

NFPA®

450

Guide for
Emergency Medical
Services and Systems

2021



NFPA® 450**Guide for****Emergency Medical Services and Systems****2021 Edition**

This edition of NFPA 450, *Guide for Emergency Medical Services and Systems*, was prepared by the Technical Committee on Emergency Medical Services. It was issued by the Standards Council on October 5, 2020, with an effective date of October 25, 2020, and supersedes all previous editions.

This edition of NFPA 450 was approved as an American National Standard on October 25, 2020.

Origin and Development of NFPA 450

In January 1999, the NFPA Standards Council considered NFPA's role in emergency medical services (EMS). After a review of extensive information submitted on the need for such a project, the council voted to create a new EMS project to address EMS-related topics not covered by other existing NFPA projects. A forum on EMS was scheduled at the May 1999 Association meeting in Baltimore, Maryland. In June 1999, NFPA held a focus group meeting to further discuss NFPA's role in EMS. A request for persons interested in being members of this new project was sent out, and a technical committee was formed. The first meeting of the technical committee was held in Tampa, Florida, to discuss what specific projects the technical committee wanted to address. The first edition of NFPA 450, *Guide for Emergency Medical Services and Systems*, was issued in 2004 to assist individuals, agencies, organizations, or systems, as well as those interested or involved in emergency medical services system design, by providing EMS guidelines and recommendations.

For the 2009 edition, the technical committee reviewed and revised a number of definitions in Chapter 3 and added new definitions for new material in Chapter 5. The committee also revised material in Section 5.6, Essential System Analysis Components. The table from Annex B was modified and moved to Chapter 5, and Annex B was deleted.

For the 2013 edition, the committee went through and updated the referenced publications to ensure that they were still relevant or pertinent to the document. The intent was to bring the document in line or ensure correlation with many of the nationally published EMS documents in use. Some changes were also made to clarify commonly used terms that initially might have been presented with some confusion or misuse.

For the 2017 edition, the technical committee updated several of the references throughout the document and addressed the many changes in the delivery of health care services as a result of the Affordable Care Act. Special attention was also made to include mobile integrated health care and community paramedicine, growing areas in the delivery of emergency medical services.

The 2021 edition of NFPA 450 has undergone extensive revision to align with NFPA 451, *Guide for Community Health Care Programs*. Following these revisions, NFPA 450 now focuses on EMS and 911 systems whereas NFPA 451 focuses on community health care and mobile integrated health care. The document has further delineated medical control structures and received updates to match new EMS technology and data reporting initiatives, and has a new training chapter that focuses on training for new EMS system responders who are already certified or licensed EMS providers.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents relating to emergency medical services, except those documents covered by other existing NFPA committees.

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NNOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex C.

Chapter 1 Administration

1.1 Scope. This document is designed to assist individuals, agencies, organizations, or systems as well as those interested or involved in emergency medical services (EMS) system design.

1.2 Purpose. The purpose of this document is to provide guidelines, resources, and recommendations to assist those interested or involved in EMS system design. Provision or development of out-of-hospital care requires the coordination and cooperation of disparate elements. This document also provides a framework for designing or evaluating a comprehensive EMS system.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this guide and should be considered part of the recommendations of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1061, *Standard for Public Safety Telecommunications Personnel Professional Qualifications*, 2018 edition.

NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2019 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program*, 2018 edition.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2020 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2020 edition.

NFPA 1581, *Standard on Fire Department Infection Control Program*, 2015 edition.

NFPA 1917, *Standard for Automotive Ambulances*, 2019 edition.

NFPA 1999, *Standard on Protective Clothing and Ensembles for Emergency Medical Operations*, 2018 edition.

2.3 Other Publications.

2.3.1 US Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington DC 20401-0001.

Title 29, Code of Federal Regulations, Part 1910.1030, *Blood-borne Pathogens*.

2.3.2 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Advisory Sections. (Reserved)

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this guide. Where terms are not defined in this chapter or within another chapter, they should be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, is the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Guide. A document that is advisory or informative in nature and that contains only nonmandatory provisions. A guide may contain mandatory statements such as when a guide can be used, but the document as a whole is not suitable for adoption into law.

3.2.4 Should. Indicates a recommendation or that which is advised but not required.

3.2.5 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall

be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Address. A number or other code and the street name identifying a location.

3.3.2 Alarm. A signal or message from a person or device indicating the existence of an emergency or other situation that requires immediate action.

3.3.3 Ambulance. A vehicle designed, equipped, and operated by approved personnel trained in the treatment of the sick or injured that responds to urgent, unscheduled requests for aid or transport of sick or injured patient(s).

3.3.4 Ambulance Service. An organization that utilizes approved personnel trained in the treatment or transportation (to an appropriate medical facility) of the sick or injured.

3.3.5 American College of Emergency Physicians (ACEP). A national organization of emergency physicians committed to advancing emergency care and preparedness through continuing education, research, advocacy, and public education.

3.3.6 Automated Vehicle Locator (AVL). A computerized mapping system used to track the location of vehicles.

3.3.7 Bloodborne Pathogens. Microorganisms and other potentially infectious material (OPIM) present in blood that can cause diseases in humans.

3.3.8 Call. A request for assistance or resources to which equipment and personnel are deployed.

3.3.9 Call Intake. The procedure for answering the phone or other device that is used to receive a signal or message from a person or device indicating the need for medical assistance or resources, learning the nature of the request, and verifying the address.

3.3.10 Call Processing. The interval from call intake by the dispatching agency to the time of unit or personnel notification, including answering the phone (alarm), gathering vital information, and initiating a response by dispatching the appropriate unit(s) or personnel.

3.3.11* Chain of Survival. A metaphor to communicate the interdependence of a community's emergency response.

3.3.12 Compliance. Adherence or conformance to laws, regulations, and standards.

3.3.13 Cross-Trained/Dual Role (CT/DR). An emergency service that allows personnel trained in two service functions (e.g., fire suppression and emergency medical care) to function in either role.

3.3.14 Defibrillation. The delivery of an electrical shock to the heart intended to reverse abnormal electrical activity.

3.3.15 Defibrillator.

3.3.15.1 Automated External Defibrillator (AED). A portable electronic device that diagnoses life-threatening arrhythmias and is able to treat them through defibrillation.

3.3.15.2 Manual Defibrillator. A portable electronic device that delivers an electric shock through the chest wall to the heart and that requires operation by trained medical personnel.

3.3.16 Deployment. The procedures by which resources are distributed.

3.3.17 Dispatch. To send resources to an address or incident location for a specific purpose.

3.3.17.1 Computer-Aided Dispatch (CAD). A dispatching method or process to provide relative dispatch data to the telecommunicator.

3.3.17.2 Dispatch Time. The time the responding unit or personnel was notified by the telecommunicator.

3.3.17.3 Emergency Medical Dispatch. A systematic program of handling medical requests.

3.3.18 Documentation. The process of gathering, classifying, and storing information.

3.3.19 Emergency. A condition or situation in which a prudent layperson perceives a need for immediate response.

3.3.20 Emergency Medical Dispatcher (EMD). Personnel specifically trained and certified in interviewing techniques, pre-arrival instructions, and call prioritization.

3.3.21 Emergency Medical Services (EMS). A coordinated system providing the full spectrum of out-of-hospital patient services that includes the provision of assessment, treatment, referrals, or transportation of patients.

3.3.22 Emergency Medical Services for Children (EMSC). A federally funded program that addresses the reduction of infant, child, and adolescent morbidity or mortality.

3.3.23 Emergency Medical System Providers.

3.3.23.1 Advanced Emergency Medical Technician (AEMT). Provides out-of-hospital basic and limited advanced emergency medical care for patients who access the EMS system.

3.3.23.2 Emergency Medical Responder. Provides out-of-hospital, immediate life-saving care to patients who access the EMS system.

3.3.23.3 Emergency Medical Technician (EMT). Provides out-of-hospital medical care and transportation for patients that access the EMS system.

3.3.23.4 Paramedic. An allied health professional whose primary focus is to provide out-of-hospital advanced medical care for patients who access the EMS system.

3.3.24 Emergency Operations. Activities of the emergency responders relating to rescue, fire suppression, emergency medical care, and special operations.

3.3.25 Emergency Service Resources. Personnel, vehicles, or other resources available to respond to requests for assistance.

3.3.26 Employee. (Reserved)

3.3.27* Employee Assistance Program (EAP). An EAP is an employer-sponsored service designed for personal or family concerns.

3.3.28 Employee Illness and Injury. A work-related illness or injury requiring evaluation or medical follow-up.

3.3.29 Employee Turnover. Termination of employment with the organization for any reason.

3.3.30* EMS Agency. EMS agencies are composed of the personnel, vehicles, equipment, and facilities used to deliver emergency and nonemergency care to individuals outside a hospital.

3.3.31 Fire Suppression. The activities involved in controlling and extinguishing fires.

3.3.32 First Responder. A common term to describe public safety personnel not trained as an emergency medical services provider that might respond to emergencies or other incidents.

3.3.33 Hazard. A source of possible injury or damage to health.

3.3.34 Hazardous Material. A substance that presents an unusual danger to persons due to toxicity, chemical reactivity, decomposition, corrosiveness, explosion or detonation, etiological hazards, or similar properties.

3.3.35 Incident Location. The address or other identifiable area of an event.

3.3.36* Incident Management System. A system that defines the roles and responsibilities to be assumed by responders and the standard operating procedures to be used in the management and direction of emergency incidents and other functions.

3.3.37 Interval. The distance as measured in time between two time stamps.

3.3.37.1 Fractile Response Interval. A method of describing response intervals that uses frequency distribution as its basis for reporting.

3.3.37.2* Turnout Interval. The time beginning when units acknowledge notification of the emergency to the movement of resources.

3.3.38 Lead Agency. An organization responsible for oversight of the day-to-day operation of the EMS system.

3.3.39 Life Support.

3.3.39.1* Advanced Cardiac Life Support (ACLS). A nationally recognized curriculum to teach advanced methods of treatment for cardiac, stroke, and other emergencies.

3.3.39.2 Basic Life Support (BLS). Emergency medical treatment at a level as defined by the medical authority having jurisdiction.

3.3.39.3 Critical Incident Stress Management (CISM). A program designed to reduce acute and chronic effects of stress related to job functions.

3.3.40* Medical Authority. The person or structure responsible for patient care oversight.

3.3.41 Medical Direction and Oversight. The granting of authority to an EMS system or agency and its providers in the delivery and improvement of EMS out-of-hospital care.

3.3.41.1* Off-Line (Indirect) Medical Direction. The medical oversight that consists of standing orders, training, protocol development, and supervision that are authorized by the medical director.

3.3.41.2* Online (Direct) Medical Direction. The medical direction provided to out-of-hospital providers by the medical director or designee, either on-scene or by real-time communication.

3.3.41.3* Medical Director. A physician trained in emergency medicine, designated as a medical director for the local EMS agency.

3.3.41.4* Medical Oversight. The physician supervision and administration of the medical aspects of an EMS system or agency and its providers.

3.3.42* Mobile Integrated Healthcare (MTH). The provision of health care through EMS systems using patient-centered, mobile resources in the out-of-hospital environment.

3.3.43 Mutual Aid. Reciprocal assistance by emergency services under a prearranged plan.

3.3.44 National Association of EMS Physicians (NAEMSP). A national organization of EMS physicians and other professionals who focus on providing leadership and fostering excellence in EMS.

3.3.45* National EMS Information Systems (NEMSIS). The national data standard and repository of EMS data.

3.3.46 National Highway Traffic Safety Administration (NHTSA). The agency under the United States Department of Transportation that is responsible for preventing motor vehicle injuries and deaths and which provides national guidance on emergency medical services and systems.

3.3.47 National Institutes of Health (NIH). An agency of the Public Health Service of the Department of Health and Human Services, responsible for promoting the nation's health and providing medical research.

3.3.48 National Response Plan. A plan mandated by HSPD-5 that integrates federal domestic prevention, preparedness, response, and recovery plans into one all-discipline, all-hazards plan.

3.3.49* Next Generation (NG) 911. NG9-1-1 is an Internet Protocol (IP)-based system made up of managed emergency services IP networks (ESInets), functional elements (i.e., applications), and databases that replicate traditional E9-1-1 features and functions and provide additional capabilities.

3.3.50 Nontraditional Providers. Providers that might or might not be licensed/certified but who provide services (e.g., social and health education) necessary to meet patients' needs.

3.3.51 Outcome. The result, effects, or consequences of services provided to a patient.

3.3.52 Patient Transportation Provider. Organizations or individuals that offer emergency, nonemergency, or prescheduled medical transportation.

3.3.53 Protocol. A defined out-of-hospital care management procedure.

3.3.54 Provider/Practitioner. Individuals that are licensed or certified to provide health care services, transportation, coordination, or referrals.

3.3.55 Public Safety Answering Point (PSAP). A facility in which 9-1-1 or other emergency calls are answered, either directly or through rerouting.

3.3.56 Quality Assurance Management (QAQM). The activities undertaken to establish confidence that the products or services available maintain the standard of excellence set for those products or services.

3.3.57 Quality Improvement (QI). The activities undertaken to continuously examine the performance of structure, processes, and outcomes within the EMS system and their comparison against a standard to improve the products and services.

3.3.58 Resource Utilization Ratio/Unit Hour Utilization (UHU). An efficiency ratio that divides the time spent on assignment by the total time the resource is available for assignment.

3.3.59 Response. The deployment of resources to an incident.

3.3.60 Response Time Interval. The time when an initial request for resources has been received to the time resources have made patient contact.

3.3.61* Secondary Dispatch Phone Rings (if appropriate). The time the telephone begins to ring in the second public safety answering point (or the call screener).

3.3.62 Staffing. The number and the level of training of personnel.

3.3.63 Standard Operating Procedure. A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions.

3.3.64 Standing Orders. A direction or instruction for delivering patient care without online medical direction backed by authority of the system medical director.

3.3.65 System.

3.3.65.1 EMS System. A comprehensive, coordinated arrangement of resources and functions that are organized to respond in an appropriate manner to out-of-hospital health care needs facilitated by an EMS service.

3.3.65.2 Geographic Information System (GIS). A system of computer software, hardware, data, and personnel to describe information tied to a spatial location.

3.3.66 Telecommunicator. The individual tasked by a public safety agency whose primary responsibility is to receive, process, transmit, or dispatch emergency and nonemergency calls for law enforcement, fire, emergency medical, and other public safety services via telephone, radio, and other communication devices.

3.3.67 Telemedicine. Two-way real-time interactive communication between the patient and the physician or provider at the distance site.

3.3.68 Time Stamps.

3.3.68.1 Incident or Onset Time. The time the incident occurred or the time that the symptoms developed.

3.3.68.2 Time of Discovery of Event. The time that a third party or the patient becomes aware of the need for assistance.

3.3.68.3 Call for Help. The time that a request for service or assistance is initiated.

3.3.68.4 First PSAP Call Time. The time the telephone (or other notification device or mechanism) activates in the first public safety answering point (or other designated entity).

3.3.68.5 Phone "Off-Hook" (answered in first PSAP). The time that the telephone is answered in the first PSAP center.

3.3.68.6 Secondary Dispatch Phone Rings — Secondary PSAP. (Reserved)

3.3.68.7 Secondary Dispatch Phone "Off-Hook" Answered (if appropriate). The time that the second PSAP or second dispatcher answers the phone, begins the interview, collects caller data, begins prearrival instructions.

3.3.68.8* Interview Ends. The time that the PSAP telecommunicator completes the interview with the caller.

3.3.68.9* Response Resources Are Identified. The time at which resources are identified to meet the needs of the call.

3.3.68.10 Dispatch Time. A discrete time stamp that represents unit notification.

3.3.68.11 Unit Acknowledgment. The time that the response resource acknowledges that they have received the notification.

3.3.68.12 Unit en Route. The time that the resource first begins moving toward the scene.

3.3.68.13 Unit Arrived on Scene. The time that the resource comes to a complete stop at the scene.

3.3.68.14 Arrived at Patient (Patient Contact). The point at which personnel has made patient contact.

3.3.68.15 First Intervention Time. The time that the first emergency medical services (EMS) skill intercession (e.g., starting an IV, defibrillation, CPR, or extrication) is begun.

3.3.68.16* Time of Result of First Intervention. The time that the responder first identifies results of the first intervention.

3.3.68.17 Unit Left Scene. The time that the resource first begins moving from the scene.

3.3.68.18 Arrived at Destination. The time that the patient arrived at the hospital, an approved alternate destination, or transfer point.

3.3.68.19 Transfer of Care. The time that responsibility for treatment was transferred from an out-of-hospital provider to another provider (e.g., when the hospital personnel physically take over care of the patient).

3.3.68.20 Available for Service. The time the emergency service resource is available for response.

3.3.68.21 Turnout Activation. Personnel preparation, boarding the vehicle, starting the vehicle, placing the vehicle in gear, and moving the vehicle toward the emergency scene.

3.3.69 Unit. A staffed and equipped emergency response vehicle.

Chapter 4 System Regulation and Policy

4.1 General. System regulation and policy is fundamental to providing emergency medical services and is the basis for effective system design. Consistent with this recognition is the core principle that a single entity should have system oversight and responsibility for the effective coordination of system elements. This entity ensures that the EMS system components are clearly articulated and defined. Furthermore, appropriate mechanisms are instituted to ensure participation of system stakeholders in developing policies and regulations. This chapter outlines the core elements of an effective process for developing and implementing EMS system regulations and policies.

4.2 Oversight. Within the boundaries of the EMS system, the authority having jurisdiction (AHJ) should provide a process for overseeing all system elements, including designating a lead agency to implement and enforce system policies.

4.2.1 Medical Oversight. EMS system medical oversight should be designated by the AHJ.

4.2.2 Operational Oversight. EMS system operational oversight should be designated by the AHJ.

4.3 Authorization. Provider agencies and personnel should be authorized to provide services. The AHJ should ensure that processes or mechanisms are in place to authorize personnel and agency(ies) to provide services consistent with determined levels of need (see Chapter 5).

4.4 Evaluation. The AHJ should ensure that mechanisms are in place to continually evaluate and re-evaluate the components of the EMS system. The lead agency should develop a process to identify components of the EMS system, establish requirements for those components, and develop an evaluation process to ensure that components meet established requirements.

4.5 Roles and Responsibilities. The lead agency should establish and articulate roles and responsibilities for EMS system participation. Establishing roles and responsibilities for EMS participants should be accomplished through a comprehensive system assessment as described in Chapter 5.

4.6 Service Levels. The lead agency should identify service levels and develop guidelines or performance standards for each service level in the community. Service levels, guidelines, and performance standards should be determined by considering factors consistent with local resources and needs, such as community expectations, measurable patient outcomes, resource availability, and financial capability.

4.7 Management Structure. The lead agency should have a clear management structure and lines of accountability. The management structure of the lead agency should be defined according to depth and breadth appropriate to the system. Each position within the lead agency should be defined according to its role(s), responsibility(ies), and reporting relationships. EMS system participants should know and understand the management structure and function of the lead agency.

4.8 Planning. The lead agency should provide planning for EMS system design.

4.8.1 The lead agency should ensure that the EMS system design is based on a systematic planning process.

4.8.2 The planning process begins by conducting an assessment of the EMS system's needs, resources, and capabilities.

4.8.3 While planning processes might vary significantly among EMS systems, the lead agency should ensure that the process occurs in a manner consistent with identified needs.

4.9 Authority to Implement Plans. The lead agency should be empowered to implement plans. Within the system, the AHJ should formally vest the lead agency with responsibility and authority to implement plans.

4.10 Resources. The lead agency should have the resources necessary to carry out its function. The AHJ should ensure that adequate fiscal and nonfiscal resources are available and accessible, thereby allowing the lead agency to function effectively.

4.11* Participation in Policy Development. Representatives of user groups and system stakeholders should be involved in designing expectations and developing system policy. The lead agency should identify appropriate participants for system design and policy development.

4.12 Authority for Policy, Procedure, and Operation. The lead agency should have the authority to convene EMS expertise to assist in designing and implementing policies, procedures, and operations. The lead agency should be vested with the authority to establish advisory bodies or committees for specific EMS system design elements.

4.13 Patient Information Protection. The lead agency should ensure that appropriate policies and procedures are in place to protect patient and quality assurance records.

Chapter 5 EMS System Analysis and Planning

5.1 Introduction.

5.1.1 Virtually all communities have some form of EMS system. For any one community, the components of the EMS system and the level of service should be tailored to the needs and wants of that community. This chapter outlines a systematic approach for evaluating and analyzing a jurisdiction's existing EMS system or for determining the EMS system design for a jurisdiction without a dedicated EMS system in place.

5.1.2 A community should conduct a comprehensive community analysis that considers available resources, customers, geography, demographics, political conditions, and other unique and special needs of the EMS system.

5.1.3 A comprehensive community analysis should focus on the areas stated in 5.1.2, identifying their potential impact on the effectiveness of EMS system components including human resources, medical direction, legislation and regulation, education systems, public education, training, communications, transportation, prevention, public access, communications systems, clinical care, information systems (i.e., data collection), and evaluation.

5.2 Analysis of System Resources. The EMS system should analyze the resources available, including financial, equipment and facilities, providers, and stakeholders.

5.2.1 Finances.

5.2.1.1 Comprehensive Financial Analysis. The financial status of the community and its capacity to support the EMS system should be evaluated. The analysis includes the financial status of all the entities within the EMS system based on generally accepted accounting principles. (See Chapter 6.)

5.2.1.2 Solvency. Each EMS system component should be financially solvent by maintaining the financial resources to allow the uninterrupted delivery of services.

5.2.1.3 Funding Stability. Funding for each component may be through a variety of sources, such as municipal budget/taxes, fee for services, subscription programs, grants, or private donations. Each component should be self-supporting, with adequate reserves to continue to function if the primary funding mechanism is temporarily interrupted or if operating costs exceed available funding.

5.2.1.4 Budget. Each system component should maintain annual operating and capital budgets consistent with generally accepted accounting principles.

5.2.2 Providers. The EMS system should identify the roles, responsibilities, staffing requirements, and training levels of each provider needed for the EMS system to meet its objectives.

5.2.2.1 Role Description. Each type of service within the EMS system should be clearly defined and fully described (e.g., the response system may be different from the transportation system).

5.2.2.2 Role Definition. Each community defines the different types and levels of providers that may be required. Examples of provider types are described in 5.2.2.2.1 through 5.2.2.2.6.

5.2.2.2.1* Telecommunicators. Telecommunicators provide verification of the incident address and notification of closest EMS system provider. Emergency medical dispatchers (EMDs) provide verification of the incident address; triage the call to identify which resources are needed to best meet the needs of the caller; notification of the closest, most appropriate provider; and prearrival patient care instructions.

5.2.2.2.2 Emergency Medical Responders. The role of emergency medical responder is as referenced by the NHTSA Office of EMS.

5.2.2.2.3 Basic Life Support. The role of basic life support responder is as referenced by the NHTSA Office of EMS.

5.2.2.2.4 Advanced Life Support (ALS). The role of ALS responder is as referenced by the NHTSA Office of EMS.

5.2.2.2.5 Mobile Integrated Healthcare (MIH). The role of each MIH provider should be clearly defined by the AHJ over the MIH system.

5.2.2.2.6 Patient Transportation Provider(s). Patient transportation providers may offer emergency, nonemergency, or prescheduled medical transportation. Resources of other nonconventional agencies such as nonemergency ambulance and municipal mass transportation services should be considered.

5.2.3 System Response Models. The EMS system should identify the roles and responsibilities of each organization type

needed for the EMS system to function. How those organizations fulfill them is determined by the needs of the community.

5.2.3.1 Structure. The system response model may be delivered by a single organization or through the combined efforts of multiple organizations, including, but not limited to, those described in 5.2.3.1.1 through 5.2.3.1.6.

5.2.3.1.1 Fire Department Based. A response and patient transportation system that uses multi-role firefighters or supplemental single-role EMS providers.

5.2.3.1.2 Fire Department-Based Oversight. The response and patient transportation system uses EMS personnel who are not cross-trained as fire suppression personnel.

5.2.3.1.3 Public Single-Role EMS System. The response and patient transportation system utilizes single-role public employees.

5.2.3.1.4 Private Ambulance Provider System. The response and patient transportation system uses nongovernmental staff.

5.2.3.1.5 Combined System. Some other combination of public and private resources is used to provide out-of-hospital care.

5.2.3.1.6 Additional Provider Types. Additional provider types such as police based, hospital based, wilderness, public corporation, military, nonprofit, and others may provide services independently or in combination with other provider types.

5.2.3.2 Participant Roles. The roles and responsibilities for each participant should be organized in a manner that ensures that every component of the EMS system contributes to the effectiveness of the EMS system as a whole, without conflict.

5.3 Community Needs Analysis.

5.3.1 While an EMS system is unique to the jurisdiction, a standardized approach should be established for assessing local needs and meeting those needs with specific service elements. The EMS system plan should identify the medical needs of the community for patient care and transport.

5.3.2 Retrospective Evaluation.

5.3.2.1 Existing Systems. For existing EMS systems, community needs and system components should be established based on response data, patient care records, and other information, including the following:

- (1) Demographic data
- (2) Historical patient data and call history
- (3) Unique geographical or environmental conditions
- (4) Local hazards
- (5) Call/incident severity
- (6) Other local data resources as appropriate

5.3.2.2 No Existing Systems. For areas without an existing EMS system, system design should be based on established industry standards.

5.3.2.3 Service Levels. Service levels should be linked to community needs and expectations.

5.4 System Design Analysis.

5.4.1 Data Collection and Evaluation. The EMS system should be examined in detail over time using indicators set forth in

existing industry standards, guidelines, or specific performance measures.

5.4.2 Existing Industry Standards and Regulations.

5.4.2.1 Existing Regulatory Standards. EMS agencies should comply with local, state, provincial, tribal, and federal laws, rules, and regulations.

5.4.2.2 Consensus-Based Industry Standards. EMS agencies should comply with applicable consensus-based industry standards.

5.4.2.3* Evidence-Based Guidelines. EMS systems and agencies should use evidence-based guidelines for resource deployment and management of patient care.

5.4.3 Performance and Quality Measures as System Design Features.

5.4.3.1* EMS systems and agencies should use performance measures as a framework for operational improvement.

5.4.3.2 Agency Accreditation. EMS systems and agencies should consider accreditation as a means of developing and maintaining verifiable performance and quality measures.

5.5 Continual Risk Assessment and Planning. EMS systems and agencies should have in place a comprehensive process to assess and manage external and internal risks.

5.5.1 Internal System Liabilities Risks. Internal system liabilities place individual agencies or the EMS system at risk. Examples of such risks include workplace violence, financial improprieties, discrimination, and harassment.

5.5.2 External-Community Risks. External system liabilities place community members at risk. Examples include risks to the community from provider negligence, inappropriate vehicle operation, lack of compliance with training standards, improper maintenance, and inadequate quality assurance processes.

5.5.3 Risk Control. Measures should be taken to guard against and protect personnel from potential exposures to risks.

5.5.4 Loss Control. Measures should be taken to limit losses through processes such as early-return-to-work programs.

5.6 Call Processing. System analysis considers call processing the manner in which calls are processed, as well as evaluation of the intervals required to complete the call and notify appropriate providers.

5.6.1 Call Processing Method. Community needs should dictate the way that resources are assigned and prioritized.

5.6.2* Call Processing Time Interval Standards. Call processing performance objectives should comply with existing standards.

5.6.3* Turnout (Activation) Interval. Turnout interval performance objectives should comply with existing standards. System analysis should consider the provider turnout interval, or the interval from response unit notification to movement of that unit to the location of the incident.

5.7 Geography. System analysis should consider geography and the implications of local geography on service delivery.

5.7.1 Geographic Response Tools. A geographic information system (GIS) may be used as a tool to model existing service delivery for each EMS system component, such as first response, BLS or ALS care, or patient transportation services. Response capabilities for each mobile system component based on desired travel intervals can be modeled using a GIS system, identifying underserved areas of a jurisdiction, for either current or planned system designs.

5.7.2 Travel Interval. Travel interval objectives examined by a GIS analysis should parallel standards as established by the lead agency.

5.7.3 Geographic Barriers. A GIS model may also identify potential barriers to delivery of care (e.g., interruption of the road network by construction, flooding, or railroad crossings).

5.7.4 Distribution of Demand. A GIS may also identify the distribution of calls in a community and areas undergoing development that would require the expansion of services in the future.

5.8 First Response. The AHJ should establish response intervals for the EMS system that are appropriate for the community. The standards should be suitable for the local demographics, resources, medical needs, and geography. The intervals should be systematically monitored for compliance with the local standard.

5.9 Demographics. The EMS system analysis should consider local demographics and the implications of those demographics on service requirements for a range of constituency groups.

5.9.1 Age. Age-related injuries and illnesses (e.g., pediatric, adolescent, or geriatric) should be considered.

5.9.2 Socioeconomics. A community's socioeconomic structure and its associated injuries and illnesses (e.g., violent crime, lack of prenatal care, or neglect) should be considered.

5.9.3 Gender. Gender-related injuries and illnesses (e.g., disease rates and treatment plans) should be considered.

5.9.4 Culture and Ethnicity. Language, cultural diversity, and ethno-specific disease processes should be considered.

5.9.5 Local Industry. Industrial area injuries and illnesses (e.g., exposure to hazardous materials, injuries from machinery) should be considered.

5.10 Regulatory Environment. The EMS system should monitor the political and regulatory environments to analyze impacts on operations, funding, and personnel.

5.11 Additional System Needs. The EMS system analysis should consider other features unique to the EMS system, such as special hazards, needs, and conditions that will affect service delivery.

5.12 Disasters. The potential for disasters as a function of unique jurisdictional features, characteristics, and risks should be considered.

5.12.1 Disaster Planning. The EMS system should ensure that a plan is available to manage response to and recovery from natural and human-caused disasters.

5.12.2 Disaster Preparedness.

5.12.2.1 The EMS system should coordinate with hospitals, public health, PSAPs, law enforcement, emergency manage-

ment, and other public safety and health care partners to ensure that citizens are prepared.

5.12.2.2* The EMS system should maintain a continuity of operations plan for any natural, man-made, or accidental disaster.

5.13* Medical Center Resources. The EMS system analysis should consider resources available through local hospitals.

5.14 EMS System Risk Reduction. Based on the comprehensive system analysis and the identified system priorities, the EMS system should include a plan for ongoing system analysis and improvements.

5.15 Resource Allotment. Resources should be allocated appropriately between agencies in the EMS system.

5.16 Master Planning/Forecasting. A master plan should be available that ensures that the necessary resources are available to the EMS system and will meet the needs of future system requirements.

5.17* Public Education and Injury/Illness Prevention. The EMS system plan should include components designed to enhance the quality of life and reduce the need for emergency responses.

5.18 Other Programs. The prevention and public education plan should include an analysis of the environment and an analysis of the need for special prevention programs.

5.19 Public Health. The EMS system should coordinate with public health programs to ensure that the citizens are integrated into the health care system.

5.20 EMS Quality Measures. The EMS system should capture data that meets state reporting requirements and NEMSIS interoperability standards.

Chapter 6 Finance

6.1 Determining Cost of an EMS System. EMS system and agency financial plans should include a method for determining costs. Methodologies have been specified to identify all costs associated with EMS elements or components. Different methods exist for determining costs for public and private organizations; costing of services may have different applications. Therefore, a number of national organizations have developed cost allocation methods, each with its own applications, benefits, and shortcomings.

6.1.1 Specification and Categorization of Direct Costs. The financial plan should be able to define the direct costs of each EMS system element.

6.1.1.1 Direct operating costs should be established for each phase of operations. The direct costs are those that can be assigned directly to a particular component of the operation, and should include start-up and ongoing costs.

6.1.1.2 EMS systems and agencies should identify the start-up costs of the operation. At a minimum, the financial plan should be able to identify and calculate the start-up costs for the following:

- (1) Emergency medical and other equipment
- (2) Vehicles
- (3) Fuel

- (4) Supplies and materials
- (5) Facilities
- (6) Personnel
- (7) Training, including certification and licensing fees
- (8) Communications

6.1.1.3 EMS systems and agencies should identify the ongoing or continuous costs of delivering EMS services.

6.1.1.4 At a minimum, the financial plan should be able to identify and calculate and, if appropriate, allocate the ongoing replacement and maintenance costs for the following:

- (1) Emergency medical and other equipment
- (2) Vehicles
- (3) Fuel
- (4) Supplies and materials
- (5) Facilities
- (6) Personnel
- (7) Training, including certification and licensing fees
- (8) Communications
- (9) Personal protective equipment (PPE)

6.1.2 Specification and Categorization of Indirect Costs. EMS systems and agencies should be able to identify the fixed and variable indirect cost of each EMS system element. Examples of such costs include the following:

- (1) Insurance non-covered expenses
- (2) Legal services and consultation
- (3) Medical oversight
- (4) Contract services
- (5) Regulatory compliance
- (6) Billing services
- (7) Information management

6.2 Method for Anticipating EMS System Funding Sources. The EMS system should be able to identify and predict the revenue sources available to support a viable EMS system. Given the diversity of funding sources for EMS systems, the EMS system should take into consideration the following potential funding sources:

- (1) Fee-for-service resources such as the following:
 - (a) Private pay
 - (b) Third-party pay
 - (c) Bad debt or contractual allowances based on uncollected revenues
- (2) Government reimbursement, such as the following:
 - (a) Medicare
 - (b) Medicaid
 - (c) Military/government and dependent care
- (3) Contractual agreements such as the following:
 - (a) Capitated agreement
 - (b) Contract service
 - (c) Special event
- (4) Public and private grants
- (5) Public funding, such as the following:
 - (a) Taxes
 - (b) EMS operating levies
 - (c) Bond levies
- (6) Statutory revenue
- (7) Corporate funding, if available
- (8) Civic group funding
- (9) Public and private donations
- (10) Subscription programs

- (11) Investment revenues
- (12) Other subsidies
- (13) Foundations

6.3 Revenue and Cost Analysis. Financial planning should use revenue and cost analyses to establish EMS system priorities, goals, and objectives, and allow the EMS systems and agencies to predict future financial capabilities.

6.4 Financial Plans. A financial plan should be developed that includes short- and long-term operating needs.

6.4.1* Short-Term. Short-term plans provide for ongoing services and include a mechanism for responding to unanticipated costs.

6.4.2* Long-Term. A long-term financial plan should be developed to forecast long-term capital needs, potential changes in revenue streams, and potentials for new or alternate methods of providing services. The following are considerations for long-term EMS system and agency financial planning:

- (1) Potential new services
- (2) Potential revenue changes
- (3) Unknown or unanticipated expenditures
- (4) Justification for resources and requirements
- (5) Cash-flow forecasts
- (6) Revenue projections
- (7) Capital replacement

6.5 Business Analysis. A business analysis should be conducted at regular intervals. A business analysis allows the EMS system to monitor its performance and compares its performance against contemporary benchmarks. The following are recognized elements that should be considered in a business analysis:

- (1) Financial performance measures
- (2) Market analysis, including prevailing rates
- (3) Cost shifting, if present
- (4) Maintenance of adequate reserves to ensure ongoing operations
- (5) Matching resources to requirements to ensure that funding is adequate
- (6) Development of a standardized cost analysis tool

6.6 Additional Financial Issues. The system should consider additional issues. Given the diversity of local EMS systems, local agencies should be able to identify or recognize fiscal considerations that are beyond the scope of standard financial practices.

6.6.1 The collection methodology should be appropriate and reviewed regularly. The EMS system should recognize the uniqueness, importance, and value of the financial reimbursement and collection process. The EMS system should regularly evaluate billing methodologies.

6.6.1.1 Regulatory restrictions should be considered with respect to the billing process. Collection methods should recognize and consider the following local, state, and federal requirements:

- (1) Health Insurance Portability and Accountability Act (HIPAA)
- (2) Medicare and Medicaid
- (3) Employee Retirement Income Security Act
- (4) State and federal insurance regulations

6.6.1.2 The collection process should be appropriate to the system. The EMS system should ensure that methods are in place to evaluate collection processes and should ensure that those processes are consistent with community expectations. The following collection processes should be considered by the EMS system:

- (1) In-house collections
- (2) Regular evaluation of collection rates
- (3) Contracted collection
- (4) Payer requirements
- (5) Appropriate documentation for the system, and provision of training to ensure appropriate documentation

6.6.2 The system should be prepared to provide financial reporting information that articulates the financial health and performance of the system. At a minimum, the financial report should include the following:

- (1) Grossbillings
- (2) Collection rate
- (3) Billing mix (ALS, BLS, scheduled, unscheduled, miles per transport, and other billing codes according to local standards)
- (4) Payer mix, including uninsured
- (5) Accounts receivable turnover rate
- (6) Bad debt expense
- (7) Contractual allowances
- (8) Write-offs
- (9) Net revenues

6.6.3 Partnerships should be considered. The system should take steps to forge partnerships when appropriate. In an effort to reduce overall system expenditures, the EMS system should consider taking advantage of fiscal and operating synergies where opportunities exist for collaborative relationships within the system.

Chapter 7 Medical Oversight

7.1* General. The necessity and value of effective and engaged medical oversight cannot be overstated. The provision of health care outside the hospital is a practice of medicine. Therefore, the designated medical director should be an appropriately board-certified, licensed physician who understands how out-of-hospital medical care is delivered in the community. This physician(s) should have appropriate clinical oversight of the emergency medical services (EMS) system that is utilized for the provision of health care.

7.2 Medical Authority. The EMS system should have a single medical authority (i.e., the medical director) or medical authority structure — with the medical director serving as its leader — in place that is responsible for patient care oversight. Individual agencies in the EMS system may have medical directors who provide agency-specific or program-specific oversight.

7.3 System Support of Medical Authority.

7.3.1 The EMS system should ensure that the medical authority tasked with overseeing the EMS system has an opportunity to provide input and direction in the initial planning, design, and implementation of the EMS system.

7.3.2* The EMS system should ensure that the medical director has the resources necessary to optimize obligation fulfillment.

7.4 Medical Director Role. The medical director provides medical oversight for the EMS system. Because every system is unique, medical authorities may be different physicians with subject matter expertise specific to the goals and objectives of their programs. In such instances, the physician medical director of the participating agency should ensure that medical care, whether emergency or nonemergency, provided by their crew members falls under the oversight of the EMS system's single EMS medical director's authority.

7.5 Medical Authority Role. The role of the medical authority for the EMS system should be clearly defined and should include the following responsibilities:

- (1) Ensuring patient-centered care
- (2) Recommending credentialing, recredentialing, and decredentialing of out-of-hospital providers to the appropriate certifying or licensing agency
- (3) Establishing an advisory committee consisting of stakeholders to review community needs and the effectiveness, safety, and value of the EMS system
- (4) Providing direction and authorization for the development and revision of the EMS system's protocols, policies, standing orders, and procedures for all patient care activities
- (5) Establishing criteria for providers to be trained and certified or licensed, if applicable, and credentialed to function within the EMS system
- (6) Establishing criteria for determining the most appropriate patient destination
- (7) Ensuring that personnel who provide direct medical oversight are familiar with the out-of-hospital environment and capabilities of responders
- (8) Establishing the procedures or protocols for the EMS system
- (9) Providing direction and authorization for the education and testing of practitioners to ensure competency
- (10) Providing direction for, and participating in, an effective quality management (QM), quality assurance (QA), and continuous quality improvement (CQI) program
- (11) Establishing methods to coordinate applicable and appropriate stakeholders (e.g., medical home/primary care physicians, specialty care physicians, referring physicians, hospitals, pharmacists, nursing staff, home health, respiratory therapy, case managers, public health, legislators, government officials, payers)
- (12) Establishing criteria for equipment used in patient care (e.g., functional, effective, evidence based)

7.6 Medical Director Responsibilities.

7.6.1 The primary responsibilities of the program's medical director should be ensuring quality patient care and overseeing all patient care activities.

7.6.2 If the EMS system's medical director is different from the agency's medical director, the physicians should work collaboratively to do the following:

- (1) Serve as patient advocates
- (2) Set and ensure compliance with patient care standards, including communication standards and medical protocols
- (3) Provide direction and authorization for the development and revision of systemwide protocols, policies, and procedures for all patient care activities

- (4) Develop and implement the process for the provision of online medical oversight, if needed
- (5) Establish the appropriateness of initial qualifications of out-of-hospital personnel involved in the EMS system
- (6) Ensure maintenance of qualifications, education, training, and competency of out-of-hospital personnel involved in patient care
- (7) Provide direction for effective QA and CQI/QM
- (8) Promote research, evaluation, and contributions to medical literature
- (9) Maintain liaison with all stakeholders
- (10) Interact with local, regional, state, and federal authorities (as applicable) to ensure resources are optimized and all compliance and regulatory requirements are fulfilled
- (11) Plan and participate in regularly scheduled continuing education activities for the participating providers to help them maintain the highest levels of awareness, training, and education in medicine
- (12) Promote patient education to engage them as stakeholders in their own care
- (13) Maintain knowledge levels appropriate for a physician medical director through appropriate continuing medical education (CME) activities
- (14) Actively participate in direct, on-scene medical care to bolster understanding of the EMS system and the challenges inherent in the delivery of out-of-hospital care

7.7 Online and Off-Line (Direct and Indirect) Medical Direction. Medical directors can provide online and off-line medical oversight.

7.7.1 During online medical direction, the medical director, or designee, provides voice, video, or other real-time communication to the provider.

7.7.2 Off-line medical oversight includes standing orders, prospective, and retrospective medical evaluation.

7.7.2.1 Prospective methods can include participating in the training, testing, and certification of providers; protocol development; operational policy and procedures development; and legislative activities.

7.7.2.2 Retrospective activities should include participation in CQI/QM.

7.7.2.3 Various aspects of prospective and retrospective medical oversight can be handled by individuals or committees functioning under the medical director with representation from appropriate stakeholders.

7.7.3 Policies should be established for the certification, training, and monitoring of other system physicians, if applicable.

7.8* Medical Director Qualifications. To optimize medical oversight of EMS systems, physicians who have medical oversight authority and a license to practice within the EMS system's boundaries should ideally possess American Board of Medical Specialties (ABMS) board certification in EMS medicine. If not, they should have specialized knowledge of EMS, including the following:

- (1) Familiarity with the design and operation of an EMS system and EMS scope of practice
- (2) Experience or training in longitudinal health care/chronic disease management

- (3) Experience or training in medical direction/oversight of out-of-hospital personnel
- (4) An active practice of medicine in an emergency or hospital setting
- (5) Experience or training in the instruction of out-of-hospital personnel
- (6) Experience or training in the QA and CQI/QM processes
- (7) Knowledge of laws and regulations pertaining to out-of-hospital care providers' practices and principles
- (8) Knowledge and coordination of local medical resources and stakeholders key to the effective delivery of out-of-hospital care

Chapter 8 Quality Management, Clinical Quality, and Data Reliability

8.1 Quality Management Program. A defined quality management program should establish mechanisms to monitor compliance with accepted clinical and industry standards, guidelines, and quality measures to provide innovative high-quality care to the out-of-hospital community, and ensure provider welfare.

8.1.1 The quality management program should have the capability to develop, test, and field quality measures based on local system priorities.

8.1.2 A quality management officer should be identified who is knowledgeable in performance improvement techniques and science. The quality management officer should report to the medical director on identified performance indicators.

8.2 Objectives. A defined quality management program should establish performance objectives based on accepted industry standards and guidelines.

8.2.1 Performance Objectives. Patient care objectives should be developed systemwide based on your community's needs, utilizing local resources to achieve desired patient outcomes.

8.2.1.1 Objectives should cover appropriate medical destinations, protocol compliance, medical care provided, and patient experience and feedback.

8.2.1.2 Objectives should meet accepted out-of-hospital clinical guidelines and quality measures to ensure patient-centered outcomes.

8.2.2 Clinical and Operational System Evaluation. Clinical and operational system evaluation should be integrated into the quality management program.

8.2.2.1 Quality measures should be established and data collected that is of sufficient quality to ensure that quality measures can be calculated.

8.2.2.2 A system for case and process review should be established.

8.2.2.3 Case reviews should be conducted in a non-punitive manner to promote participation and improve future policies, procedures, and so forth.

8.2.2.4 The system should measure both resources and availability for the following:

- (1) Public-access defibrillator locations
- (2) Ancillary EMS, fire, rescue, air medical, and hazmat services

- (3) Hospitals—identifying specialty destinations and diversion policies and procedures
- (4) Alternative destination facilities (e.g., urgent care, medical offices)
- (5) Public health and social services (e.g., national, state, and local services)
- (6) Unit availability and allocation
- (7) Designated disaster facilities and procedures

8.2.2.5 Staffing and resource allocation should be monitored and consistent with a community-based needs assessment.

8.2.2.6 Standard operating procedures and guidelines should be established, regularly reviewed, and updated.

8.2.2.7 Staff turnover should be evaluated for causes and effects to evaluate retention opportunities and system improvement.

8.2.2.8 Equipment maintenance should be monitored and maintained based on manufacturer recommendations.

8.2.2.9 System design and changes should be evaluated regularly, incorporating patient outcomes, provider health and safety, and cost-benefit information.

8.2.2.10 The communications system should be regularly evaluated based on industry performance guidelines.

8.2.2.11 Interagency relationships and agreements should be developed and regularly reviewed for effectiveness to meet system needs.

8.2.3 Data Capture. The EMS system should use uniform data element definitions. The EMS system should identify and capture appropriate data points.

8.2.3.1 A uniform pre-hospital patient care record that aligns with NEMSIS should be used throughout the EMS system.

8.2.3.2 A method should be in place to collect and analyze data at the state, system, agency, and individual provider level.

8.2.3.3* The EMS system should use a uniform data set.

8.2.3.4 Data Sharing.

8.2.3.4.1 Data should be available for inclusion in the NEMSIS data repository.

8.2.3.4.2 Data sets of the EMS system should be regularly reviewed to ensure that all electronic patient care reporting systems meet AHJ standards for interoperability and privacy.

8.3 Public Health Clinical Outcome Parameters. Public health clinical outcome parameters should be developed and regularly reviewed for each performance objective through the use of benchmarking, if possible.

8.3.1 Public health and social service partnerships should be developed within the EMS system to minimize overuse and misuse of services and improve patient outcomes.

8.3.2 Standardized outcome measures should be specified based on contemporary professional standards and should evaluate the entire continuum of care.

8.3.3 EMS agency directors should incorporate clinical outcome models that address injury and illness prevention, patient-centered outcomes, provider wellness, and access to care and health equity to the populations served by the EMS system.

8.3.4 A system should be in place to share information between system participants, including patient care facilities, and to obtain outcome information from outside databases, such as, but not limited to, the following:

- (1) Health information exchange
- (2) Medical examiner reports
- (3) Hospital records
- (4) Trauma registry
- (5) Cardiac arrest registry (CARES)
- (6) Stroke registry
- (7) Transport registry reports
- (8) Discharge data
- (9) Computer-aided dispatch
- (10) Other appropriate databases

8.3.4.1 All information shared should have a defined and agreed-upon process.

8.3.4.2 This process should be compliant with existing information security and privacy regulations.

8.4 Physician and EMS Leadership Participation. A quality management program should include active EMS leadership and physician oversight to support and advance the clinical practice of the EMS system.

8.5 Patient Confidentiality. All data management programs should maintain patient confidentiality, at a minimum, in accordance with federal, state, and local regulations.

8.6 Injury/Illness Reduction and Prevention. The quality management program should incorporate standards directed at reducing injuries and illnesses and align with regional, state, or system injury prevention strategic plans.

8.7 Complaints. A consistent process should be in place to address complaints.

8.7.1 Quality management programs should have a formal complaint-handling process in place to address complaints.

8.7.2 Customer satisfaction surveying can be used as a mechanism to receive and process complaints.

8.7.3 EMS systems should solicit customer input to improve customer satisfaction, identify opportunities for service enhancement, and reduce system cost.

8.8 Participation in Studies and Research. The EMS system participants may develop relationships with academic institutions or researchers to take an active role in studies and research using system data as follows:

- (1) Establish credible data collection process
- (2) Identify research issues
- (3) Provide linkage (to other studies)
- (4) Identify research funding sources
- (5) Publish study results in recognized peer-reviewed journals
- (6) Develop relationships with academic institutions or researchers to identify and promote evidence-based EMS research

8.9 System Review. All quality management systems should be reviewed on a regular basis for effectiveness.

8.10 Documentation. The EMS system should be able to provide documentation of its quality management program, including quality assessment and improvement methods, provider training programs, prevention strategies, loop closure, and system performance measures.

8.11* Multiple Clocks Within a System. Most EMS systems use one clock to record certain events, while other clocks record time stamps for other events. When more than one clock is used, time discrepancies are much more likely. Therefore, when multiple clocks are used in a system to record discrete time stamps, all efforts should be made to synchronize those clocks.

8.12 System Transformation.

8.12.1 EMS systems should participate in regional, state, and national initiatives that will drive performance in line with the triple aim.

8.12.2 Systems should provide care at the right place and time to improve patient health and reduce cost.

Chapter 9 Stakeholder Relations

9.1 General.

9.1.1 The organizations operating an EMS system should create a collaborative communications network between its management personnel and stakeholders.

9.1.2 For purposes of this document, stakeholder groups are divided into four categories: internal, external, regulatory, and payers. System management should identify and work collaboratively with all stakeholders in these groups to ensure that the needs of the community are met.

9.2 EMS System Goals. The authority having jurisdiction (AHJ) leading the EMS system should assess the needs of the community, identify gaps in care and services, and develop a draft for the types of services needed. Ideally, this should be done in a collaborative community forum.

9.3* Internal Stakeholder Relations. Before changes to an EMS system begins, internal stakeholders should be included in the process. Internal stakeholders need to be engaged and committed for the change process to be successful.

9.4* External Stakeholder Relations. External stakeholders include entities outside of the system's participants that are impacted by, or could impact, the success or failure of any change or development.

9.5* Regulatory Stakeholders Relations. Engaging early with regulatory agencies is essential to success.

9.6 Payer Stakeholder Relations. Potential payers should be included in the planning and development stages of the EMS system as early as possible to build valuable partnerships that yield sustainable revenue. (*See Chapter 5.*)

9.7 Achieving Stakeholder Relations Success. To be successful in obtaining and maintaining relationships with stakeholders, EMS systems should focus on objectives, including, but not limited to, the following:

- (1) Always keep the patients at the center of the system
- (2) Engage all stakeholders early in the process
- (3) Engage internal stakeholders first
- (4) Ensure the long-term continuity of the system
- (5) Engage regulatory agencies as important EMS system partners

Chapter 10 Community Education and Risk Reduction

10.1 Community Education. The local EMS system should take steps to establish a coordinated program of community education, information, and relations.

10.1.1 Education efforts should be coordinated to ensure community awareness of EMS system access. The participants in the EMS system should work collaboratively to ensure that the telephone number for appropriate EMS system access is promoted.

10.1.2* Education messages delivered by EMS system providers should be coordinated to ensure consistency. Education messages should use appropriate delivery methods.

10.1.3 Education efforts should be coordinated to ensure public awareness of injury and illness prevention programs.

10.1.3.1 Education efforts should attempt to reduce the incidence of injuries and illness.

10.1.3.2 Providers should work together to design programs that focus on preventing injuries and illnesses by analyzing local or regional data, identifying populations for outreach, researching methods of intervening, and implementing the most appropriate methods.

10.1.3.3 Education efforts should teach community members to become immediate responders to health threats.

10.1.4 Messages should be delivered according to the diverse needs of community groups.

10.2 Community Education Goals. The EMS system should focus on providing opportunities and education to empower community members to participate in a healthier community.

10.2.1 The EMS system should evaluate the existing community education process and plan for improvements.

10.2.2 Improvement efforts should address public access, recognition, and intervention to improve patient outcomes, and include the following:

- (1) Focus on teaching illness or injury prevention
- (2) Citizen disaster preparation
- (3) Earlier identification of illness or injury and proper use of the EMS system
- (4) Educating the community to become immediate responders to illness or injury (e.g., AED use, hands-only CPR, Stop the Bleed, and so on)

10.3 Personnel Qualifications. Specialized skills are required to provide effective public communications. This is an essential component of an EMS system, and each agency should have at least one such person skilled in public communications.

10.4 Community Education Activities. The participants in the EMS system should develop a working group of public education specialists. Activities should be chosen to ensure the best outcomes and ensure consistent messaging. The community education group should include EMS personnel, educators, and public information specialists, as well as local or national experts on specialized topics with experience with the following:

- (1) Teaching classes
- (2) Holding seminars
- (3) Working with national and local media outlets
- (4) Using social media platforms

- (5) Developing print and electronic media for education
- (6) Developing practice drills (e.g., fire drills)
- (7) Participating in health fairs and other public events

10.5 Identification of Funding Resources. The EMS system should identify funding sources and partners to ensure stable funding for community education activities.

10.6 Community Risk Reduction.

10.6.1 Community Risk Assessment (CRA). Community risk assessments can identify the needs or risks within the community.

10.6.2 Risk Reduction Plan Development and Implementation. Based on risks identified in the CRA, risks should be prioritized according to their probability, and impact as well as community needs and expectations, resource availability, and legal requirements.

10.6.2.1 Addressing Root Causes. The risks and root causes identified in the CRA should be identified to determine the best risk-reduction strategies.

10.6.2.2 Identifying Strategic Partners. The CRA and root cause evaluations should be used to identify possible strategic partners, which can be selected based on common interests, available resources, and skill sets, to formulate goals, objectives, and strategies.

10.6.2.3 Establishing Goals and Objectives. Goals and objectives should be developed based on the prioritized risks, the root causes, and the resources and skill sets of the strategic partners.

10.6.2.4 Developing Strategies. Strategies to accomplish goals and objectives should be created as follows:

- (1) Designating individuals, strategic partners, and agencies responsible for accomplishing each strategy
- (2) Determining an overall timeline to accomplish the goals, objectives, and strategies

10.6.2.5 Obtaining Administrative Approval. A lead person or organization should be chosen to submit a recommended plan for administrative approval.

10.6.3 Plan Review. A periodic review should be conducted to evaluate whether the activities achieved the intended goal(s). This may include repeating the CRA, developing new strategies, and implementing a revised plan.

Chapter 11 Health Information Technology (HIT) and Communications Technology

11.1* Interoperability in Health Care Information and Management Systems

11.1.1* General. EMS systems should incorporate integration with multiple patient care systems (i.e., interoperability). Interoperability in the health care industry is the ability of HIT systems of various health care providers, facilities, organizations, and ancillary services to seamlessly collaborate and share information to advance the effective delivery of health care for individuals and communities.

11.1.2 Delivering HIT.

11.1.2.1* Organizations should investigate emerging and existing technologies and determine the best options for trans-

mitting HIT in various forms (e.g., voice, data, video). Options for transmitting HIT data include, but are not limited to, radio wireless technology (e.g., Wi-Fi, cellular, and satellite technology).

11.1.2.2* First Responder Network Authority (FirstNet) Allows for Wireless Prioritization.

11.1.3 Interoperability Types. There are three levels of HIT interoperability—foundational, structural, and semantic.

11.1.3.1 Foundational Interoperability. Foundational interoperability allows data exchange from one HIT system to be received by another HIT system. The receiving HIT system does not require the ability to interpret the data.

11.1.3.2 Structural Interoperability.

11.1.3.2.1 Structural interoperability is an intermediate level that defines the syntax (i.e., structure or format) of data exchange where there is uniform movement of health care data from one HIT system to another such that the clinical or operational purpose and meaning of the data is preserved and unaltered.

11.1.3.2.2 Structural interoperability ensures that data exchanges between HIT systems can be interpreted at the data field level.

11.1.3.3 Semantic Interoperability.

11.1.3.3.1 Semantic interoperability is a high level that allows two or more systems or elements to exchange and use information by taking advantage of both the structuring of the data exchange and the codification of the data, including vocabulary, so that the receiving HIT system can interpret the data.

11.1.3.3.2 Semantic interoperability supports the electronic exchange of patient summary information among caregivers and other authorized parties via potentially disparate electronic health record (EHR) systems and other systems and improves quality, safety, efficiency, and efficacy of health care delivery.

11.2 Patient Care Record Accessibility. EMS systems should be able to access and utilize electronic HIT systems, such as the following:

- (1) Electronic medical records (EMRs)
- (2) Electronic health records (EHRs)
- (3) Electronic patient care records (ePCRs)

11.2.1* Records, which can help providers make decisions about a patient's care when accessed, automate and streamline provider workflow and can contain, but are not limited to, the following information:

- (1) Pertinent medical or surgical history
- (2) Medications
- (3) Treatment plans
- (4) Immunization dates
- (5) Allergies
- (6) Imaging
- (7) Laboratory
- (8) Electrocardiograms
- (9) Physician documentation

11.2.2 Records should be integrated and interchangeable. This will allow providers to access the most up-to-date information and reduce duplication of efforts and treatments.

11.3 Data Security.

11.3.1 Data security should be addressed, with privacy protections in place and current cyber security methods and systems provided.

11.3.2 Topics to be addressed should include, but not be limited to, the following:

- (1) Privacy risks and controls, HIPAA protections
- (2) Risk assessment for data security risks
- (3) Security controls
- (4) General requirements for data protection in telehealth
- (5) Primary authority for telehealth privacy and security oversight
- (6) Data breach protocols

11.4 Communications. Communications centers serve as the entry point to access out-of-hospital response. In addition, communication systems provide the infrastructure and operational support for responders to link resources for EMS activities. Policies and procedures should ensure that communication systems and public safety answering points (PSAP) are in accordance with NFPA 1221, and all training of communications personnel is in accordance with NFPA 1061.

11.5 Lead Agency. A single lead agency should be responsible for coordinating EMS communications. The lead agency is the agency, usually a public agency, that has the principal responsibility, assigned by the AHJ.

11.5.1 Communication Center Coordination. Communication centers should incorporate EMS system goals and objectives into center operations. The communication centers should have a defined administrative structure.

11.5.2 User Agencies. A user agency is any agency other than the lead agency having a specific interest in EMS communication in the jurisdiction it serves. User agencies should be represented within the communication center governing structure.

11.6 Centralized Communication Plan. A systemwide communication plan should be in place that functionally consolidates dispatch centers.

11.6.1* Planning Coordination. Communication centers should be part of other EMS system planning efforts.

11.6.2 Plan Outcomes. The EMS system should describe methods to optimize administrative costs, improve administrative services, lower economic costs of service, and improve service benefits from the communication infrastructure. The communication plan should articulate how these benefits will be achieved.

11.6.3 Communication Relationships. The EMS communication plan should describe and define the communication relationships between system agencies. Such relationships may include managing emergency information, providing a unified communication control system, transferring or handling (without duplicating) event information, and ensuring compatibility of communication devices.

11.7 Computer-Aided Dispatch. The system should include computer-aided dispatch (CAD), which allows for reference location information such as location of previous incidents, duplicate incidents, or premise/hazard information. The CAD system and the data it collects for the EMS system should be consistent with the requirements of NFPA 1221.

11.7.1 Additional Data and CAD Elements.

11.7.1.1 National Fire Incident Reporting System (NFIRS). The CAD system should be able to capture and report information according to the requirements of NFIRS.

11.7.1.2 National EMS Information System (NEMSIS). The CAD should be able to capture essential data elements recommended by NEMSIS.

11.7.2* A system of integrating and reporting data should be available for all responders and stakeholders in the system.

11.8 Quality Management. A system should be in place to monitor the quality of the communication system. Communication improvements should be made based on quality evaluations and technological advancements.

11.9 Communication Equipment. The age and reliability of equipment should be monitored regularly.

11.9.1 Equipment Maintenance. An equipment maintenance plan should be developed and followed.

11.9.2 Financial Plans. Financial plans should anticipate repair and maintenance needs. Funding methodologies should be established that minimize the impacts of capital expenditures for new or replacement equipment.

11.10 Operability. The communication system should allow communication between all providers in all operating environments.

11.10.1 Operating Security. The system should ensure that secured or dedicated frequencies are available that are not affected by private users (especially cellular telephone users) and should ensure the physical and electronic security of communication resources.

11.10.2 Tactical Frequencies. Tactical operating frequencies should be available to reduce high-traffic radio communication and for use during multiagency events.

11.10.3 Disaster Operations. Disaster communication frequencies should be available and used during disasters, mass casualty incidents, and other multiple-patient scenes according to the standards of the system.

11.10.3.1 The disaster communication process should be dependable to minimize loss of service.

11.10.3.2 Backup systems should be in place in case of the primary system's interruption.

11.10.3.3 High incident response levels (HIRL) should support major events and minimize dispatch volumes. Primary dispatch activities should be limited to emergent incidents; routine calls should be managed by local jurisdiction on an "as available" assignment.

11.11 Criteria-Based Dispatch. Criteria-based dispatch (CBD) protocols should be used to prioritize requests for service and dispatch resources according to pre-established criteria.

11.11.1 Pre-Arrival Instructions. The dispatch center should establish standards for providing medically approved pre-arrival instructions.

11.11.2 Protocols. Dispatch system protocols should address, but not be limited to, the following:

- (1) Dispatching systems

- (2) Online medical direction systems
- (3) Nonemergency systems
- (4) Nurse lines
- (5) Insurance referrals
- (6) Primary care physicians
- (7) Scheduling systems

11.11.3 Quality Assurance. The system should use quality assurance measures, such as outcome, comparison, and validation information, to ensure continuous improvement.

11.12 Training. Call receivers/dispatchers should participate in and complete a nationally recognized and accepted emergency medical dispatch certification program and should receive on-the-job, site-specific training. Call receivers/dispatchers should regularly participate in continuing education.

11.13 Direct Medical Control. The EMS system should ensure that direct medical control is available for all field responders.

11.14 Nonemergency Services. Methods should be in place to provide alternative medical services for those requests that do not require emergency medical responses.

11.15* Telemedicine. Telemedicine utilizes technology to link a treating or consulting physician or nurse practitioner/physician assistant with a patient in real time, which is especially helpful and potentially life-saving if the patient is in a remote location. Telemedicine can include, but is not limited to, remote biometric monitoring of the following:

- (1) Blood pressure
- (2) Heart rate and rhythm
- (3) Respiratory rate and rhythm
- (4) Temperature
- (5) Fetal heart rate

11.16* Telehealth. The term *telehealth* is often used interchangeably with telemedicine. While telemedicine refers to the practice of medicine over a distance using communication technologies, telehealth refers to health-related activities such as, but not limited to, the following:

- (1) Continuing education for health care providers
- (2) Administration of health care service
- (3) Medical and bio-scientific research
- (4) Public health activities

Chapter 12 Equipment and Facilities

12.1 Standard for First Response and Ambulance Transportation. The EMS system should have a standard for first response and ambulance transportation equipment. The EMS system should have a standard or method to determine the equipment and related specifications needed in the EMS system for all patients. The method could permit individual agencies to make equipment determinations.

12.1.1 Vehicles. The EMS system should create specifications for first response and transport vehicles used within the EMS system. A part of the vehicle standard may include allowing individual agencies to make purchasing decisions within the restrictions established by the EMS specification or by state or national standards, such as NFPA 1917.

12.1.1.1 EMS systems should have policies and procedures in place to ensure the appropriate locking and security of vehicles.

12.1.1.2 Vehicles should have systems that are able to disable functions to avoid misuse or theft of the vehicle (i.e., a kill switch).

12.1.2 Biomedical Equipment. The EMS system should follow minimum specifications for first response and transport of biomedical equipment used within the EMS system.

12.1.3 Durable Equipment. The EMS system should follow minimum specifications for first response and transport of durable equipment used within the EMS system.

12.2 Replacement and Maintenance Plan. A replacement and maintenance plan should be developed at the time the equipment is purchased, based on the life expectancy of each equipment type.

12.3 Response Vehicle Licenses. EMS system equipment should be licensed according to local or state regulations.

12.4 Inspecting Emergency Equipment. Equipment inventory and inspection lists should be developed.

12.4.1 The EMS system should develop plans for inspecting equipment and inventory carried aboard emergency response vehicles. Regular inspections should be conducted.

12.4.2 It is understood that EMS system regulators can conduct announced or unannounced inspections.

12.5 Personnel Education and Training. All personnel should receive the training necessary to ensure they can effectively operate vehicles they are expected to operate in the course of their duties as required by the AHJ.

12.5.1 In addition to driver training, the training courses should include basic inspection requirements for vehicles personnel are expected to operate in the course of their duties.

12.5.2 Personnel should receive driver training courses that meet or exceed the minimum requirements of NFPA 1451.

12.5.3 Training programs should be customizable based on local needs.

12.5.4 Personnel should receive training on procedures for appropriately securing vehicles, medications, and equipment.

12.5.5 The EMS system should perform periodic records checks to ensure that driver's licenses are in place and not suspended, revoked, or restricted in any other way.

12.5.6 The EMS system should have processes in place to identify and address at-risk vehicle operators.

12.6 Maintenance Plans. An equipment inspection and maintenance program should be developed.

12.6.1 The maintenance program should have plans in place that provide a schedule for maintenance and carefully articulated maintenance plans based, at a minimum, on manufacturers' recommendations for all major equipment used in the EMS system, including vehicles, biomedical equipment, or other medical equipment.

12.6.2 The maintenance plans should include a replacement schedule and plans to provide reserve equipment or equipment "on loan" during repair periods.

12.7 Maintenance Personnel for Emergency Equipment. The maintenance program should use specially trained personnel to conduct vehicle, biomedical, and hardware maintenance.

12.7.1* The EMS system should adopt policies to ensure that maintenance personnel are appropriately trained for that maintenance.

12.7.2 Biomedical equipment should be maintained in accordance with manufacturers' recommendations.

12.8* Response Facilities. Ambulance and other response facilities should be designed consistent with system demands, community needs, existing standards, and the potential for use in community health care and should be located based on demand analysis or risk-hazard evaluation. These facilities should have adequate safety and security measures.

Chapter 13 Human Resources

13.1 Introduction. EMS system planners and regulators should ensure that minimum standards exist in the EMS system for monitoring, managing, and ensuring appropriate staff performance.

13.2 Recruitment. EMS systems and agencies should recruit according to their needs, as determined by analysis, design, and planning.

13.2.1 Selection. The EMS system should have a process for candidate/member selection.

13.2.2 Wages/Benefits. Plans for wages or benefits should be clearly outlined and documented.

13.3* Retention. EMS systems and agencies are responsible for retaining personnel.

13.4 Personnel. EMS systems and agencies should have effective employment or membership processes.

13.4.1 Employee/Member. EMS systems and agencies should ensure that a regularly scheduled, objective personnel evaluation process is in place and followed.

13.4.2 Duties Specifications. Jobs/duties should be clearly defined.

13.4.3 Service Delivery. EMS systems and agencies should have appropriate staffing and scheduling methods to ensure adequate delivery of services.

13.4.4 Credentials. EMS agencies should ensure that personnel have a current identification card that displays affiliation and licensure/certification level.

13.4.5 Records. EMS agencies should maintain personnel records.

13.5 Rules and Regulations. EMS agencies should have rules and regulations structured to provide for equitable management of personnel in the EMS system.

13.5.1 EMS agencies should have a process in place to manage discipline, appeals, grievances, and other personnel actions.

13.5.2 EMS agencies should have a process in place to ensure compliance with occupational safety regulations.

13.6 Health and Safety. EMS agencies should ensure that each agency has and implements a written comprehensive health and safety plan.

13.6.1 Personal protective equipment meeting applicable NFPA standards such as NFPA 1500 and NFPA 1999 should be provided to all personnel, as mandated by law, to system standards and manufacturer recommendations.

13.6.2 Health and wellness programs should be in place to prevent participant illness and injury.

13.6.3 These health and wellness programs should include training on bloodborne pathogens meeting NFPA 1581 and 29 CFR 1910.1030.

13.6.4 A program to address occupational exposure to atypically stressful events should be in place.

13.6.5 An employee assistance program (EAP) should be in place.

Chapter 14 Operations

14.1 Implementation of System Design (Operations). The leadership of EMS systems and agencies should consider operational components both individually and as part of a coordinated system.

14.2 System and Agency Preparation. EMS operations should be implemented based on EMS system and agency planning, analysis, and financial capability.

14.3 Communications Coordination.

14.3.1 EMS communications should be coordinated based on EMS system and agency design and available local resources.

14.3.2 EMS systems and agencies should ensure communication interoperability with surrounding systems and agencies.

14.4 Response Coordination. EMS systems and agencies should have written plans outlining first response, ambulance transport, alternate methods of transport, definitive care locations, and alternative care destinations as determined by system analysis and planning.

14.5 Incident Management. EMS systems and agencies should have written plans detailing the function of incident management, coordination of efforts, and accountability for all responding resources.

14.5.1 The incident management system (IMS) as described in NFPA 1561 should be consistent throughout all agencies that can be expected to interact.

14.5.2 The IMS should be based on a strategy of efficient and effective utilization of resources.

14.5.3 The IMS should address chain of command, including transfer of authority of any officer or position.

14.5.4 The IMS should provide for delineation of responsibilities and authority for all involved response personnel and agencies.

14.6 Treatment Guidelines. Patient care protocols should be consistent with evidence-based treatments as authorized by medical oversight.

14.7 Patient Destination Guidelines.

14.7.1 Patient destination guidelines should be consistent with AHJ guidelines, evidence-based treatments, medical oversight, and established protocols.

14.7.2 EMS systems, agencies, hospitals, and alternative-care destinations should have written plans to address patient destinations during multicasualty events or during times of increased system demand.

14.8 Functional Capabilities of Health Care Facilities. The EMS system, in concert with the local medical community, should maintain a summary of the functional capabilities of health care facilities and determine the types of patients who should be delivered to those facilities.

14.8.1 The summary should be disseminated to emergency care personnel.

14.8.2 Components of the EMS system, including hospitals, agencies, and alternative-care destinations, should have written policies to address patient distribution based on availability of health care system resources.

14.8.3* Health care facilities should have evacuation plans that are created in coordination with the EMS system.

14.9 Coordinated Medical Oversight. EMS systems and agencies should have a written plan that outlines direct and indirect medical oversight, coordinating medical care, developing patient care protocols, and a quality management program.

14.10 Logistics. EMS systems and agencies should have a written plan that outlines logistics for operations such as the following:

- (1) Materials, disposables, and consumables restocking
- (2) Equipment, clothing, and vehicle decontamination
- (3) Equipment repair and replacement
- (4) Data collection and management
- (5) Extended-duration incident operations support
- (6) Vehicle fueling

14.11 Staff Management. Staff recruitment, development, evaluation, education, training, and retention programs should be in place to ensure that sufficient numbers and types of qualified providers are available based on EMS system design.

14.12 Public Information, Education, and Relations. A program should be in place to allow for an information interface with the community, including EMS access information, public education, and system public relations.

14.13 Regulatory Compliance. EMS systems and agencies should ensure operations comply with all applicable regulations and laws.

14.14 Automatic and Mutual Aid. EMS systems and agencies should maintain automatic and mutual aid agreements.

14.15 Coordinated Training Plan. EMS systems and agencies should have a coordinated training plan that prepares responders for daily operations as well as large-scale incident responses.

14.16 Emergency Response Planning.

14.16.1 Participants in the local EMS system should be familiar with the relevant emergency management agencies' annexes and emergency operation plans.

14.16.2 The EMS system should ensure that each agency has a plan to meet its own needs within its capabilities.

14.16.3 System and agency plans should ensure that performance expectations and obligations agreed to under local emergency management plans are met.

14.17 Nonconventional Resources. Resources of other nonconventional agencies such as nonemergency ambulance and municipal mass transportation services should be considered in cases of patient surge.

14.18 System Goals and Objectives Analysis. System goals and objectives determine service levels as a function of community needs identified through EMS system evaluation and analysis and community needs assessments.

14.18.1 System Design. System design should be dynamic and based on continual evaluation of the EMS system according to defined indicators and performance measures.

14.18.2 Cost/Benefit. System design should consider both the costs and benefits of service delivery options.

14.18.3 Prevention Efforts. Illness and injury prevention and education efforts should be linked to community needs and resource availability.

14.18.4 Prevention Targets.

14.18.4.1 The EMS system plan should identify vulnerable population groups that would benefit from prevention programs.

14.18.4.2 The prevention programs should include the following:

- (1) Primary illness- and injury-prevention programs for age-related hazards
- (2) Special needs or special hazard groups, based on an analysis of the community's population

14.19 Infectious Diseases. EMS systems should have written plans outlining their approach to responding to incidents involving infectious diseases.

14.19.1 EMS systems should designate an infection control officer and have plans, policies, and procedures for infection control in accordance with NFPA 1581.

14.19.2 EMS systems should have a plan for reporting infectious disease exposures.

14.19.3 EMS systems' infection control officer should be responsible for exposure reporting procedures and documentation, this includes at least the following:

- (1) Assisting with documentation of initial exposure and reporting
- (2) Coordinating with health care facilities to provide care personnel
- (3) Communicating with facilities to receive exposure and test results for personnel and patients
- (4) Assisting with scheduling follow-up care and appointments for personnel
- (5) Conducting quality assurance measures to ensure that personnel are following infection control procedures

Chapter 15 Training and Education

15.1* General. The EMS system should employ a comprehensive training program that includes certification and recertification requisites, safety protocols, skills development, quality management, findings of risk-based assessments, and other related items deemed necessary by the AHJ and medical director.

15.2 Training Program.

15.2.1 A training program should be established and regularly evaluated to ensure delivery of the most up-to-date content.

15.2.2 The AHJ should ensure that training programs are uniform and consistent for all EMS system agencies and personnel.

15.2.3* The AHJ should ensure that agencies that may respond together to EMS incidents conduct multiagency training to ensure continuity of care when responding to those events.

15.2.4 The training program should follow the national EMS education guidelines, national EMS scope of practice, and any AHJ regulatory requirements and guidelines.

15.2.5 The training program should address new protocols/guidelines and procedures as well as deficiencies identified in the quality management program.

15.2.6 The medical director should provide oversight and guidance of clinical components of the training program.

15.2.7 The AHJ should evaluate each subject matter and designate as either mandatory or elective for personnel.

15.3 Certification/Licensure.

15.3.1 The EMS system should ensure that personnel maintain required certification or licensure as mandated by statute.

15.3.2 Personnel education/training/certification records should be maintained by the EMS system.

15.4 Professional Development Program.

15.4.1 The EMS system should have a comprehensive professional development plan for personnel to grow their personal and professional skill sets.

15.4.2 EMS personnel should receive approved training to become agency-recognized educators or trainee evaluators.

15.4.3* The training as stated in 15.4.2 should be focused on adult education, specific to EMS personnel, and maintained during their time as an educator or evaluator.

15.4.4 Medical oversight should be involved in the approval of training to ensure it meets the needs of the EMS system and the AHJ.

15.4.5 Medical oversight should be encouraged to provide direct training and education to EMS personnel. This should include lecture-based and skill-based training.

15.5 Educational Opportunities. Educational opportunities should be made available to personnel in the EMS system.

15.5.1 AHJs should support their personnel attending local, regional, national, and international EMS education/training opportunities and conferences.

15.5.2 AHJs should encourage their personnel to apply to lecture/teach at EMS education/training conferences.

15.6 Vehicle Operations Training. All personnel should receive the training necessary to effectively operate vehicles they are expected to operate in the course of their duties as required by the AHJ.

15.6.1 In addition to driver training, the training courses should include basic inspection requirements for vehicles personnel are expected to operate in the course of their duties.

15.6.2 Personnel should receive driver training courses that meet or exceed the minimum requirements of NFPA 1451.

15.6.3 Training programs should be customizable based on local needs.

Annex A Explanatory Material

Annex A is not a part of the recommendations of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner; since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.11 Chain of Survival. The chain of survival is composed of five distinct links: immediate recognition of cardiac arrest and activation of the emergency response system; early CPR with an emphasis on chest compressions; rapid defibrillation; effective advanced life support (ALS); and integrated post-cardiac arrest care.

A.3.3.27 Employee Assistance Program (EAP). Some examples of personal or family concerns an EAP could be designed for include, but are not limited to, mental health, substance abuse, various addictions, marital problems, parenting problems, or financial or legal concerns.

A.3.3.30 EMS Agency. Key services of an EMS agency include public access through a coordinated communications system, public safety and EMS response, and patient transportation.

A.3.3.36 Incident Management System. The system is also referred to as an incident command system (ICS).

The implementation of HSPD-5 led to the development of the National Incident Management System (NIMS). The NIMS is a system mandated by HSPD-5 that provides a consistent nationwide approach for federal, state, local, and tribal governments; the private sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among federal, state, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology. HSPD-5 identifies these as the ICS; multi-agency coordination systems; training; identification and management of resources (including systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources.

In addition to the NIMS, the process also incorporates the National Response Plan.

A.3.3.37.2 Turnout Interval. This interval includes personnel and equipment preparation for response, and the movement of resources toward the incident.

A.3.3.39.1 Advanced Cardiac Life Support (ACLS). The American Heart Association ACLS and the American Red Cross ALS provider programs are examples of nationally recognized programs.

A.3.3.40 Medical Authority. Individual agencies in the system could have medical directors that provide agency-specific or program-specific oversight. This may be a single physician or group of physicians, but there are some examples of different authority modalities around the world.

A.3.3.41.1 Off-Line (Indirect) Medical Direction. All EMS providers should follow the protocols developed or implemented by the medical director of their EMS agency.

A.3.3.41.2 Online (Direct) Medical Direction. The mechanism for this contact can be radio, telephone, telehealth, or other means as technology develops, but it should include person-to-person communication of patient status, orders to be carried out, and assistance in coordination of care.

A.3.3.41.3 Medical Director. Ideally, this physician would be subspecialty trained and board certified in EMS.

A.3.3.41.4 Medical Oversight. Medical control is the now obsolete term for medical oversight and medical direction.

A.3.3.42 Mobile Integrated Healthcare (MTH). Patient-centered, mobile resources include, but are not limited to, services such as providing telephone advice to 9-1-1 callers instead of resource dispatch; providing community paramedicine care, chronic disease management, preventive care, or post-discharge follow-up visits; or transport or referral to a broad spectrum of appropriate care not limited to hospital emergency departments.

A.3.3.45 National EMS Information Systems (NEMSIS). Since the 1970s, the need for EMS information systems and databases has been well established, and many statewide data

systems have been created. However, these EMS systems vary in their ability to collect patient and systems data and allow analysis at a local, state, and national level.

A.3.3.49 Next Generation (NG) 911. NG9-1-1 is designed to provide access to emergency services from all connected communications sources and provide multimedia data capabilities for public safety answering points (PSAPs) and other emergency service organizations.

A.3.3.61 Secondary Dispatch Phone Rings (if appropriate). Many systems do not use secondary dispatch centers.

A.3.3.68.8 Interview Ends. This time stamp can occur before or after resources are identified, or before or after resources arrive on the scene.

A.3.3.68.9 Response Resources Are Identified. For example, the telecommunicator might identify ambulance, fire apparatus, quick-response vehicles, police vehicles, specialty vehicles, or other appropriate resources. In some systems this could be automated based on call nature or geographic location.

A.3.3.68.16 Time of Result of First Intervention. For example, when extrication occurred, when return of spontaneous circulation occurred, and so forth.

A.4.11 For example, stakeholders may include consumers or users of EMS services, health care providers, hospitals, public health agencies, nursing homes, special populations, educators, governmental officials, and payers.

A.5.2.2.2.1 Resources that telecommunicators may use include a nurse advice line.

A.5.4.2.3 Evidence-based guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. The quality and strength of the evidence should be considered when making recommendations to agencies.

A.5.4.3.1 EMS system performance and quality measures are designed to function as a framework for a new system design or as a tool through which community may monitor the performance of the existing EMS system. Several indicators serve as system design data collection points. Through the continuous measurement of a system's structure, processes, and outcomes using designated indicators and performance measures, EMS system planners may identify areas of the EMS system design that require modification or enhancement.

A.5.6.2 For example, NFPA 1221 has established a standard that 95 percent of all emergency calls must be answered in 30 seconds. Dispatch of emergency response aid should be made within 60 seconds of the completed receipt of an emergency alarm.

A.5.6.3 For example, NFPA 1710 establishes turnout time objectives of no more than 60 seconds.

A.5.12.2.2 NFPA 1600 provides guidance for continuity of operations plans.

A.5.13 Examples of resources could include frequency of hospital "diversion" status, resource hospital training, resupply of disposables and medications, and ALS quality assurance.

A.5.17 Illness and injury prevention programs such as Stop the Bleed; Drop, Cover, and Hold; CPR; and Stop, Drop, and Roll should be available and regularly provided to citizens.

A.6.4.1 An operating budget is an example of a short-term plan that is prepared and approved annually and reviewed regularly.

A.6.4.2 A capital budget is an example of a long-term plan that should be prepared, approved, and reviewed regularly.

A.7.1 There are documents available to assist those physicians who are involved in medical direction and oversight of out-of-hospital health care delivery systems. Topics covered in such documents include, but are not limited to, online and off-line medical direction, evidence-based protocol development, clinical quality assurance and improvement management, understanding of emergency operations, understanding of longitudinal health care objectives, and field experience.

A.7.3.2 Examples of such resources include, but are not limited to, financial support, physical infrastructure, authorization and support of the agency's command staff, clerical and staff support, communications, malpractice insurance, and liability coverage.

A.7.8 For outside of the United States, physicians should be board certified in medical practice by that country's equivalent of the ABMS.

EMS medical directors should take an EMS medical director orientation course, such as ones offered by the military or NAEMSP. This course and its further series, give new EMS medical directors a deeper understanding of the complexities of EMS systems above and beyond their medical training.

A.8.2.3.3 Examples of data sets are available through NHTSA, National Fire Incident Reporting System (NFIRS), CARES, and others.

A.8.11 For example, a 9-1-1 center dispatch clock may not be synchronized with the clock used by a responding agency.

A.9.3 Presenting information and potential benefits specific to each stakeholder group will help them understand how the EMS system could not only improve patient care, but help them achieve their own goals.

Table A.9.3 lists likely major internal stakeholders as well as the significant role they would play in the development and implementation of the EMS system and the expected outcomes from their participation.

A.9.4 Examples of external stakeholders include, but are not limited to, hospitals, social service organizations, home health agencies, nursing associations, emergency physician groups, skilled nursing centers, hospice organizations, senior care organizations, public health, separate EMS agencies, and primary care physicians. These stakeholders share goals and seek opportunities to work collaboratively with organizations in your community.

Table A.9.4 lists likely major external stakeholders as well as the significant role they would play in the development and implementation of the EMS system and the expected outcomes from their participation.

Table A.9.3 Internal Stakeholders

| Stakeholder | Role | Participation Contributions |
|--|--|--|
| Command staff/Management | Provide direction to the agency Approve resources | Benefits to patients served Benefits of increased value in health care system Benefits of enhanced public image Potential revenue stream from contracted services |
| Agency communications center | Coordinates resources and requests for services Allocate additional resources | Benefits to patients served Benefits of increased value in health care system Benefits of enhanced public image Potential revenue stream from contracted services |
| Medical director | Develop/approve medical protocols Interface with health care community Ensure quality assurance and improvement management | Benefits to patients served Benefits of increased value in health care system Benefits of enhanced public image |
| Labor union/Workforce | Politically support implementation Engage workforce | Benefits to patients served Potential for enhanced staffing and union positions Enhanced community perception of the workforce/labor union for supporting system development |
| City/County or district board/Local leadership | Politically support implementation Engage workforce Approve the system's mission and vision Approve budget | Benefits to patients served Enhanced community perception of the workforce/labor union for supporting system development |

A.9.5 It is imperative to engage regulatory agencies and providers at the beginning and throughout the process as a way to clarify roles, address concerns, and develop strategies that make optimal use of all provider types. Scope of practice regulations impact the ability of EMS personnel to deliver health care services.

Table A.9.5 lists likely major regulatory stakeholders as well as the significant role they could play in the development and implementation of the system and the expected outcomes from their participation.

A.10.1.2 Delivery methods can include, but are not limited to, print media, electronic media, television, radio, and social media.

A.11.1 Further information on interoperability and integration with multiple patient care systems can be found on the Healthcare Information and Management Systems Society (HIMSS) website at www.himss.org. Additionally, interoperability roadmaps are available in downloadable PDF format at www.healthit.gov.

A.11.1.1 HIT systems in laboratories and pharmacies are two examples of interoperable systems in the health care industry.

A.11.1.2.1 One concern with wireless technologies is the hacking of security systems to obtain patient health or personal identification information, which can be used for identity theft.

A.11.1.2.2 The Middle Class Tax Relief and Job Creation Act of 2012 created FirstNet as an independent authority within the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA). FirstNet provides emergency responders with a nationwide, high-speed, broadband network dedicated to public safety. FirstNet's mission grew out of the public safety community's commitment to, and advocacy, for a dedicated network to address communication challenges it faced on 9/11, during Hurricane Katrina, and during similar incidents and events.

A.11.2.1 One of the key features of an EHR is that health information can be created and managed by authorized providers in a digital format capable of being shared with other providers across more than one health care organization. EHRs are built to share information with other providers and organizations, including laboratories, specialists, medical imaging facilities, pharmacies, emergency facilities, hospitals, health information exchanges, and school and workplace clinics, and contain information from all clinicians involved in a patient's care.

Table A.9.4 External Stakeholders

| Agency | Role | Participation Outcomes |
|-------------------------------------|--|---|
| Social service agencies | Connect patients to necessary services Deliver services to patients | Relationship built as a referral source for nonmedical needs Development of access to services through county or private social service agencies (e.g., Council on Aging, United Way) or similar organizations |
| Hospitals | Provide primary health care to community Provide care for common patients Provide clinical education Potentially fund system components | Collaboration in developing patient care strategies and protocols Leveraged financial incentive for hospitals to reduce visits and readmissions Quality care improvement measures |
| Non-EMS out-of-hospital health care | Provide home health nursing, skilled nursing facilities, home hospice agencies, and assisted living facilities Consist of accountable care organizations | Defined boundaries of service Development of referral patterns that are mutually supportive |
| Other medical professionals | Provide emergency care, primary care, outpatient clinic care, independent practice care, behavioral health resources, pharmaceutical support, and addiction recovery resources | Identification of opportunities and threats Development of referral patterns Access to training resources and opportunities to improve care Medication reconciliation Opportunities for medical direction |
| Public health departments | Collect data Perform community needs assessment Provide public access health clinics and immunization centers | Identification of training needs for staff Identification of community health care needs Preparedness planning |
| Insurance industry | Primary payer of health care services Provide commercial and government-run programs | Development of relationships with organizations that are potential funding sources Positive financial impact Development of sources of outcome data |

A.11.6.1 Other EMS system planning efforts could include special events, active shooters, specialty team responses, and so forth.

A.11.7.2 For example, data between EMS and hospital systems.

A.11.15 For more information on telemedicine, see the American Telemedicine Association's website at www.americantelemed.org. Also, see "Telemedicine Liability: Texas and Other States Delve into the Uncertainties of Health Care Delivery via Advanced Communications Technology," in *The Review of Litigation*.

A.11.16 For more information on telehealth, see "An Information Technology Framework for Strengthening Telehealthcare Service Delivery," in the *Journal of Telemedicine and e-Health*.

A.12.7.1 For vehicle maintenance qualifications, see NFPA 1071.

A.12.8 Some existing standards that can be used in the design of response facilities include the following:

- (1) NFPA 1
- (2) NFPA 101
- (3) NFPA 72
- (4) NFPA 1500
- (5) NFPA 1584
- (6) *International Building Code*

A.13.3 Programs should be appropriate to the local area but may include the following:

- (1) Length of service award programs (LOSAPs)
- (2) Incentive plans
- (3) Recognition plans
- (4) Educational/training opportunities
- (5) Job advancement/advancement opportunity programs
- (6) Provider support

A.14.8.3 Model systems are utilizing their health care coalitions to achieve a coordinated and unified evacuation plan.

Table A.9.5 Regulatory Stakeholders

| Agency | Role | Participation Outcomes |
|--|--|---|
| State department of health | Provide regulatory framework | Development of a regulatory framework that provides oversight |
| | Provide educational and training requirements | Enforcement of state regulations and standards |
| State office of EMS | Provide agency direction | Development and implementation of strategies governing medical training and scope of practice |
| | Develop/approve medical protocols | Enforcement of approved medical policies and protocols |
| | Provide educational and training requirements | Training according to state standards |
| | Interface with the health care community | |
| | Provide quality assurance and improvement management | |
| Local or regional EMS authority | Provide direction to the system | Development and implementation of strategies governing medical training and scope of practice |
| | Develop/approve medical protocols | Enforcement of approved medical policies and protocols |
| | Establish educational and training requirements | Training according to state standards |
| Local or regional public health agencies | Provide direction to the system | Development and implementation of strategies to integrate with public health |
| | Integrate with public health role and goals | Access to resources and integration |
| | Establish educational and training requirements | Training according to state standards |

A.15.1 The proposed framework includes the following steps:

- (1) Ensure professional competence and license/certification to practice
- (2) Support adaptation of technical and nontechnical professional capacities into the low-resource and emergency context
- (3) Prepare for an effective team performance in the field

A combination of training methodologies is also recommended, including individual theory-based education, immersive simulations, and team training (see <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5104687/>).

A.15.2.3 This could potentially include law enforcement, community health care personnel, air medical services, mutual aid resources, or other components of the emergency response community.

A.15.4.3 Common training entities include NAEMT, NREMT, NAEMSE, FISDAP, and TEEX.

Annex B Time Intervals and Components

This annex is not a part of the recommendations of this NFPA document but is included for informational purposes only.

B.1 Essential EMS System Analysis Components.

B.1.1 The nature of time presents a classic problem in semantics: The same term can have different meanings to different people. Additionally, tradition and unique EMS system design

have created a language of time incomparability. The NFPA 450 EMS time template, shown in Table B.1.1, is an attempt to solve this problem with consensus terms. The key to this time template is to differentiate clearly between discrete points versus intervals of time. Column A represents discrete points in time or time stamps that occur during an EMS call. Columns B and C mark the elapsed time or intervals between the time stamps.

B.1.2 The lists in Table B.1.1 are not exhaustive but represent typical core points in time and common operational situations. It is not expected that every time stamp be reported. Depending on the EMS system's complexity and level of technology, it is understood that a function interval may be long or instantaneous. However, when reporting EMS system performance, these consensus terms should be used.

B.2 Discrete Time Stamp. The term *time stamp* refers to the historical tradition in EMS during which call events were recorded by stamping a card that printed the hour and minute that was displayed at that moment on that clock. Today, times are often recorded automatically by computerized dispatch systems in hours, minutes, and seconds and are synchronized using the U.S. Naval Observatory's atomic clock. These time stamps define discrete moments at which certain events occur, recorded in hour:minute:second [hh:mm:ss] format. Discrete time stamps, collected in this way, allow the user to measure the interval between events. The EMS system must have the ability to capture time stamps in a reliable, consistent, and accurate manner. Not all time stamps are available or collectible, while

Table B.1.1 Essential EMS System Analysis Components

| Column A Discrete Time Stamps | Column B Functional Intervals | Column C Process Intervals |
|--|--|-----------------------------------|
| (1) Incident or onset time | (1) Recognition interval (1 to 2) | (1) Event activation (1 to 4) |
| (2) Time of discovery of event | (2) System access interval (2 to 3) | (2) Citizen reaction (2 to 4) |
| (3) Call for help | (3) Switching interval (3 to 4) | (3) Call processing (4 to 11) |
| (4) First PSAP call time | (4) Answer interval "A" (4 to 5) | (4) System response (4 to 14) |
| (5) Phone "off-hook" (answered in first PSAP) | (5) Routing interval (5 to 6) | (5) Unit response (11 to 14) |
| (6) Secondary dispatch phone rings — secondary PSAP (if appropriate) | (6) Answer interval "B" (6 to 7) | (6) Patient management (14 to 19) |
| (7) Secondary dispatch phone "off-hook" answered (if appropriate) | (7) Interrogation interval (5 or 7 to 8) | (7) Event to treatment (1 to 15) |
| (8) Interview ends | (8) Resource selection interval (8 to 9) | (8) Scene management (13 to 17) |
| (9) Response resources are identified | (9) Alert interval (9 to 10) | (9) Unit cycle (11 to 20) |
| (10) Dispatch time | (10) Acknowledgment interval (10 to 11) | |
| (11) Unit acknowledgment | (11) Turn-out interval (11 to 12) | |
| (12) Unit en route | (12) Travel interval (12 to 13) | |
| (13) Unit arrived on scene | (13) Patient access interval (13 to 14) | |
| (14) Arrived at patient (patient contact) | (14) Initial treatment interval (14 to 15) | |
| (15) First intervention time | (15) Initial result interval (15 to 16) | |
| (16) Time of result of first intervention | (16) On-scene patient care interval (16 to 17) | |
| (17) Unit left scene | (17) Transport interval (17 to 18) | |
| (18) Arrived at destination | (18) Care transfer interval (18 to 19) | |
| (19) Transfer of care | (19) Unit-ready interval (19 to 20) | |
| (20) Available for service | | |

others are reported with varying degrees of accuracy. Sharing time stamp data across EMS system components and synchronizing time recording devices are critical to establishing an accurate and reliable measurement process.

B.2.1 Function Intervals. An interval is the elapsed time between two discrete time stamps. Function intervals are the intervals between consecutive time stamps. The function interval describes the activity occurring at the task level of a single call. Function intervals allow analysis of each function that is taking place throughout the continuum of the event. Certain groups of consecutive functions describe processes.

B.2.2 Process Intervals. A process interval is made up of multiple, consecutive function intervals. A process interval is used to describe the elapsed time required to complete the agency's or EMS system's objective. The process interval allows decision makers to establish baselines, monitor changes, benchmark to other EMS systems, and create long-term plans.

B.3 Reporting EMS System Data. When decision makers compare EMS systems to benchmark performance, they must use consistent language and data to describe the function and process intervals. For example, the term *response time* is commonly used but not commonly defined. Therefore, caution must be exercised to ensure that the term describes the identical functions or processes. Yet even when common definitions are used, response times may not be accurately compared. For example, some EMS systems report "average" response times, which fail to adequately describe performance. Comparisons should therefore be based on "fractile" reporting, which, for example, may describe time performance with 90 percent reliability.

B.4 Table B.1.1 Definitions.

B.4.1 Column A Definitions. The definitions in B.4.1.1 through B.4.1.20 are listed to match the order as shown in Column A of Table B.1.1.

B.4.1.1 Incident or Onset Time. The time the incident occurred or the time that the symptoms developed. (*See 3.3.68.1.*)

B.4.1.2 Time of Discovery of Event. The time that a third party or the patient becomes aware of the need for assistance. (*See 3.3.68.2.*)

B.4.1.3 Call for Help. The time that a request for service or assistance is initiated (*See 3.3.68.3.*)

B.4.1.4 First PSAP Call Time. The time the telephone (or other notification device or mechanism) activates in the first public safety answering point (or other designated entity). (*See 3.3.68.4.*)

B.4.1.5 Phone "OffHook" (answered in first PSAP). The time that the telephone is answered in the first PSAP center. (*See 3.3.68.5.*)

B.4.1.6 Secondary Dispatch Phone Rings--Secondary PSAP. (Reserved) (*See 3.3.68.6.*)

B.4.1.7 Secondary Dispatch Phone "OffHook" Answered (if appropriate). The time that the second PSAP or second dispatcher answers the phone, begins the interview, collects caller data, and begins prearrival instructions. (*See 3.3.68.7.*)

B.4.1.8 Interview Ends. The time that the PSAP telecommunicator completes the interview with the caller. (This time

stamp may occur before or after resources are identified, or before or after resources arrive on the scene.) (See 3.3.68.8.)

B.4.1.9 Response Resources Are Identified. The time at which resources are identified to meet the needs of the call. For example, the telecommunicator might identify ambulance, fire apparatus, quick-response vehicles, police vehicles, specialty vehicles, or other appropriate resources. In some EMS systems this could be automated based on call nature or geographic location. (See 3.3.68.9.)

B.4.1.10 Dispatch Time. A discrete time stamp that represents unit notification. (See 3.3.68.10.)

B.4.1.11 Unit Acknowledgment. The time that the response resource acknowledges that they have received the notification. (See 3.3.68.11.)

B.4.1.12 Unit en Route. The time that the resource first begins moving toward the scene. (See 3.3.68.12.)

B.4.1.13 Unit Arrived on Scene. The time that the resource comes to a complete stop at the scene. (See 3.3.68.13.)

B.4.1.14 Arrived at Patient (Patient Contact). The point at which personnel has made patient contact. (See 3.3.68.14.)

B.4.1.15 First Intervention Time. The time that the first emergency medical services (EMS) skill intercession (e.g., starting an IV, defibrillation, CPR, or extrication) is begun. (See 3.3.68.15.)

B.4.1.16 Time of Result of First Intervention. The time that the responder first identifies results of the first intervention. (For example, when extrication occurred, when return of spontaneous circulation occurred, and so forth.) (See 3.3.68.16.)

B.4.1.17 Unit Left Scene. The time that the resource first begins moving from the scene. (See 3.3.68.17.)

B.4.1.18 Arrived at Destination. The time that the patient arrived at the hospital, an approved alternate destination, or transfer point. (See 3.3.68.18.)

B.4.1.19 Transfer of Care. The time that responsibility for treatment was transferred from an out-of-hospital provider to another provider (e.g., when the hospital personnel physically take over care of the patient). (See 3.3.68.19.)

B.4.1.20 Available for Service. The time the emergency service resource is available for response. (See 3.3.68.20.)

B.4.2 Column B Definitions. The definitions in B.4.2.1 through B.4.2.19 are listed to match the order as shown in Column B of Table B.1.1.

B.4.2.1 Recognition Interval (1 to 2). The elapsed period starting with (1), Incident or onset time, and ending at (2), Time of discovery of event.

B.4.2.2 System Access Interval (2 to 3). The elapsed period starting with (2), Time of discovery of event, and ending at (3), Call for help.

B.4.2.3 Switching Interval (3 to 4). The elapsed period starting with (3), Call for help, and ending at (4), First PSAP call time.

B.4.2.4 Answer Interval “A” (4 to 5). The elapsed period starting with (4), First PSAP call time, and ending at (5), Phone “off-hook” (answered in first PSAP).

B.4.2.5 Routing Interval (5 to 6). The elapsed period starting with (5), Phone “off-hook” (answered in first PSAP), and ending at (6), Secondary dispatch phone rings — secondary PSAP.

B.4.2.6 Answer Interval “B” (6 to 7). The elapsed period starting with (6), Secondary dispatch phone rings — secondary PSAP, and ending with (7), Secondary dispatch phone “off hook” answered.

B.4.2.7 Interrogation Interval (5 or 7 to 8). The elapsed period starting with (5), Phone “off-hook” (answered in first PSAP), or (7), Secondary dispatch phone “off hook” answered, and ending with (8), Interview ends.

B.4.2.8 Resource Selection Interval (8 to 9). The elapsed period starting with (8), Interview ends, and ending with (9), Response resources are identified.

B.4.2.9 Alert Interval (9 to 10). The elapsed period starting with (9), Response resources are identified, and ending with (10), Dispatch time.

B.4.2.10 Acknowledgment Interval (10 to 11). The elapsed period starting with (10), Dispatch time, and ending with (11), Unit acknowledgment.

B.4.2.11 Turn-out Interval (11 to 12). The elapsed period starting with (11), Unit acknowledgment, and ending with (12), Unit en route.

B.4.2.12 Travel Interval (12 to 13). The elapsed period starting with (12), Unit en route, and ending with (13), Unit arrived on scene (wheels stopped).

B.4.2.13 Patient Access Interval (13 to 14). The elapsed period starting with (13), Unit arrived on scene, and ending with (14), Arrived at Patient (patient contact).

B.4.2.14 Initial Treatment Interval (14 to 15). The elapsed period starting with (14), Arrived at Patient (patient contact), and ending with (15), First intervention time.

B.4.2.15 Initial Result Interval (15 to 16). The elapsed period starting with (15), First intervention time, and ending with (16), Time of result of first intervention.

B.4.2.16 On-Scene Patient Care Interval (16 to 17). The elapsed period starting with (16), Time of result of first intervention, and ending with (17), Unit left scene.

B.4.2.17 Transport Interval (17 to 18). The elapsed period starting with (17), Unit left scene, and ending with (18), Arrived at destination.

B.4.2.18 Care Transfer Interval (18 to 19). The elapsed period starting with (18), Arrived at destination, and ending with (19), Transfer of care.

B.4.2.19 Unit-Ready Interval (19 to 20). The elapsed period starting with (19), Transfer of care, and ending with (20), Available for service.

B.4.3 Column C Definitions. The definitions in B.4.3.1 through B.4.3.9 are listed to match the order as shown in Column C of Table B.1.1.

B.4.3.1 Event Activation (1 to 4). The elapsed time between the event and when the telephone first rings in the first PSAP. This process includes the recognition interval, the system access interval, and the switching interval, and is intended to

measure a EMS system's ability — using education, technology, or other means — to recognize that an emergency exists and to take immediate steps to access assistance.

B.4.3.2 Citizen Reaction (2 to 4). The citizen reaction process begins when an event is first discovered and ends when the telephone rings in the first PSAP. The citizen reaction process is intended to measure the system access interval and the switching interval. The process measures the EMS system's ability to reinforce certain citizen behaviors and provides the means for those citizens to make appropriate access.

B.4.3.3 Call Processing (4 to 11). The call processing interval is the process that begins when the telephone first rings at the first PSAP and ends when responding units acknowledge that they are aware of the event. The processing interval includes the time required to appropriately answer the telephone in the PSAP, triage and route the call, interview the caller, provide instructions, identify and alert resources, and recognize that the alert has been received. This interval is intended to measure the EMS system's ability to quickly process a request for assistance and notify the appropriate responding units.

B.4.3.4 System Response (4 to 14). The system response interval is the process that begins when the telephone first rings at the first PSAP and ends when the responders arrive at the patient's side. The system response interval is intended to measure the EMS system's performance in responding to a call for assistance by considering the call processing interval, as well as the turnout, travel, and patient access intervals.

B.4.3.5 Unit Response (11 to 14). The unit response interval is the process that begins when the individual unit acknowledges that a response is required and ends with patient contact. The unit response interval is intended to measure an individual unit's performance in responding to a call for assistance by considering the turnout, travel, and patient access intervals.

B.4.3.6 Patient Management (14 to 19). The patient management interval is the process that begins when responders first make contact with the patient and ends when responsibility for the patient is transferred to another medical provider. The patient management interval is intended to measure the time committed by the EMS system to meet the needs of the patient and reflects the EMS system's ability to manage and monitor resources.

B.4.3.7 Event to Treatment (1 to 15). The event to treatment interval is intended to measure the EMS system's ability to initiate treatment once an event exists. This interval is intended to measure the process that begins when the event occurs and ends when the first treatment is provided. This process may measure the time that responders, dispatchers, citizens, or others intervene as part of an organized EMS system design.

B.4.3.8 Scene Management (13 to 17). The scene management interval begins when the first vehicle stops at the scene of an event, and ends when the last patient leaves the scene. The interval is intended to measure the time required to manage the logistics of accessing the patient, providing initial treatment, packaging for transport, and leaving the scene.

B.4.3.9 Unit Cycle (11 to 20). The unit cycle process reflects the cycle time of an individual unit from activation to availability. The unit cycle process measures the time that a unit is assigned to an event and unavailable for other assignments.

Annex C Informational References

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