

NFPA®

450

Guide for
Emergency Medical
Services and Systems

2021



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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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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.

Contents

Chapter 1 Administration	450– 5	7.2 Medical Authority.	450– 13
1.1 Scope.	450– 5	7.3 System Support of Medical Authority.	450– 13
1.2 Purpose.	450– 5	7.4 Medical Director Role.	450– 14
Chapter 2 Referenced Publications	450– 5	7.5 Medical Authority Role.	450– 14
2.1 General.	450– 5	7.6 Medical Director Responsibilities.	450– 14
2.2 NFPA Publications.	450– 5	7.7 Online and Off-Line (Direct and Indirect)	
2.3 Other Publications.	450– 5	Medical Direction.	450– 14
2.4 References for Extracts in Advisory Sections.		7.8 Medical Director Qualifications.	450– 14
(Reserved)	450– 5	Chapter 8 Quality Management, Clinical Quality,	
Chapter 3 Definitions	450– 5	and Data Reliability	450– 15
3.1 General.	450– 5	8.1 Quality Management Program.	450– 15
3.2 NFPA Official Definitions.	450– 5	8.2 Objectives.	450– 15
3.3 General Definitions.	450– 6	8.3 Public Health Clinical Outcome Parameters.	450– 15
Chapter 4 System Regulation and Policy	450– 9	8.4 Physician and EMS Leadership Participation.	450– 16
4.1 General.	450– 9	8.5 Patient Confidentiality.	450– 16
4.2 Oversight.	450– 9	8.6 Injury/Illness Reduction and Prevention.	450– 16
4.3 Authorization.	450– 9	8.7 Complaints.	450– 16
4.4 Evaluation.	450– 9	8.8 Participation in Studies and Research.	450– 16
4.5 Roles and Responsibilities.	450– 9	8.9 System Review.	450– 16
4.6 Service Levels.	450– 9	8.10 Documentation.	450– 16
4.7 Management Structure.	450– 9	8.11 Multiple Clocks Within a System.	450– 16
4.8 Planning.	450– 9	8.12 System Transformation.	450– 16
4.9 Authority to Implement Plans.	450– 9	Chapter 9 Stakeholder Relations	450– 16
4.10 Resources.	450– 9	9.1 General.	450– 16
4.11 Participation in Policy Development.	450– 9	9.2 EMS System Goals.	450– 16
4.12 Authority for Policy, Procedure, and		9.3 Internal Stakeholder Relations.	450– 16
Operation.	450– 9	9.4 External Stakeholder Relations.	450– 16
4.13 Patient Information Protection.	450– 9	9.5 Regulatory Stakeholders Relations.	450– 16
Chapter 5 EMS System Analysis and Planning	450– 9	9.6 Payer Stakeholder Relations.	450– 16
5.1 Introduction.	450– 9	9.7 Achieving Stakeholder Relations Success.	450– 16
5.2 Analysis of System Resources.	450– 9	Chapter 10 Community Education and Risk	
5.3 Community Needs Analysis.	450– 10	Reduction	450– 17
5.4 System Design Analysis.	450– 10	10.1 Community Education.	450– 17
5.5 Continual Risk Assessment and Planning.	450– 11	10.2 Community Education Goals.	450– 17
5.6 Call Processing.	450– 11	10.3 Personnel Qualifications.	450– 17
5.7 Geography.	450– 11	10.4 Community Education Activities.	450– 17
5.8 First Response.	450– 11	10.5 Identification of Funding Resources.	450– 17
5.9 Demographics.	450– 11	10.6 Community Risk Reduction.	450– 17
5.10 Regulatory Environment.	450– 11	Chapter 11 Health Information Technology (HIT)	
5.11 Additional System Needs.	450– 11	and Communications Technology	450– 17
5.12 Disasters.	450– 11	11.1 Interoperability in Health Care Information	
5.13 Medical Center Resources.	450– 12	and Management Systems.	450– 17
5.14 EMS System Risk Reduction.	450– 12	11.2 Patient Care Record Accessibility.	450– 18
5.15 Resource Allotment.	450– 12	11.3 Data Security.	450– 18
5.16 Master Planning/Forecasting.	450– 12	11.4 Communications.	450– 18
5.17 Public Education and Injury/Illness		11.5 Lead Agency.	450– 18
Prevention.	450– 12	11.6 Centralized Communication Plan.	450– 18
5.18 Other Programs.	450– 12	11.7 Computer-Aided Dispatch.	450– 18
5.19 Public Health.	450– 12	11.8 Quality Management.	450– 19
5.20 EMS Quality Measures.	450– 12	11.9 Communication Equipment.	450– 19
Chapter 6 Finance	450– 12	11.10 Operability.	450– 19
6.1 Determining Cost of an EMS System.	450– 12	11.11 Criteria-Based Dispatch.	450– 19
6.2 Method for Anticipating EMS System Funding		11.12 Training.	450– 19
Sources.	450– 12	11.13 Direct Medical Control.	450– 19
6.3 Revenue and Cost Analysis.	450– 13	11.14 Nonemergency Services.	450– 19
6.4 Financial Plans.	450– 13	11.15 Telemedicine.	450– 19
6.5 Business Analysis.	450– 13	11.16 Telehealth.	450– 19
6.6 Additional Financial Issues.	450– 13	Chapter 12 Equipment and Facilities	450– 19
Chapter 7 Medical Oversight	450– 13	12.1 Standard for First Response and Ambulance	
7.1 General.	450– 13	Transportation.	450– 19
		12.2 Replacement and Maintenance Plan.	450– 20

12.3	Response Vehicle Licenses.	450– 20	14.9	Coordinated Medical Oversight.	450– 21
12.4	Inspecting Emergency Equipment.	450– 20	14.10	Logistics.	450– 21
12.5	Personnel Education and Training.	450– 20	14.11	Staff Management.	450– 21
12.6	Maintenance Plans.	450– 20	14.12	Public Information, Education, and Relations. .	450– 21
12.7	Maintenance Personnel for Emergency Equipment.	450– 20	14.13	Regulatory Compliance.	450– 21
12.8	Response Facilities.	450– 20	14.14	Automatic and Mutual Aid.	450– 21
Chapter 13	Human Resources	450– 20	14.15	Coordinated Training Plan.	450– 21
13.1	Introduction.	450– 20	14.16	Emergency Response Planning.	450– 21
13.2	Recruitment.	450– 20	14.17	Nonconventional Resources.	450– 22
13.3	Retention.	450– 20	14.18	System Goals and Objectives Analysis.	450– 22
13.4	Personnel.	450– 20	14.19	Infectious Diseases.	450– 22
13.5	Rules and Regulations.	450– 20	Chapter 15	Training and Education	450– 22
13.6	Health and Safety.	450– 21	15.1	General.	450– 22
Chapter 14	Operations	450– 21	15.2	Training Program.	450– 22
14.1	Implementation of System Design (Operations).	450– 21	15.3	Certification/Licensure.	450– 22
14.2	System and Agency Preparation.	450– 21	15.4	Professional Development Program.	450– 22
14.3	Communications Coordination.	450– 21	15.5	Educational Opportunities.	450– 22
14.4	Response Coordination.	450– 21	15.6	Vehicle Operations Training.	450– 23
14.5	Incident Management.	450– 21	Annex A	Explanatory Material	450– 23
14.6	Treatment Guidelines.	450– 21	Annex B	Time Intervals and Components	450– 27
14.7	Patient Destination Guidelines.	450– 21	Annex C	Informational References	450– 30
14.8	Functional Capabilities of Health Care Facilities.	450– 21	Index		450– 35

NFPA 450

Guide for

Emergency Medical Services and Systems

2021 Edition

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

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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 (EMS-C). 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.

N 3.3.26 Employee. (Reserved)

Δ 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.

N 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.

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

Δ 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.

Δ 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.

Δ 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.

Δ 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.

N 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.

Δ 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.

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

Δ 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.

N 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.

N 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.

N 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.

N 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.

N 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.

Δ 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.

Δ 3.3.59 Response. The deployment of resources to an incident.

N 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).

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

Δ 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.

Δ 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.

N 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.

N 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.

Δ 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.

N 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.

Δ 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.)

- Δ **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.

- Δ **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).

- Δ **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.

- Δ **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.

Δ 5.3 Community Needs Analysis.

- N **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.

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

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

N 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.

N 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.

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

Δ 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.

N 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.

N 5.12.2 **Disaster Preparedness.**

N 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.

N 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.

Δ 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.

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

Δ 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.

Δ 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

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

N 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