutical mitigation activities that may be implemented during a pandemic and that are addressed in this chapter are isolation and treatment, voluntary home quarantine, dismissal of students from school, canceling events of social congregation (e.g., theater, sporting events), social distancing, and infection prevention and control measures (e.g., hand hygiene, cough etiquette). Exhibit 17 provides an overview of these control measures.

This tool is included on page 46 of Chapter 7.

Purpose: *Provide a checklist of disease prevention actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use this checklist to chart the organization's progress.*

Exhibit 16. Preventing the spread of disease checklist.

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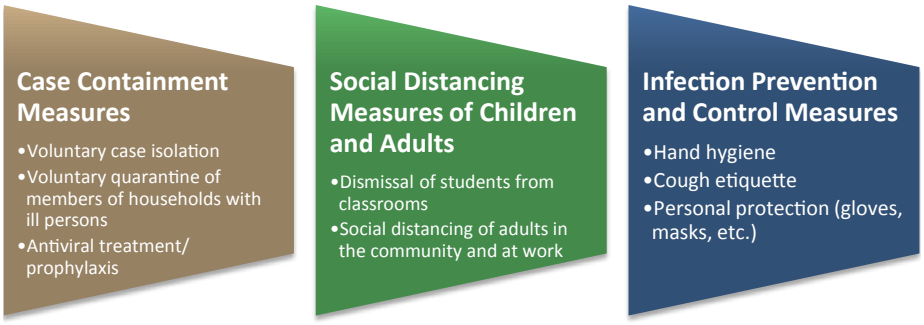

Exhibit 17. Three types of control measures.

Decisions about non-pharmaceutical community mitigation activities will be made amid considerable scientific uncertainty. Non-pharmaceutical community mitigation activities must be adapted to the epidemiologic (the study of disease) context of each phase of the pandemic. The effectiveness of non-pharmaceutical community mitigation activities is unknown and depends on characteristics of the evolving disease-causing microorganism (see details in Exhibit 18).

Non-medicated community mitigation interventions represent a cornerstone of pandemic response, particularly early in a pandemic when a vaccine is unlikely to be available. Public health agencies will institute various combinations of pharmaceutical measures as part of a comprehensive strategy to address the immediate and possible long-term shortage of pharmaceutical solutions to a pandemic. Each of the three strategies (case containment, social distancing, and infection prevention and control) will impact how transportation organizations manage and communicate with their workforce during a pandemic. Exhibit 19 provides details on several non-pharmaceutical containment measures and the relevant considerations for transportation organizations.

Characteristic	Description
Pathogenicity	How much of the germ causes disease, including how much of the virus, bacteria, or other microorganism is needed to make someone sick
Virulence	How sick the disease makes someone
Principal mode of transmission	Modes may include direct contact, indirect contact, droplet or aerosol
Onset and duration of shedding	How much a person gives off disease-causing particles
Attack rate in different groups	Infectivity of the microorganism
Proportion of asymptomatic infections	People who carry the disease but do not exhibit the disease symptoms
Clinical presentation	Observed signs or symptoms of the disease in a clinical setting (i.e., by a health practitioner)
Compliance among the targeted populations	An unpredictable percentage of the population will not comply with health department guidelines to reduce social interactions for a variety of social, economic, cultural, personal need, and potentially political reasons

Exhibit 18. Characteristics that determine the effectiveness of non-pharmaceutical community mitigation activities.

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Measure	Definition	Considerations for Transportation Organizations
Isolation	The separation of infected persons from other persons for the period of communicability in conditions that will prevent the transmission of the disease. In strict isolation, the individual is confined to a room with a separate bed, with direct contact only with designated caretakers.	Employees should stay home when sick. Protocols may be needed to address employees who report for work sick or become sick while on shift. Additionally, organizations should have protocols in place for sick passengers expecting to use transportation services.
Quarantine	The limitation of freedom of movement of persons or animals that have been exposed to a communicable disease for a period of time equal to the longest usual incubation period of the disease, in such manner as to prevent effective contact with those not so exposed.	Employees and/or their family members may be placed in quarantine by public health authorities.
Individual-level containment measures	Measures applied to individuals, as opposed to groups or communities.	Encourage family preparedness measures; maintain supplies of food, water, other necessities in case of home quarantine.
Quarantine of close contacts	The quarantine of individuals exposed to patients with communicable diseases; the individual should remain separated from others for a specific period. During that time, the individual should be regularly assessed for signs and symptoms of disease.	Employees or their family members may be placed in quarantine by public health authorities.
Community-based activity restrictions	Measures applied to groups of people or communities. Measures that may be beneficial and practical when there is a larger number of cases and more extensive viral transmission. In such settings, individual-level measures may no longer be effective or practical.	Public health may recommend changes to how people are transported, directly impacting a transportation agency. These may impact routes, seating arrangements, or boarding protocols. These measures may limit ridership.
Focused measures to increase social distance and decrease social interactions	Measures applied to specific groups (as opposed to individuals or whole communities), designed to reduce interactions and thereby transmission risk within the group. Focused measures apply to groups or persons in specific settings, most, but not necessarily all, of whom are at risk of exposure. Includes quarantine of groups of exposed persons and measures that apply to the use of specific sites or buildings.	Public health may recommend changes to how people are transported, directly impacting the transportation agency. These may impact routes, seating arrangements, or boarding protocols. These measures may limit ridership.
Restricting the use of specific sites or buildings or public events	A type of focused measure that may involve restricting entrance to a building or other site or requiring fever screening before entrance.	Cancelation of public events; closure of office buildings, schools, shopping malls; closure of public transportation such as rail or bus lines.

Exhibit 19. Non-pharmaceutical containment measures: definitions, examples, and considerations. *Adapted from* U.S. Department of Health and Human Services Pandemic Influenza Plan, November 2005 (http://www.flu.gov/planning-preparedness/federal/hhspandemicinfluenzaplan.pdf)

(continued on next page)

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Measure	Definition	Considerations for Transportation Organizations
Coordinated community and business closures	Voluntary measures that coordinate simultaneous closure of offices, schools, transportation systems and other non-essential community activities, services, and businesses for a specified period of time. All non-essential service personnel and community members are urged to stay at home.	Transit organizations need to coordinate with external organizations to alter services to meet community needs. Staffing within the transit organization may be altered to minimize non-essential personnel exposure.
Infection prevention and control measures	Use of physical barriers and hygiene measures to limit the risk of transmission.	Includes respiratory hygiene, cough etiquette, hand washing and hand hygiene, use of gloves, masks, and general hygiene and disinfection.

Exhibit 19. (Continued).

Cleaning and Disinfection of Transportation Assets

Maintaining safety in transportation locations and vehicles will require stringent cleaning and disinfection of transportation assets. The basic components of effective environmental management of pandemics include:

- Having a policy and appropriate EPA-registered disinfectants, personal protective equipment (PPE), and cleaning protocols for vehicles, stationary public areas, and work areas (contact county health department or public health agencies for recommended supplies and storage recommendations).
- Routine cleaning with soap or detergent in water to remove soil and organic matter, followed by the proper use of chemicals and steps that can reduce the chances of hand transfer of a disease, such as limiting physical contact with persons and surfaces, frequent hand washing, use of waterless hand cleaners, and the use of gloves.
- Reducing the aerosolization of disease-causing microorganisms during the cleaning process.
- Training and equipping workers to use disinfectants appropriately for their protection and safety.

Transportation organizations should have a policy of when and how to implement altered cleaning activities in response to a disease outbreak. Workers must be appropriately trained and equipped, including respiratory protection from chemicals used in the disinfection. (Note: Filters that are effective for protection from diseases may not be effective for chemical protection; check manufacturer's specifications.) Guidance on cleaning and disinfecting is available from flu.gov (see Exhibit 20).

Medical Interventions

Local and state public health prioritization schemes for vaccines, antivirals, and other medical countermeasures may or may not include frontline transportation workers. It is important that transportation agencies work with public health entities to ensure their essential workers are included in local plans for community vaccinations and medical support and receive an appropriate priority.

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Transportation Planning > Seasonal Flu Guidance

Disinfectants marketed in the United States are required to be registered by the U.S. EPA. These products must be used in accordance with their label instructions; following label instructions is necessary to achieve adequate efficacy and to avoid unreasonable adverse effects. Flu.gov provides guidance for the transportation industry on managing the close-contact environments in travel settings and for proper cleaning/disinfecting of stations, cargo, and passenger vehicles.

Access the most up-to-date guidance online at:

http://www.flu.gov/planning-preparedness/transportation

Antimicrobial Products Registered for Use Against the H1N1 Flu and Other Influenza A Viruses on Hard Surfaces

When cleaning and preventing the spread of disease, it is important to use appropriate disinfectants and to use them properly. For example, using alcohol based hand cleaners is effective against many germs, but is not considered appropriate for preventing the spread of clostridium dificile (known as c. dif). The manner in which these products are used is important. For example, while bleach and ammonia both are potent cleaners, mixing the two products can generate dangerous vapors.

Access the most up-to-date guidance online at:

http://www.epa.gov/oppad001/influenza-disinfectants.html

Interim Guidance for Passenger Railcar (Transit Vehicle) Cleaning When a Passenger or Crewmember is Visibly Ill During an Influenza Pandemic

Flu.gov provides interim guidance for passenger railcar (transit vehicle) cleaning when a passenger or crewmember is visibly ill during an influenza pandemic.

Access the most up-to-date guidance online at:

http://www.flu.gov/planning-preparedness/transportation/cleaning_railcar.html#

Interim Guidance for Cleaning Transit Stations During an Influenza Pandemic

Flu.gov provides interim guidance for cleaning transit stations during influenza pandemic.

Access the most up-to-date guidance online at:

http://www.flu.gov/planning-preparedness/transportation/cleaning_transit_stations.html#

Exhibit 20. Additional resources for preventing the spread of disease.

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CHAPTER 5

Providing Services During a Pandemic

This chapter outlines the process for defining essential functions and determining how services may be utilized differently.

Exhibits in this Chapter

21 *Providing Services During a Pandemic Checklist*
22 *Additional Resources for Identifying Essential Functions*
23 *Considerations for Service Utilization Changes that may Impact the Organization and Other Services*
24 *Services for Sick Riders: Direct and Indirect Disease Transmission*

Pandemics produce two operational burdens on local transportation organizations: widespread absenteeism across all sectors and infection prevention. Since both can have a substantial impact on the ability to provide services, transportation agencies must identify their essential functions and strategies for reallocating resources to maintain those essential functions if possible.

It is likely that for many residents without access to personal vehicles, the services provided by their local transportation organization are their most reliable and accessible option for transportation. This makes it even more important that small urban and rural transportation organizations prepare for potential service changes in advance of a pandemic. To best meet demand with the constraints caused by pandemic or other highly infectious disease outbreaks, it is critical that transportation agencies (ahead of time) identify essential services, project how services can be impacted by outbreaks, and establish policies/procedures for managing these events, including potentially transporting symptomatic individuals. A checklist on providing services during a pandemic is provided in Chapter 7 (see Exhibit 21).

Identifying Essential Functions

Essential functions are those functions (primary services and supporting services) that the organization must continue even in the event of an emergency. Non-essential functions are still important but can be deferred with minimal consequences until additional resources become available. Identifying essential functions is part of the continuity of operations planning process (see Exhibit 22).

These essential functions serve as part of the foundation for a local transportation agency's Continuity of Operations Plan (COOP). Essential functions may encompass those activities that are at the core of the organization's mission, but may also include activities that are deemed essential due to the nature of the outbreak (e.g., providing transportation to medical providers). By pre-identifying those functions that a transportation organization must continue or are the last to be curtailed if services are suspended in a pandemic, a large burden is lifted from decision makers trying to address multiple response issues during an outbreak. It will be useful to get insights from the partners (agency and nonprofit stakeholders and rider representatives) identified in Chapter 3 when discussing and determining essential functions. Organizations are reminded that pre-emergency projections should be re-evaluated prior to implementation to ensure decisions take into account actual circumstances.

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This tool is included on page 48 of Chapter 7.

Purpose: *Provide a checklist of service-related issues transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart to plot progress.*

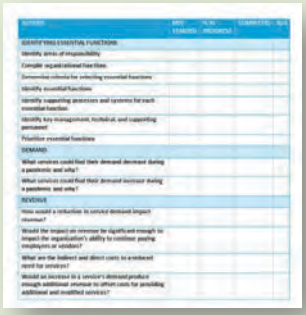

Exhibit 21. Providing services during a pandemic checklist.

Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies

A comprehensive guide on how to identify essential functions (in coordination with developing a COOP) can be found in the NCHRP Report 525, Volume 16: *Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies*. The worksheets provided at the end of that guide provide a detailed process, examples, and forms for identifying essential functions.

Access the document online at:

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_525v8.pdf

Developing Partnerships between Transportation Agencies and the Disability and Underrepresented Communities

TCRP Research Results Digest 107: Developing Partnerships between Transportation Agencies and the Disability and Underrepresented Communities provides guidance on addressing the needs of special needs populations.

Access the document online at:

http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_107.pdf

Exhibit 22. Additional resources for identifying essential functions.

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Service	Considerations
Fixed routes and on-demand	Based on route of transmission, modify service model
Commuter Services	Suspend or curtail
Peripheral Routes	Reduce frequency, change to on-demand, revamp with contiguous or complementary transit service providers
Non-pandemic related community events participation	Suspend

Exhibit 23. Considerations for service utilization changes that may impact the organization and other services.

This process is vital to being able to respond to long-term absenteeism in a strategic and organized fashion. Determining essential functions can be difficult because staff and others may incorrectly presume that any function that is not selected as essential is not important.

Service Utilization Changes

Based on the nature of a pandemic, the demand for transportation services could either be reduced or increased. Both scenarios, while temporary, bring challenges that can be addressed through the planning process (see Exhibit 23). During a pandemic, normal ridership will likely diminish due to:

- Workforce absenteeism.
- Reduced commerce.
- Fear of exposure to infection in a public setting.
- Directives from public health and/or emergency management.

Conversely, riders who would normally not use transportation organizations may change their travel patterns during an infectious disease outbreak. The rural and small urban communities may also see an influx of persons without personal vehicles migrating from more densely populated areas.

Services for Ill Passengers

It is highly probable that passengers who normally rely on public transportation and who may be exhibiting symptoms of the infectious disease will try to use the services of the transportation organization in order to get to work, school, medical appointments, or other locations. In order to best protect the serviceability of vehicles and the safety of other individuals on board, transportation agencies should establish clear safety protocols for providing reasonable accommodation to potentially contagious individuals while best protecting uninfected workers and riders.

Safety protocols should:

- Make worker protection the highest priority.
- Be mindful of the provisions of the Americans with Disabilities Act (ADA).
- Recognize that pandemics involve relatively untested and unfamiliar tasks.
- Take into account fear, uncertainty, and mental health issues.
- Recognize that there will likely be levels of rider and staff noncompliance.

Pandemic diseases are transmitted in various ways. The most significant for transportation organizations are through both direct and indirect means, as described in Exhibit 24. Not all methods of disease transmission are discussed in this guide.

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	DIRECT TRANSMISSION	INDIRECT TRANSMISSION
How it Spreads	• Airborne/droplet. • Spread by breathing (or other routes of entry such as the eyes) the agent that has been released from someone talking, sneezing, coughing, and (less so) breathing.	• Physical contact. • Spread by touching a surface that becomes contaminated with the disease (i.e., fomites) that can remain infectious outside the body.
Examples of illnesses spread this way	• Bacterial meningitis, chickenpox, common cold, influenza, tuberculosis, measles, rubella, whooping cough, SARS.	• Influenza, norovirus, clostridium difficile, Staphylococcus aureus, shigellosis.
Preventative Actions	• Deny service or provide reasonable accommodation. • Require sick rider to wear a surgical mask. • Transit worker wears N95 or equivalent. • Transit worker wears gloves and/or other PPE. • Social distancing enforced. • Use environmental controls such as physical barriers or stand-off zones. • Hand sanitizer provided. • Vehicle and structure disinfection.	• Deny service or provide reasonable accommodation. • Require sick rider to wear a surgical mask. • Require sick rider to wear gloves. • Transit worker wears gloves and/or other PPE. • Social distancing enforced. • Hand sanitizer provided. • Vehicle and structure disinfection.

Exhibit 24. Services for sick riders: direct and indirect disease transmission.

Multiple options are available to transportation organizations to minimize the spread of disease to riders, surfaces, and transit workers. Transportation agencies should incorporate some or all of the actions above when consistent with the recommendations of their local public health department or OSHA and the CDC. *Note: Activating safety protocols is an example of decision making by organization leaders.*

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CHAPTER 6

Workforce

This chapter outlines the process for identifying and addressing potential workforce challenges during a pandemic.

Exhibits in this Chapter

25 Workforce Checklist
26 Key Family Preparedness Activities in Support of a Pandemic
27 Additional Resources for Workforce Preparedness

When faced with a disease outbreak with many unknowns and a work setting that provides greater potential to contract the disease, ensuring that a sufficient and healthy workforce exists to support the organization's needs presents many challenges.

This section is intended to provide those involved in transportation emergency challenges the tools to identify and address the issues associated with workforce protection and management during an infectious disease outbreak. In addition, a workforce checklist is provided in Chapter 7 (see Exhibit 25).

Staffing

It is very likely during a pandemic that normal staffing routines will need to be changed due to one or more complications such as:

- Widespread absenteeism, possibly extending for months
- Change in staffing patterns due to changes in services
- Fear of exposure to infection (to both self and family)
- Increased staffing resources required in order to address new tasks caused by pandemic (e.g., more stringent cleaning of transit vehicles)
- Temporary reassignments to essential functions
- Fatalities in the workforce
- High levels of stress and anxiety
- Workers' compensation claims for illness and stress

Human Resources

While organizations generally tout their workforce as being their most valuable asset, it is during emergencies when those statements are most put to the test.

In a pandemic, worker safety and providing a healthy and safe workplace must be the highest priority for transportation organizations to maintain ample human resources. Regardless of the number of employees and the employer/employee arrangement (e.g., union, non-union, full-time, part-time, salaried, hourly), human resource policies must be in place prior to a pandemic in order to set clear expectations for both the organization and employees.

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This tool is included on page 50 of Chapter 7.

Purpose: *Provide a checklist of workforce-related actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart to plot progress.*

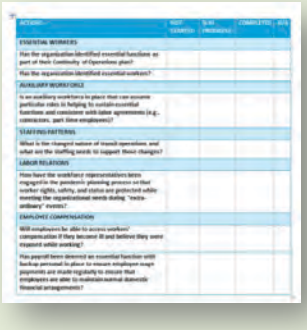

Exhibit 25. Workforce checklist.

Questions to consider when forming human resource policies include:

- Ability of staff to perform nontraditional essential job functions safely and effectively
- How to address refusal to do work based on concern for personal safety
- Needs for reasonable accommodation
- Compliance with standards associated with tasks (e.g., respiratory protection)

Family Preparedness

Family preparedness is instrumental to ensuring that a healthy staff is available and prepared to work during a pandemic. Organizations should encourage their employees to discuss and prepare for emergencies within their family unit to help ensure their sustainability and that of the transportation organization (see Exhibit 26). Organizations can encourage employees to prepare for pandemics and other emergencies by providing easy-to-use documents and by incorporating family preparedness into existing training and safety-themed activities (see Exhibit 27).

When possible and with appropriate privacy protections, organizations should try to identify and assess how the impact of school/daycare/adult care closures and other employee needs may impact the availability of employees during a pandemic. Transportation organizations may want to institute a family hotline, which serves as a direct and secure way for family members to be able to contact transportation workers.

Actions for all family members

- Encourage family members to wash their hands often with soap and water
- Limit contact when possible around sick people
- Cover the mouth and nose when coughing or sneezing
- If one does not have a tissue, cough or sneeze into the sleeve and not into hands

What to do when sick

- Plan to stay home for at least 10 days when sick during a pandemic flu to prevent spreading it to others and allowing one time to heal
- Determine who will take care of children or dependent adults if one is sick and share that plan with them

Supplies and plans to have on hand

- Have basic, over the counter health supplies such as a thermometer, tissues, and fever reducing medicine
- Have a current list of emergency phone numbers
- Determine who will take care of children and dependent adults in the case of school or daycare closures
- Make alternate plans for caring for children, dependent adults and/or pets in the case of longer work shifts

Exhibit 26. Key family preparedness activities in support of a pandemic.

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Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies

A comprehensive guide on how to identify essential functions (in coordination with developing a COOP) can be found in the NCHRP Report 525, Volume 8: *Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies*. The worksheets provided at the end of that guide provide a detailed process, examples, and forms for identifying essential functions

Access the document online at:

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_525v8.pdf

Developing Partnerships between Transportation Agencies and the Disability and Underrepresented Communities

TCRP Research Results Digest 107: Developing Partnerships between Transportation Agencies and the Disability and Underrepresented Communities provides guidance on addressing the needs of special needs populations.

Access the document online at:

http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_107.pdf

Family Preparedness Materials

The CDC has a series of posters and flyers designed to aid with family preparedness.

Access posters online at:

http://www.cdc.gov/flu/pdf/freeresources/family/spread-poster-print.pdf
http://www.cdc.gov/flu/pdf/freeresources/family/p_spreadpopcorn_print.pdf

Access flyers online at:

http://www.cdc.gov/flu/pdf/freeresources/updated/everyday_preventive.pdf
http://www.cdc.gov/flu/pdf/freeresources/updated/fluandyou_upright.pdf

Access a flu home care brochure online at:

http://www.cdc.gov/flu/pdf/freeresources/updated/influenza_flu_home care_guide.pdf

Exhibit 27. Additional resources for workforce preparedness.

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CHAPTER 7

Crisis and Emergency Risk Communication

Communication is always a challenge during a disaster, in part because it is more art than science. Crisis and emergency risk communication is the effort by experts to provide information to allow an individual, stakeholder, or an entire community "to make the best possible decisions about their well-being" within "nearly impossible time constraints" and help people ultimately to accept the "imperfect nature of choices" during the crisis, according to *Crisis and Emergency Risk Communication, 2012 edition* published by the CDC, page i.

During a pandemic, public health agencies will be the primary government agency communicating information to the public about the agent and its medical effects. However, it is crucial that transportation organizations of all sizes provide clear, consistent messages to all stakeholders (e.g., employees, response partners, riders) in order to anticipate problems and mitigate confusion, fear, and the spreading of false information.

Writing media releases, developing talking points, handling media and public inquiries, and preparing for and conducting media conferences are examples of activities that require knowledge, skills, and experience to perform effectively. Formal training and regular practice markedly improves the organization's capabilities, capacities, and competencies. In small systems many of these functions may be executed by local units of government, the EOC, or public health agencies.

This chapter outlines the actions all transportation organizations should take in order to prepare for the demands of communications during a pandemic. In addition, this chapter includes a Public and Media Relations Checklist (see Exhibit 28).

This chapter outlines the actions all transportation organizations should take in order to prepare for the demands of communications during a pandemic.

Exhibits in this Chapter

28 Public and Media Relations Checklist
29 Tenets of Emergency Public Information
30 Additional Resources for Crisis and Emergency Risk Communication

The Message

The actual message relayed by transportation agencies or their surrogates is important in the overall communications. Communicating during a crisis is different than routine communications and requires a more simplified message, as people are more distracted than normal (Exhibit 29).

- Present a short, concise, and focused message with limited detail targeted at a 6th-grade reading and comprehension level.
- Only include relevant information.
- Give action steps in positives, not negatives.

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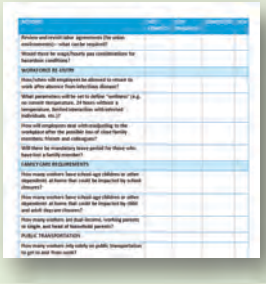
This tool is included on page 52.

Purpose: *Provide a checklist of public information actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*



Directions: *Use this checklist to keep track of the organization's progress.*

Exhibit 28. Public and media relations checklist.

- Create action steps in threes or fours, if appropriate.
- Repeat messages frequently using many different delivery methods.
- Use personal pronouns for the organization such as, "We are committed . . . "
- Avoid technical jargon.
- Avoid condescending or judgmental phrases.
- Promise or guarantee only what can actually be delivered.
- Do not use humor as people rarely get the joke when they are feeling desperate.

Emergency Public Information Is for Internal, as well as External, Audiences

Too often, organizations spend most of their efforts reaching out to the public but not effectively communicating with their staff and allied organizations. An informed staff is a staff that is more likely to show up at work when and where needed, work safely, and best protect the organization and execute its mission. The issues of rumor control (aka rapid response) and social media also apply to internal audiences.

Rumors Need to be Tracked and Responded to Rapidly

Rapid response (rumor control) must validate and intervene when inaccurate, incomplete, or misleading information is circulating. Rumors are the bane of emergency response. Rumors can divert resources and encourage individuals to respond to inaccurate information. Systems should be in place or tasks assigned to monitor all forms of communication, including social

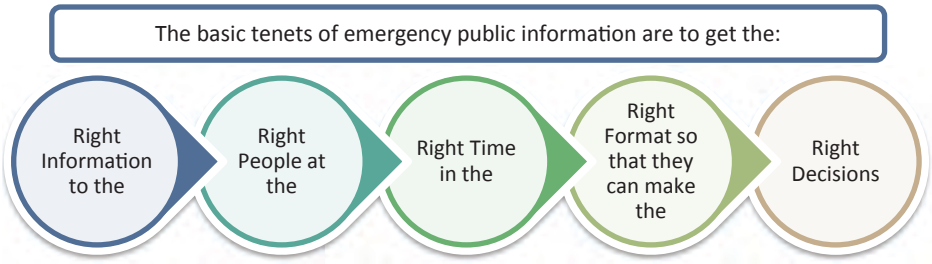


Exhibit 29. Tenets of emergency public information.

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media, to quickly identify information, concerns, and trends, and to then rapidly and aggressively respond to those rumors.

Consistency Is Important

Public information officers should ensure that all messages that are released from all sources are consistent. A joint information center (JIC) can serve as a clearinghouse to avoid mixed messages and conflicts.

Understand the Diverse Communication Needs of Constituents

Persons with access and functional needs, including people with limited English proficiency are especially vulnerable during emergencies. Transportation organizations must understand how to address the communication needs of their constituents. *TCRP Report 150*, cited in Exhibit 30, provides guidance for reaching out to diverse populations.

Do as Much Work Beforehand as Possible

Having the public hear the same message in multiple forms and from multiple sources is a powerful means of maximizing penetration of the communication. For example, if during a media interview the local public health officer includes a message relevant to the transit organization's response during the outbreak, the credibility of the physician can have a positive impact on the effectiveness of the message's content. When possible, coordinate public information efforts through the local EOC.

Developing templates for media releases, fact sheets, and talking points based on reasonably anticipated topics will save time and effort during a pandemic. Public information personnel in like and allied organizations can be resources for developing communication materials in advance of a pandemic.

The Messenger

Transportation organizations must be the first to communicate transportation-related information in order for people to take appropriate actions.

In many organizations the chief executive must approve all messages released to the public and only the chief executive is authorized to speak to the public. In rapidly evolving and labor intensive events such as an emergency, the approval process and limited persons available to interact with the media can become a bottleneck. Each organization should evaluate their public information processes to ensure that public information effectiveness is maximized. Delegation of approval authority, authority to quote, and developing a trained public information team are examples of ways to accelerate the timely release of information, if deemed prudent in the planning stages.

Delivery Methods

Traditional media, when combined with social media, provide powerful tools to disseminate information to key stakeholders regarding services and other changes that may affect them during a pandemic.

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Crisis and Emergency Risk Communication

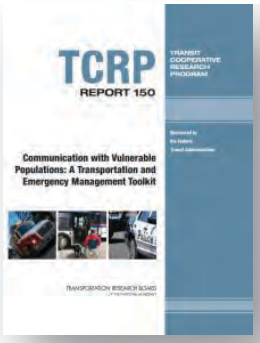
The CDC's *Crisis and Emergency Risk Communication,* 2012 edition, is an essential guide for those needing to learn how to communicate effectively with the public during a crisis. Additionally, they provide webinars and on-demand training based on this document at no charge.

Access these resources online at:
http://emergency.cdc.gov/cerc/

Use and Deployment of Mobile Device Technology for Real-Time Transit Information

TCRP Synthesis 91: Use and Deployment of Mobile Device Technology for Real-Time Transit Information documents the state of the practice in the use and deployment of real-time transit information on mobile devices.

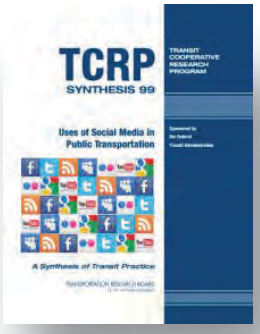
Access the document online at:
http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_91.pdf



Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit

Varied trusted messengers—people with established community leadership relationships—should be enlisted to carry information to isolated or mistrustful members of the community. Relationships with trusted messengers should be established and fostered well in advance of an emergency. *TCRP Report 150: Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit* provides step by step guidance and tools to help accomplish this.

Access the document online at:
http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_150.pdf



Uses of Social Media in Public Transportation

TCRP Synthesis 99: Uses of Social Media in Public Transportation outlines how transportation organizations are currently using social media to connect with their customers.

Access the document online at:
http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_99.pdf

Exhibit 30. Additional resources for crisis and emergency risk communication.

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Use communication channels most appropriate to the organization's target audience. Using only radio, television, and the newspapers will not suffice in today's culture, especially when the information is time critical. Reverse 911, hot lines, texting, social media, billboards, and flyers are several examples that should be exploited in a coordinated effort to distribute information. If a JIC is established, transportation emergency public information messaging methods can be joined by other disciplines to get the word out.

Public information personnel should not overlook the most basic of information dissemination tools including community leaders (e.g., civic and faith based), door-to-door visits; and those palettes within the transportation system itself (e.g., signage on the outside and inside of transit vehicles and signage at transit stations).

An important part of communications preparedness is identifying which delivery methods should be used in which circumstance and in coordination with what partners.

Traditional Media

Traditional media encompasses print, radio, and television and still serves much of the customer base of rural and small urban transportation organizations. These media are still powerful avenues to distribute information but are not the only ones.

There are many ways to disseminate information directly to (and through) the traditional media including:

- Press releases;
- Press conferences or media opportunities;
- Satellite media tours;
- Press conferences by telephone and webcast;
- E-mail distribution and broadcast faxes;
- Websites, video streaming, and webinars; and
- Response to media calls.

Working directly with traditional media, especially during a crisis, is overwhelming and is most effective when those responsible for public information have had the benefit of training. If the transportation organization does not already have multiple individuals familiar with crisis and emergency risk communication, it is strongly recommended that a few personnel be selected and trained. The CDC Crisis and Emergency Risk Communication, 2012 edition, is an essential guide for those needing to learn how to communicate effectively with the public during a crisis. Additionally, the CDC provides webinars and on-demand training based on this document at no charge. See Exhibit 30 to learn how to access these resources. Additional training programs can be found at the National Emergency Training Center and the Center for Domestic Preparedness.

Social Media

Social media is a powerful tool for delivering emergency public information. It involves many platforms and is constantly evolving. Web pages, mass texts, Facebook, Twitter, Instagram, and Tumblr are examples of platforms in current use that have shown to be powerful tools for delivering emergency public information. New technologies emerge and old ones fall away. It is important to be aware of the current technologies. Rural and small urban transportation organizations will know whether social media is an effective communication tool in their service areas, taking into consideration possible lack of access, limited levels of service, and nonusers of the Internet and smartphone technology, as well as agency protocols on the use of social media.

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Notices on route changes, curtailed and additional services (e.g., transportation to medical services), rapid response, social distancing guidance, and other information can be effectively communicated using social media. Because social media can be an avenue in which rumors can spread rapidly, it is incumbent upon those responsible for emergency public media to constantly monitor traffic on the many platforms and to respond quickly and appropriately to misinformation. It is important to note that during a pandemic one segment of the intended audience may be persons from more densely populated areas that have temporarily relocated to the service area and for whom social media is their primary source of information. Accommodations for that population should be anticipated and incorporated into emergency public information planning.

Transportation organizations that already use social media regularly may be able to transition from normal operations to pandemic response more effectively than organizations that do not. Organizations are recommended to develop depth in their personnel who have expertise in social media to account for increased need and potential absenteeism among staff.

Additional Resources

Several resources for crisis and emergency risk communication are available from the CDC and TCRP (see Exhibit 30).

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Assessment Tools and Checklists

This section contains the following tools (the chapter and exhibit numbers in the parentheses indicate the sections of the guide that discuss each tool):

Page 42 **Sample Pandemic Activation Matrix (Chapter 1, Exhibit 7):** Provides a sample activation matrix. The chart can be customized to transportation organizations and be included as the Activation Matrix in a pandemic plan/annex.

Page 43 **Pandemic Vulnerability Assessment Tool (Chapter 2, Exhibit 12):** Assists transportation organizations in identifying vulnerability to a pandemic. Use this assessment to facilitate an internal discussion about where the organization's vulnerabilities are and how to best address them with limited time and budgetary resources.

Page 44 **Decision Making and Partnership Planning Tool (Chapter 3, Exhibit 13):** Assists transportation organizations in breaking down specific planning issues within the context of an ICS type response. Use this planning tool to determine how specific planning issues translate to a response using the ICS.

Page 46 **Preventing the Spread of Disease Checklist (Chapter 4, Exhibit 16):** Provides a checklist of disease prevention actions transportation agencies should address during the planning phase for pandemics.

Page 48 **Providing Services During a Pandemic Checklist (Chapter 5, Exhibit 21):** Provides a checklist of service-related issues transportation agencies should address during the planning phase for pandemics.

Page 50 **Workforce Checklist (Chapter 6, Exhibit 25):** Provides a checklist of workforce-related actions transportation agencies should address during the planning phase for pandemics.

Page 52 **Public and Media Relations Checklist (Chapter 7, Exhibit 28):** Provides a checklist of public information actions transportation agencies should address during the planning phase for pandemics.

It is important to recognize that many of these tools and checklists will have to be updated frequently during a pandemic response. This effort serves many purposes: situational awareness, documentation and resource allocation are among the most important.

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Sample Pandemic Activation Matrix

Purpose: *Provide a sample activation matrix for a pandemic plan/annex.*

Directions: *Customize the chart to an organization and include as the activation matrix in a pandemic plan/annex.*

Transit system managers may use this matrix to help organize their thinking and decision making when confronting a possible pandemic.

	STANDBY/Alert/ Monitoring	MINOR IMPACT	MODERATE IMPACT	MAJOR IMPACT
Describe the impact in general terms	Outbreak of a pandemic, or potentially, pandemic, disease somewhere in the world	Current outbreak in another state or contiguous country	Current outbreak locally with notable changes in absenteeism and ridership	Significant impact locally with challenges to providing services
Describe the local impact in detail	Situation requires monitoring	The illness has not yet, but is reasonably expected to, impact community	Conditions or activities exceed normal resource utilization for response or capabilities/capacities diminished but can be carried out within the confines and capabilities of the organization with some modifications	Response requires a community/regional response to save lives and maintain continuity of operations
Need to activate emergency operations plan?	Maybe	Yes, partially	Yes	Yes
Need to activate incident management team?	Maybe	Yes, partially	Yes	Yes
Need to activate command center?	Maybe	Yes, partially	Yes	Yes
Need to communicate with local EOC?	Yes	Yes	Yes	Yes
Need to communicate with employees and the public?	Yes	Yes	Yes	Yes
What non-pharmaceutical measures to prevent the spread of disease?			Case containment Social distancing Infection control	Case containment Social distancing Infection control

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Pandemic Vulnerability Assessment Tool

Purpose: *Assist transportation organizations in identifying vulnerability to a pandemic. Vulnerabilities are most present for a pandemic when the organization is not prepared. As a result, this tool focuses on level of preparedness.*

Directions: *Use this assessment to facilitate an internal discussion about where the organization's vulnerabilities are and how to best address them with limited time and budgetary resources.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
Obtain real, demonstrable, substantive, long-term executive support for pandemic preparedness.				
Participate regularly in local emergency planning committee (if functioning) and other local forums.				
Establish relationship with local public health department.				
Familiarize management with local and state public health powers.				
Understand how a pandemic will likely impact the organization.				
Conduct comprehensive planning and develop realistic and useful emergency management plans and emergency operations plans.				
Plan for the impact of a pandemic on employees and customers.				
Establish policies to be implemented during a pandemic.				
Allocate resources to protect employees and customers during a pandemic.				
Develop a continuity of operations plan that addresses issues such as order of succession and command structure.				
Work with public health and emergency management to ensure that transportation personnel are considered "essential services" where they, and their family, may receive priority for limited resources such as vaccines.				
Determine staff training needs based on their expected job functions.				
Train on the ICS and NIMS.				
Obtain appropriate PPE and other supplies.				
Ensure preventative maintenance program is in place for PPE and other supplies.				
Train on the PPE.				
Develop internal protocols (e.g., PPE, structure and vehicle disinfectant).				
Obtain EPA-approved disinfectant.				
Exercise regularly both internally and within the community.				
Evaluate the effectiveness of the transit organization's emergency management program on a regular basis.				
Promote and support emergency planning and preparation for personnel families.				

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Decision Making and Partnership Planning Tool

Purpose: *Assist transportation organizations in breaking down specific planning issues within the context of an ICS type response. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use this planning tool to determine how specific planning issues translate to a response using the ICS. Note that this tool is organized by function and that one person can be assigned more than one function.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
COMMAND				
Have the roles, responsibilities, and authorities of the incident commander and command staff been identified and documented?				
Has a crosswalk been developed to identify who may fulfill different functions (including those who are cross-trained)?				
Has the safety officer been authorized in writing to modify or terminate any activity they consider to be unsafe?				
Has the organization established relationships with external agencies that they will likely need to liaise with during an emergency?				
Have the persons that may be tasked with public information been trained and exercised on their function?				
Has the organization identified persons that may serve as technical specialists?				
Has an EOC or DOC been identified, equipped, and readied for activation?				
Have the allied organizations been identified and contact list including key information been developed?				
Has organization participated in forums with emergency management, public health, and transportation organizations regarding emergency management?				
Has organization established a DOC, transportation multi-agency coordination center (MACC) or equivalent if appropriate?				
Has organization developed and validated memorandum of agreement or memorandum of understanding, mutual aid agreements, service agreements?				
Has leadership made a commitment and statement of executive support?				
Identify the order of succession for decision-making roles.				
Identify decisions that can only be made by an outside governance board during a disaster.				
Leadership has been trained and exercised in ICS/NIMS.				

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ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
PLANNING				
Have criteria been established for activation of the plan and opening of the EOC/DOC?				
Is planning capable of conducting effective situation information collection and analysis?				
Can planning generate an appropriate and effective incident/event action plan?				
Can planning track attainment of objectives, strategies, and tactics throughout an operational period?				
OPERATIONS				
Have branches, divisions, groups, and units been identified for use by the transit system?				
Has staff been trained on expected job functions?				
Can operations develop effective tactics to carry out objectives and strategies in coordination with planning?				
Can operations clearly articulate resource needs to logistics to carry out assigned tactics?				
Are different procedures or protocols required during emergencies for staff to use?				
LOGISTICS				
Has logistics identified and developed agreements with external resources (i.e., services and equipment)?				
Can logistics track the status of personnel and equipment?				
Can logistics provide needed employee well-being services and family care?				
Has logistics developed a draft communications plan for use during an emergency?				
FINANCE				
What additional personnel costs will be associated with implementing this policy?				
What additional supply/equipment costs will be associated with implementing this policy?				
Will tracking personnel time require additional steps?				
How vulnerable is the organization to claims from how this policy is implemented?				
Identify how payroll and other crucial financial services can operate when impacted with a high level of absenteeism.				
Determine how decreased services for an extended time will impact revenue collection and financial capacity.				

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Preventing the Spread of Disease Checklist

Purpose: *Provide a checklist of disease prevention actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart below to plot progress.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
CLEANING AND DISINFECTION OF TRANSPORTATION ASSETS				
Has organization established how transit stations will be cleaned and disinfected during a pandemic?				
Has organization established how transit and other vehicles will be cleaned and disinfected during a pandemic?				
Has organization established how passenger vehicles will be cleaned and disinfected during a pandemic?				
Has organization established how other transportation assets (e.g., customer service centers, public sites, offices, dispatch centers, maintenance facilities) will be cleaned and disinfected during a pandemic?				
VACCINES				
Have front line transportation workers been included in local plans for vaccinating key personnel (e.g., in line behind public safety, nurses, and doctors)?				
CASE CONTAINMENT MEASURES				
Will employees be screened upon arrival at work for symptoms (e.g., fever, etc.) and sent home or for medical care if they appear ill?				
Has the organization determined how to ensure that sick employees are staying home in order to stop the spread of the disease?				
How will employees who become sick during a shift be sent home and replaced if appropriate?				
SOCIAL DISTANCING MEASURES				
Will social distancing practices be established in the work areas that do not include interface with riders (e.g., maintenance facilities, offices)?				
Will social distancing practices be established in areas where riders are present (e.g., vehicles, bus stops, stations, customer service centers)?				
Are there methods established to encourage/enforce social distancing?				
INFECTION PREVENTION AND CONTROL MEASURES				
Is staff interacting with the public expected to wear personal protective equipment?				
If so, is the PPE available and maintained?				
Are there reliable means to replace personal protective equipment when expended?				

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ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
Is staff trained and exercised in use of PPE to establish and maintain competency?				
Is staff trained in identifying PPE donning, inspection, failure, doffing, and signs and symptoms of physical and mental stress while using PPE?				
If using respiratory equipment, is staff provided medical clearance from a licensed health professional?				
Is staff that use respiratory protection enrolled in a respiratory protection program pursuant to applicable OSHA standards?				
Is aggressive hand washing using soap/water and non-water hand sanitizers for staff and riders a part of the infection prevention program?				
Are opportunities for hand washing available, convenient, and maintained?				
Has a cleaning schedule for the component parts of the transit system (e.g., vehicles, stations, industrial work areas, office work areas) been established?				
Have EPA-approved disinfectants been acquired or can they be quickly and reliably accessed?				
Are there protocols, and has staff been trained and equipped, for conducting cleaning where chemicals are used or aerosols generated (e.g., steam cleaning)?				
How will transportation vehicles (e.g., bus and rideshare) follow public health orders for social distancing (e.g., limiting number of passengers per vehicle, only every third seat occupied, no standing riders)?				
Will passengers with disease symptoms be allowed to board transportation vehicles?				
How can drivers and other passengers operate with minimal physical interaction?				
How will the organization address employees' emotional stress based on fear of infection, illness, and possible death?				
Are family emergency plans for staff in place?				
Are transportation organization personnel identified as "essential services"?				

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Providing Services During a Pandemic Checklist

Purpose: *Provide a checklist of service-related issues transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart below to plot progress.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
IDENTIFYING ESSENTIAL FUNCTIONS				
Compile organizational functions.				
Determine criteria for selecting essential functions.				
Identify essential functions (e.g., payroll, bus service, etc.) and areas of responsibility.				
Identify supporting processes and systems for each essential function.				
Identify key management, technical, and supporting personnel.				
Prioritize essential functions.				
Define which functions are essential.				
SERVICE CHANGES				
Identify how an impact to basic local services (e.g., trash pickup, street-cleaning, etc.) may impact ability to provide transportation services.				
Identify alternate fuel and spare parts vendors, including executing agreements that have been validated.				
Identify alternate staffing configurations (e.g., retired workers).				
Actively involve labor organizations in planning process, if represented.				
Define which services are essential and which can be suspended temporarily.				
Identify what level of absenteeism could be tolerated from each service area before capabilities or capacity must be altered.				
Identify how some business operations (if any) could shift to having work performed from home with little warning?				
Identify which transportation lines and/or routes can be altered temporarily.				
Identify alternative means of servicing essential and peripheral routes.				
Identify ACS and POD to address destinations generated by the response to the disease outbreak.				
DEMAND				
What services could find their demand decrease during a pandemic and why?				
What services could find their demand increase during a pandemic and why?				
REVENUE				
How would a reduction in service demand impact revenue?				
How would an increase in service demand impact revenue?				
Would the impact on revenue be significant enough to impact the organization's ability to continue paying employees or vendors?				
What are the indirect and direct costs to a reduced need for services?				
What are the indirect and direct costs to an increased need for services?				

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ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
PASSENGERS WITH ACCESS AND FUNCTIONAL NEEDS				
How does the organization define passengers with access and functional needs?				
How will passengers with access and functional needs (e.g., wheelchair, assistance, etc.) be impacted by services that see an overall decrease or reduction?				
Will an increase in an overall need for services increase the number of passengers with access and functional needs?				
DENY SERVICE				
If denying services, how will organization present alternative means for individuals to travel (e.g., ambulance, taxi, dedicated vehicles on routes or on-demand, etc.)?				
Denying services may be controversial and will require clear and consistent use of protocols. How will these protocols be developed upon receipt of public health directives?				
PERSONAL PROTECTION				
Surgical masks are a means to minimize the spread of airborne or droplet particles from an ill person sneezing or coughing, but does not protect against becoming infected. Under what circumstances will the transportation authority provide passengers (all or those with symptoms) with masks, request/require use during ride and prepare to dispose of them properly?				
Is the infrastructure in place to fit test and train workers on use of N95s? Note that N95 respirators or equivalents (e.g., P100, APR/PAPR with HEPA filter) provide a higher level of protection from infection but need to be fit tested (except for a PAPR) and the worker enrolled in a Respiratory Protection Program pursuant to the applicable OSHA standard 29 CFR 1910.134 or equivalent).				
How will management accommodate workers wearing N95 respirators since work capacity diminishes when using respiratory protection for an extended period of time? Is there a plan for communicating with the public regarding the issuance of masks to transportation employees?				
Under what circumstances will hand sanitizer dispensers be installed at the entrance of each vehicle and drivers trained to either strongly encourage or mandate usage prior to boarding? Note: Alcohol based hand cleaners increase fire hazards and some diseases (e.g., C. diff) are resistant to alcohol.				

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Workforce Checklist

Purpose: *Provide a checklist of workforce-related actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart below to plot progress.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
ESSENTIAL WORKERS				
Has the organization identified essential functions as part of their continuity of operations plan?				
Has the organization identified essential workers?				
AUXILIARY WORKFORCE				
Is an auxiliary workforce in place that can assume particular roles in helping to sustain essential functions and is it consistent with labor agreements (e.g., contractors, part-time employees)?				
STAFFING PATTERNS				
What is the changed nature of transit operations and what are the staffing needs to support those changes?				
LABOR RELATIONS				
How have the workforce representatives been engaged in the pandemic planning process so that worker rights, safety, and status are protected while meeting the organizational needs during extraordinary events?				
EMPLOYEE COMPENSATION				
Will employees be able to access workers' compensation if they become ill and believe they were exposed while working?				
Has payroll been deemed an essential function with backup personnel in place to ensure employee wage payments are made regularly to ensure that employees are able to maintain normal domestic financial arrangements?				
Has direct deposit been made available so that ill workers do not need to be physically present to receive payment?				
HEALTH INSURANCE				
Are the applicable insurance programs provided by the organization clearly understood and communicated in the context of a pandemic or public health emergency?				
How will the case of a worker who contracts a pandemic disease that exists in the community be addressed in terms of a “work related illness?”				
Will a worker who contracts a pandemic disease that exists in the community be presumed to have a work related illness?				
Does the organization pay for or encourage annual flu vaccination?				
LEAVE				
Is there a phased approach to the management of employee leave entitlements (e.g., employees use existing arrangements such as paid sick time, then are granted time without pay, etc.)?				
In the event of employees being directed not to attend work due to illness will they still receive their normal salary and wages?				

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ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
MENTAL HEALTH				
Will the organization be providing timely and accurate communication to employees, including those who are sick, during the pandemic to reduce stress?				
Will the organization provide opportunities for support, counseling, and mental health assessment and referral should these be necessary?				
Does the organization have an employee assistance program that can provide guidance and resources on mental health and resiliency?				
Does the organization have a system in place for monitoring worker and worker family social and psychological concerns?				
UNION RELATIONS				
Review and revisit labor agreements (for union environments); what can be required?				
Would there be wage/hourly pay considerations for hazardous conditions?				
WORKFORCE RE-ENTRY				
How/when will employees be allowed to return to work after absence due to infectious disease?				
Does the organization have a system to track those individuals who have had the disease and are now immune?				
What parameters will be set to define “wellness” (e.g., no current temperature, 24 hours without a temperature, incubation period, limited interaction with infected individuals, etc.)?				
How will employees deal with readjusting to the workplace after the possible loss of close family members, friends, and colleagues?				
Will there be a mandatory leave period for those who have lost a family member?				
FAMILY CARE REQUIREMENTS				
How many workers have school-age children or other dependents at home that could be impacted by school closures?				
How many workers have school-age children or other dependents at home that could be impacted by child and adult daycare closures?				
How many workers are dual-income, working parents or single, and head of household parents?				
PUBLIC TRANSPORTATION				
How many workers rely solely on public transportation to get to and from work?				
COMMUNICATION				
What are the best methods for sharing home protection measures with workers and their families?				
What systems are in place to communicate information to employees about status, changes in schedules, recommendations, etc.?				

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Public and Media Relations Checklist

Purpose: *Provide a checklist of public information actions transportation agencies should address during the planning phase for pandemics. This checklist is designed to provide a starting point and is not exhaustive of all possible actions.*

Directions: *Use the chart below to plot progress.*

ACTIONS	NOT STARTED	% IN PROGRESS	COMPLETED	N/A
PUBLIC INFORMATION OFFICERS				
Has the organization identified public information personnel [or point of contact (POC) or responsible agency]?				
Have members of the public information staff been trained and exercised in their expected job functions?				
Have those responsible for public information at the transit organization been in touch with local emergency management and public health?				
Have those responsible for public information at the transit organization reached out to other public information personnel?				
Have the public information personnel developed pre-scripted messages and identified places for media conferences, interview, and photo locations?				
Have public information personnel reached out to local media?				
Have public information personnel developed an internal information plan?				
Have alternate methods of communication dissemination been explored and developed, including social media?				
Is there a plan for public and media inquiries to be managed?				
Has a rapid response capability been developed?				
Have public information personnel participated in JIC training?				
Has the ability to expand public information staffing to meet anticipated need been addressed?				
Have pre-scripted messages and other templates been developed that can be adapted quickly during an emergency?				
AUDIENCES AND MESSAGES				
Identify demographics of riders that traditionally do not use transit services that may join ridership during an outbreak.				
Determine how regular passengers are most likely to receive updates regarding changes to transportation services during a disaster (e.g., text, television news, etc.).				
Craft and test messages and means of dissemination of public information.				
Have means to communicate with difficult-to-contact audiences (e.g., non-English speaking, functionally challenged, non-technical) been developed and field-tested?				
DELIVERY METHODS				
Adopt social media policies that provide guidance on who uses social media and how it is used, and distinguish which are used for an emergency and which are used for normal operations.				
Have organization accounts set up with sites, systems, and tools of choice (e.g., twitter, Facebook, blogs, podcasts, etc.)?				
Determine usage habits and accessibility of social media by regular and non-regular passengers and other stakeholders.				
Have multiple staff trained on how to use these systems (e.g., post updates, monitor feedback, etc.)?				
Determine what types of information will be updated through social media during a pandemic.				
Has a current contact list for local media been established and regularly updated?				
Has internal, or access to external, resources for social media?				

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Glossary of Terms

Avian flu Avian (or bird) flu is caused by influenza viruses that occur naturally among wild birds. The H5N1 variant is deadly to domestic fowl and can be transmitted from birds to humans. There is no human immunity and no vaccine is available.

Crisis and emergency risk communication Crisis and emergency risk communication is the effort by experts to provide information to allow an individual, stakeholder, or an entire community to make the best possible decisions about their well-being within nearly impossible time constraints and help people ultimately to accept the imperfect nature of choices during the crisis.

Furloughing Non-Essential Workers Voluntary or mandatory closure of all non-essential businesses and/or furloughing all non-essential workers.

Influenza Influenza is an acute viral disease of the respiratory tract characterized by fever, headache, myalgia, prostration, runny nose, sore throat, and cough. Otitis media, nausea, and vomiting are also commonly reported among children.

Isolation Separation of persons with specific infectious illnesses in their homes, in hospitals, or in designated healthcare facilities.

Pandemic influenza Pandemic flu is virulent human flu that causes a global outbreak, or pandemic, of serious illness. Because there is little natural immunity, the disease can spread easily from person to person.

Personal protective equipment (PPE) Equipment or clothing worn to reduce hazard exposure.

Quarantine Separation and restriction of the movement, usually of a group of people, who, while not yet ill, have potentially been exposed to an infectious agent.

Seasonal (or common flu) Seasonal (or common) flu is a respiratory illness that can be transmitted person to person. Most people have some immunity, and a vaccine is available.

Social Distancing Within the workplace, social distancing measures could take the form of: modifying the frequency and type of face-to-face employee encounters (e.g., placing moratoriums on hand-shaking, substituting teleconferences for face-to-face meetings, staggering breaks, posting infection control guidelines); establishing flexible work hours or worksites, (e.g., telecommuting); promoting social distancing between employees and customers to maintain three-feet spatial separation between individuals; and implementing strategies that request and enable employees with influenza to stay home at the first sign of symptoms.

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Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation

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