



You Are Here: [AHRQ Home](#) > [Public Health Preparedness](#) > [Mass Medical Care with Scarce Resources](#)

Chapter 4. Prehospital Care

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This chapter discusses the unique context in which the U.S. emergency medical services (EMS) systems operate, and the issues that will need to be addressed in the case of a mass casualty event (MCE). It presents the challenges to planning and coordination posed by the fragmented nature of EMS training, guidelines, and response capacity and offers recommendations for allocating scarce resources to respond to a catastrophic MCE. It highlights specific issues that planners need to consider to maximize EMS response capacity, offers recommendations for successful EMS MCE planning, and presents ideas and resources for EMS planners based on real-case scenarios and planning efforts.

Prehospital Care Issues and Recommendations At A Glance

Major Challenges Affecting EMS MCE Planning

Lack of:

- ◊ Consistency in EMS training and credentialing.
- ◊ Coordination and communication among EMS services and with public safety, public health, hospitals, trauma centers, and 9-1-1 dispatchers.
- ◊ Readiness preparedness among EMS providers and systems.
- ◊ Disaster training in EMS curricula.
- ◊ Financial and staff resources.
- ◊ An evidence base for EMS care.

Recommendations for EMS Planners

- ◊ Develop partnerships with Federal, State, and local stakeholders to clarify roles, resources, and responses to potential MCEs.
- ◊ Improve communication and coordination strategies and backup plans.

- ◊ Exercise, evaluate, modify, and refine MCE plans.
- ◊ Model EMS responses to MCEs.
- ◊ Develop public education plans to provide information on when and where to obtain care.
- ◊ Ensure a cadre of EMS leaders.
- ◊ Plan and implement strategies to maximize to the extent possible:
 - Use and availability of EMS personnel.
 - Transport capacity.
 - Role of dispatch and public safety answering points (facilities that receive 9-1-1 calls).
 - Personal protection for EMS personnel.
 - Patient triage and evaluation.
 - Destination choices.
- ◊ Use natural opportunities to exercise disaster planning.
- ◊ Use existing case examples and best practices.
- ◊ Develop strategies to identify large numbers of young children who may be separated from parents and cannot give information that would help them to be reunited with their parents.

[Return to Contents](#)

Context of EMS Systems and Challenges for MCE Planning

In the event of a catastrophic MCE, it is the EMS systems that will be called on to provide first-responder rescue, assessment, care, and transportation and access to the emergency medical health care delivery system. Emergency medical services in the United States are provided through a complex system composed of highly variable organizational structures. Nearly half of all EMS are delivered through local fire departments. Others are structured within municipal or county governments, police departments, health departments, or private companies (e.g., hospital-based, for-profit ambulance services) or are volunteer-based.⁵⁹

The variability of EMS response systems is further exacerbated by important differences in EMS preparedness training, guidelines, and response capacity—posing significant coordination and communications challenges for EMS leaders and planners. Two recent reports from the Institute of Medicine (IOM), *Emergency Medical Services: At the Crossroads*⁶⁰ and *Hospital-based Emergency Care: At the Breaking Point*,⁶¹ highlight constraints and challenges that will impede the capacity of the nationwide EMS systems to respond to a catastrophic MCE. They include the following:

Lack of Consistency. A criticism of the existing state of EMS preparedness is that there is no single oversight agency responsible for ensuring consistency in training, certification, or guidelines for disaster response, the use of personal protective equipment (PPE), or the coordination of EMS response and operations. There is wide variation in the design of EMS systems across States and local areas. Similarly, there is no coherent compliance program to ensure that EMS preparedness initiatives are integrated, sustainable, and exercised regularly to test for efficacies and vulnerabilities. In their recent report cited above, the IOM recommends that all institutions responsible for the training, continuing education, and credentialing and certification of professionals involved in emergency care (including medicine, nursing, EMS, allied health, public health, and hospital administration) incorporate disaster preparedness training into their curricula.

Lack of Coordination. No central command and control entity coordinates assets and ensures communication among EMS response systems. Often EMS agencies are unable to communicate with each other because of incompatibilities in their communication systems. There is also a lack of communication and coordination among prehospital EMS and 9-1-1 dispatchers, public safety agencies, public health, air medical providers, hospital centers, and trauma centers—especially when emergencies cross jurisdictional lines.

Lack of Readiness Preparedness. EMS representation in disaster planning at the Federal level has been limited, according to the IOM report. In addition, most EMS systems are not trained in the National Response Plan. Thus, they have little or inconsistent knowledge with its incident command and its tenets for supporting operational requirements. Likewise, EMS systems may not be fully aware of the Federal response capability, such as the provisions of the Homeland Security Presidential Directive/HSPD-5, the National Disaster Medical System (NDMS), use of Disaster Medical Assistance Teams, the Incident Command System, Occupational Safety and Health Administration (OSHA) PPE guidelines, and OSHA Hazard Materials Operations regulations. As a result, there is risk that requests for resource augmentation will be misdirected—possibly overlooking potential sources of support, command and control, communications, and interoperability from other Federal departments and agencies.

Examples of Federal Response Resources

Homeland Security Presidential Directive HSPD-5:

<http://www.whitehouse.gov/news/releases/2003/02/20030228-9.html>

NDMS: <http://www.ndms.fema.gov>

Disaster Medical Assistance Teams: <http://oep-ndms.dhhs.gov/teams/dmat.html>

OSHA PPE Guidelines: <http://www.osha.gov/SLTC/personalprotectiveequipment/index.html>

OSHA Hazard Materials Operations Regulations:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099

Lack of Standardized Disaster Training in EMS Curricula. At this time there is no standardized requirement for education (and continuing education) regarding disaster training, special incident, or catastrophic response, and thus most EMS personnel have not been consistently trained to respond to acts of terrorism, natural disasters, or other potential MCEs. As a result, EMS responders will be called to situations in which they may be overwhelmed and unprotected. Some of these issues are being addressed by the Federal Interagency Committee on EMS, which was created to provide the EMS community with a mechanism for ongoing Federal coordination of EMS programs. The Committee and its supporting Federal agencies are focused on the development of National EMS Education Standards.

Developing a National Model for EMS Training

To address the lack of consistency in EMS training and credentialing, the National Highway Traffic Safety Administration (NHTSA) has been developing a national model to aid States in adopting a common scope of practice for EMS personnel, with State licensing reciprocity. Together with the Health Resources and Services Administration and other Federal Agencies, NHTSA is focused on the development of National EMS education standards and on providing leadership and coordination of comprehensive, evidence-based emergency medical services and 9-1-1 systems.

More information is available at

<http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.2a0771e91315babbbf30811060008a0c/>.

Lack of Financial Resources. Many EMS response agencies do not have the financial resources to extend themselves beyond the demands of daily operations. Large-scale disasters often require unique resources and response capabilities, which are outside the scope of normal operations and far exceed agency budgets.

Lack of Staff. EMS response organizations are confronted with a severe recruitment and retention problem nationwide. EMS systems often are not attributed the same professional regard as other health professionals, and their salaries are often lower than those of police officers, fire fighters, and nurses. Many prehospital providers also hold other jobs; for example, volunteer emergency medical technicians (EMTs) in most communities have other employment, and their availability during an MCE may be limited. In addition, many personnel have more than one EMS employer or other obligations such as participation in the NDMS or military service.

Lack of an EMS Evidence Base. Research on prehospital care and response is limited, raising concerns that some practices may be inappropriate (e.g., field intubation of children) and clinical care questions remain unanswered. These challenges make it difficult for EMS response agencies to ensure a uniform culture of preparedness. As a result, there is an increased risk that without careful and concerted pre-event planning, the response to an MCE will be disjointed and less effective than it could be and will lead to avoidable deaths or injuries of both affected civilians and EMS responders themselves.

[Return to Contents](#)

EMS in an MCE: Expected Shortages and Needs

In the case of an MCE, many health care resources at the local and regional levels will be overwhelmed or eliminated.

Those EMS response agencies that are able to remain operational likely will encounter a demand for services that will outstrip the supply and available resources. EMS systems will confront:

- Personnel shortages.
- Breakdowns in supply chains.
- Lack of coordination and information sharing among diverse EMS providers, public safety, hospitals, trauma center, and public health.
- Breakdown of logistic support for operational sustainability, including such things as fuel shortages; inadequate availability of transport vehicles; and shortages in supplies, equipment, and pharmaceuticals.
- Overloading of hospital emergency departments and associated services such as intensive care capabilities; specialty services such as burn care or decontamination units; and specialized equipment such as ventilators, PPE, or negative pressure rooms.
- Breakdowns in local "burden sharing" strategies (mutual aid agreements) due to overwhelming demand and lack of surge capacity.
- The need to implement modified treatment protocols to meet the extraordinary conditions of the MCE that may be limited to reasonable life-sustaining activities where appropriate.

Recommendations for Planners

There are several important actions that planners should take *prior to an MCE* to help maximize the response capacity of prehospital EMS services. Those actions include the following:

"Emergency management is really about building relationships, whether you are in the public or private sector. And in building those relationships, it is important to remember not to *tell*, but to *talk*."

—Edward Gabriel, Walt Disney Corporation

Forging Partnerships at all Levels. Building relationships and partnerships is a critical component of emergency management planning. The need to coordinate and allocate scarce prehospital resources in the case of a catastrophic MCE requires the development, implementation, exercising, and refinement of partnerships between Federal, State, and local government response agencies, as well as between public and private entities. These relationships need to clearly define the roles, responsibilities, capabilities, oversight, command, communications, logistics, and response resources each will bring to bear in an MCE. *Involvement of senior leadership from all response agencies is essential for success and actual progress.*

Examples of partnerships could include the establishment of mutual aid agreements or interstate compacts to address issues such as the acquisition and deployment of extra transport vehicles or licensure and indemnification matters regarding responders. Similarly, memoranda of understanding (MOUs) could be developed among public and private ambulance services to coordinate response to potential MCEs.

Memoranda of Understanding (MOUs)

Further information on developing MOUs is available from the Center for Law and the Public's Health at <http://www.publichealthlaw.net/Research/Katrina.htm>. Select Memo 3.

Improving Communication and Coordination. Planners must develop integrated and interoperable communications and data systems that can link EMS agencies to hospitals, trauma centers, public safety departments, emergency management offices, and public health agencies. Communication discipline is one of the keys to effective incident management, and ideally, these systems would be centralized through established Incident Command System (ICS) channels. There also should be a plan for backup or redundant communication strategies in case there are failures in primary communication methods. Similarly, other backup procedures for actions that can be taken when systems fail should be planned, tested in advance, and integrated into the planning process.

Continually Modifying and Refining Plans. Practical planning is essential and should include concrete implementation

steps with training and exercise goals for each step. Each component of the response should be taught, exercised to the point of failure, evaluated, modified, rewritten, and tested once again. Exercises should simulate actual casualties, as well as management of the "worried well"—individuals calling for EMS resources who actually do not need them. Exercises should include response partners from public, private, community, and governmental agencies. This iterative process allows for continuous modifications and improvements.

Modeling MCE Responses. Modeling responses to a catastrophic MCE may take the form of tabletop exercises, actual but smaller events, or computer simulations and can provide examples of difficulties which may be faced during such an event. Such modeling efforts should start using small numbers of casualties as a starting point and then use rising victim number scalability models; i.e., plan for 100, then 1,000, then 10,000, and then 100,000. Planners should consider the use of models such as the Large Scale Emergency Response (LASER) Program at New York University (NYU), which includes the following components: computer modeling of large-scale events, risk communication, legal aspects, workforce support, and community-based response issues.

Modeling Large-scale Disaster Scenarios

The LASER program at NYU uses a computer model of New York City to simulate possible catastrophic disasters according to a range of prescribed parameters. It can simulate the National Incident Management System and assess its integration at the local level to test in detail the effectiveness of various emergency response strategies. It also highlights factors such as communications strategies for providing risk and emergency information to the public that could decrease fatalities.

Further information is available at <http://www.nyu.edu/ccpr/projects/laser.html>.

Educating the Public. Planners need to develop, implement, exercise, and refine efforts to provide for comprehensive public education. This may include such things as scripted messages that provide specific directions to the public on actions they should take or public information programs that specifically outline whether to call 9-1-1 for assistance.

Providing and Ensuring Leadership. Leadership training should be provided for mid- and upper-level EMS supervisory staff members to ensure that in case of major illness, injuries, or deaths, there will be individuals who can take on the role of EMS medical director or leadership. The determination also should be made in advance regarding who in the organization would be able to adjust standard operating procedures and the scope of practice of EMTs to the needs of the situation.

Case Study: Preparation for the 2004 Democratic National Convention in Boston, MA

For more than a year before the 2004 Democratic National Convention, Massachusetts's public health agencies planned and drilled for a variety of potential emergency and disaster scenarios. Following are examples of the key preparatory steps they took.

- EMS agencies and organizations in the Boston area developed a mapping database with current information on emergency exits, emergency medicine locations, and routes to hospitals and clinics to be used in GIS mapping systems and for planning purposes.
- The Massachusetts Emergency Management Team (MEMT), composed of liaisons from more than 70 agencies and organizations, met and trained together on a monthly basis. The MEMT served as the coordinating agency for the State Emergency Operations Center (SEOC). More than 30 Federal, State, local, private, and volunteer agencies and organizations staff the SEOC on a 24/7 basis.
- The MEMT prepared and tested a plan for integrating business and industry into the emergency support function. Designated liaisons from area businesses and industries helped the MEMT prepare to use their assets and expertise and to communicate with business and industry leaders.
- A Consequence Management Subcommittee met to develop response and coordination plans for the various EMS organizations. The subcommittee considered how information should be

collected and shared among the large number of command and/or operations centers and explored ways to connect these centers to Washington and all the other command and/or operations centers.

Approaches to the Allocation of Scarce Resources

In the face of a catastrophic MCE, there likely will be scarcities and mismatches regarding EMS personnel, transport capacity, and destination availabilities for patient treatment. As a result, creative strategies will need to be implemented for coordinating and maximizing the use of available staff members and resources. Ideally, these strategies should be considered, tested, and refined prior to the MCE. Legal and ethical advisors should be included in discussions (Chapters 2 and 3 of this guide). Approaches to the allocation of scarce resources to be considered should include, but not be limited to, the following:

Maximize the Availability of EMS Personnel through modified or extended shifts, deployment of no more than two providers per vehicle, and use of one-person response vehicles for "patient evaluation" prior to dispatch of transport resources. Staff members also may be shifted so that non-EMT personnel serve as drivers; fire, police, or volunteer EMT personnel provide assistance during transport; and other medical personnel (e.g., physicians, nurses, nurse's aides) help staff casualty treatment sites to permit EMS personnel to provide transport services. "Just-in-time" programs to train nonmedical volunteers to provide basic medical care such as direct pressure for hemorrhage control also should be developed.

Maximize Use of Available EMS Personnel. Some medical protocols may be suspended (e.g., base contact for certain interventions) to allow for greater efficiency and flexibility in patient management. EMS personnel may be used in nontraditional settings (e.g., alternative care sites, hospitals, pharmaceutical distribution centers) for field triage, treatment, or transport. Their scope of practice may be extended to provide vaccinations or medications or to deliver nontraditional medical care at the scene or in the home.

Maximize Transport Capability. Public and private ambulance services should be coordinated and steps taken to ensure that they do not self-dispatch to MCEs. Paramedic-initiated alternative transport mechanisms also should be put into place (e.g., buses, taxis, privately owned vehicles). Mutual aid agreements should be in place and implemented to deploy and use available transportation assets, staff members, and staging locations. Transport assets should be loaded to their full capacity and patients taken to the closest appropriate hospital or care site. Air transport should be used to take patients to distant facilities (unless the incident presents contamination risks). Noncritical calls should be batched by geographic area. Bypass, diversion, or closure rules could be suspended to promote equitable distribution of patients and to try to avoid the overloading of any one hospital. Secondary transport needs should be anticipated so that patients can be transferred from overloaded hospitals or care sites to those that are less affected.

Community Emergency Response Teams (CERTs)

The CERTs program educates people on disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using the training learned in the classroom and during exercises, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community.

Further information is available at <http://www.citizencorps.gov/cert/about.shtm>.

Maximize the Role of Public Safety Answering Points and Dispatch. Call screening strategies should be in place to determine the level of urgency required to respond to calls. Maximal response strategies involving multiple responders (e.g., engine company, ambulance, law enforcement) used in standard EMS response should be avoided.

Preambival instructions should be scripted and tailored to the incident at hand with formal recommendations regarding the use of alternative methods of transport and alternative care sites. Nontransporting vehicles with a single responder

may be dispatched to evaluate calls and the need for onsite care and ambulance transport.

Maximize Personal Protection for Personnel. Universal precautions should be used for every patient encounter, if at all possible. To minimize the number of responders exposed to pathogens or chemicals, specialized protections should be used to the extent possible and adjusted to the nature of the incident (e.g., distribution of antibiotics, vaccines, or antidotes to staff and family members). In the case of chemical incidents, decontamination needs must be evaluated and addressed prior to transportation to preserve transport capability. Similarly, security personnel should be assigned to protect EMS response operations, logistics centers, and stockpile depots.

Maximize Patient Triage and Evaluation. Specific triage systems should be in place prior to an incident, and personnel should be trained and exercised in their use. Examples of triage systems include the START and JUMPSTART triage systems.

START/JUMPSTART

A combined **START/JUMPSTART triage algorithm** for patients from birth to age 14 years is available at <http://miemss.umaryland.edu/emscwww/pdfs/startjumpstartq.pdf>.

Simple triage methods include rapid separation of the critical from the noncritical (i.e., "Everyone who can walk should get on this bus"). The overarching principle for triage is "the most good for the most people." The differentiation of "expectant" patients from those who likely will survive should be performed in consultation with or by the EMS Medical Director or designee. Selected triage systems should include palliative treatment for casualties deemed to have little likelihood of survival. Although such patients may be categorized as lower priority for transport, appropriate comfort measures, including pharmacologic treatment, should be provided as available.

National Field Triage Criteria

The Terrorism Injuries: Information, Dissemination and Exchange (TIIDE) Project convened a meeting in 2005 to begin to develop national field triage criteria that can be used in mass casualty events. The TIIDE grantees consist of six emergency medicine organizations who are leading an effort to review the available evidence on mass casualty triage and develop a position paper on the subject that will be endorsed by the TIIDE partner organizations.

Planners can find further information about the TIIDE Project at <http://www.acep.org/webportal/membercenter/sections/ems/cdcmmodelcommunities.htm>.

Maximize Destination Choices. A centralized coordination of patient transport should be in place to minimize hospital overloading and maximize the use of other available resources, such as primary care providers, alternative care sites, medical evaluation centers, or triage centers.

Indeed, it is likely that the vast majority of victims of an MCE may end up being most appropriately managed in the home setting, either because their illness or injury is not severe enough to warrant institutionalized care or because the successful outcome of such inpatient treatment in the setting of scarce and limited resources would be considered futile and potentially wasteful.

Many view the community hospital as a "safe haven," a place to go for food, shelter, protection, and medical attention. However, particularly in the event of a transmissible infectious disease in which hospitalized patients represent the sickest patients in the community, the concept of "safe haven" may not be applicable. In fact, it may be more dangerous to be in the hospital setting than to remain at home. It is important for community planners to highlight the concept of the home as a "safe haven" in their risk communication strategies and develop measures to support this concept. Emergency planners, therefore, must incorporate the likelihood of home care delivery in all aspects of their planning efforts. This planning must focus on the possibility that some rudimentary degree of medical care will need to be delivered in the home setting, often with limited outside professional assistance.

Incorporating Home Care Into Emergency Planning: Issues to Consider

- ◊ Register patients being cared for in the home setting with a local emergency management agency and the public health department to ensure access to relevant information.
- ◊ Ensure adequate stock of routine, chronic care medications.
- ◊ Ensure adequate stock of basic first aid supplies, including but not limited to bandages, antipyretic medications (acetaminophen, ibuprofen), oral electrolyte solutions, and thermometers.
- ◊ Ensure that backup utility support is in place if warranted (particularly for those patients requiring electricity support for medical devices).
- ◊ Establish a "sick room" in the home for the primary management of ill household members, particularly in the event of a transmissible infectious disease.
- ◊ In the event of caring for patients with advanced symptoms "too sick" for hospital care, coordinate symptom palliation with a home care team coordinated by local public health authorities.
- ◊ Ensure the availability of a bedside commode or bedpan.
- ◊ Ensure the availability of a bedside humidifier, if possible.

Planners also need to make sure to include the ambulatory care system as part of the MCE planning process. Many people look to their primary care provider first for information on health care issues. Primary care providers would play a critical role in MCE situations, particularly that of influenza pandemic, for example, in determining which patients need to go to the hospital and which patients can be cared for at home. Planners therefore should regard primary care providers and their local ambulatory care system as an important component of a system to keep the hospitals from being overwhelmed. Given their role as critical sources of health care information and assistance for communities, planners should incorporate ways to maximize the ambulatory care system appropriately as part of the overall MCE response.

Whenever possible, specialized patient treatment requirements should be matched to the most appropriate destinations. Information services systems that provide ongoing updates of hospital bed status and capabilities should be in place and implemented to inform EMS about destination choices and to help coordinate patient distribution. This includes local, regional, statewide, and national systems such as the National Hospital Available Beds for Emergencies and Disasters (HAvBED)⁶² national hospital bed availability tracking initiative.

HAvBED System

The HAvBED System explores the feasibility of a national real-time hospital-bed tracking system to address a surge of patients during an MCE. This demonstration model is funded by the Agency for Healthcare Research and Quality and has been developed by Denver Health.

A report describing the development, implementation, and evaluation of HAvBED is available at <http://www.ahrq.gov/research/havbed>.

Casualty treatment areas can be established on site, near the disaster scene, or at alternative care sites (depending on the nature of the incident) to address the volume of casualties, provide triage, assess transport needs and choices, and serve as a treatment site to which supplies will be deployed. Home health care should be used according to predetermined triage protocols to prevent unnecessary use of EMS transport and hospital resources (e.g., provision of primary care, vaccines, antiviral medications).

Using Case Examples and Best Practices

Cities have natural opportunities to exercise their disaster planning by using special events such as marathons, major sports/cultural events, or large national conventions as "planned disasters." Special events inevitably result in large crowds, more accidents and injuries than usual, and a strain on EMS resources. Thus, they present a prime opportunity to prepare for MCEs and test MCE equipment and protocols. This approach is supported by the U.S. Department of Homeland Security in their *Lessons Learned Information Sharing* electronic database, which provides updates and examples of community response plans, lessons learned from actual disaster events, developments of MOUs and

other planning tools, best practices, and stories of successes.

The more EMS agencies are able to take advantage of opportunities such as special events and to invest in drills and training, the better prepared they will be when actual disasters arise. For example, the effective emergency response to the July 2005 London public transport bombings was a direct result of extensive training. Planners should take the time to write and read after-action reports, as they serve as useful tools for better understanding what has and has not worked and they can provide the basis for necessary improvements to be made to response capabilities.

Case examples of disaster relief from USAID can be found at http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/.

Learning from others—other nations or other U.S. or international agencies—is a critical component of being prepared. Although EMS agencies in the United States rarely deal with MCEs, for certain countries, such as Israel, and agencies such as the U.S. Agency for International Development's (USAID) Office of Foreign Disaster Assistance, responding to medical disasters is more common. Thus, much may be learned by examining ways in which other nations respond to large-scale emergency events (e.g., bombings, natural disasters, disease outbreaks) with limited resources.

Lessons Learned Information Sharing (LLIS)

Lessons Learned Information Sharing (LLIS) contains the following types of original content:

- **Lessons Learned:** Knowledge and experience—positive or negative—derived from actual incidents such as the 1995 Oklahoma City bombing and the 9/11 attacks as well as observations and historical study of operations, training, and exercises.
- **Best Practices:** Peer-validated techniques, procedures, good ideas, or solutions that work and are solidly grounded on actual experience in operations, training, and exercises.
- **Good Stories:** Exemplary—but non-peer-validated—initiatives implemented by various jurisdictions that have shown success in their specific environments and that may provide useful information to other communities and organizations. Access to LLIS is restricted to verified emergency response providers and homeland security officials.

The content is available at <http://www.llis.gov>.

[Return to Contents](#)

[Proceed to Next Section](#)



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