

# SAN FRANCISCO EMERGENCY MEDICAL SERVICES AGENCY

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## LOCAL EMERGENCY MEDICAL SERVICES INFORMATION SYSTEM (LEMSIS)

### I. PURPOSE

The Local EMS Information System (LEMSIS) serves as the central repository of EMS data using standardized data elements and indicators for system-wide monitoring and evaluation of patient care in the San Francisco EMS System.

### II. AUTHORITY

- A. Code of Federal Regulations, Title 45, Section 164.512 (b) (1) (i)
- B. California Health and Safety Code, Division 2.5, Section 1797.220
- C. California Code of Regulations, Title 22, Section 100172
- D. Code of Federal Regulations, Title 45, Section PART 164, Subpart E, Sec. 164.512 (b,i)

### III. REFERENCE

- A. EMSA #164 California EMS Information System Data Dictionary
- B. NEMSIS (National EMS Information System, NHTSA Version 2.2.1 Data Dictionary)

### IV. POLICY

#### A. Patient Care Documentation Standards

1. The provider Patient Care Record (PCR) must contain all data fields listed in Appendix A.
2. A SF EMS Agency approved Patient Care Record (may be paper or electronic) shall be completed for all patient contacts, including:
  - a) Transported patients
  - b) Non-transport
  - c) Patients treated and released at special events, including when released to event medical staff (refer to Mass Gathering Policy 7010)
3. For prehospital births, a separate PCR must be completed for the mother and each newborn.
4. PCR's shall be completed immediately after each call whenever possible, and must be completed prior to going off duty.
  - a) A copy of the PCR will be provided to the receiving hospital prior to leaving the facility unless the unit is needed for another emergency call.
    - (1) If required for another emergency call, the PCR will be provided to the facility prior to going off duty, or within 24 hours, whichever is earlier.
5. PCR's must be completed for all patients during MCI. Triage tags are not considered an acceptable substitute for a PCR. Patient tracking information will be included on the PCR.

#### B. Data Collection and Reporting

1. Dispatch and Ambulance providers shall collect all data elements as defined by this policy, in Appendix A in a format defined by the EMSA and in accordance with standards established the National EMS Information System (NEMSIS) and California EMS Information System (CEMSIS).
2. Hospital providers shall report hospital outcome data elements from the Hospital data systems.
3. Providers shall train all personnel involved in collecting data on the purpose of the LEMSIS, the LEMSIS data elements definitions (Appendix A), and data sources as defined in this policy.
4. Providers shall collect, organize, and validate the LEMSIS data elements.
  - a) Provider QI plans shall include method for validation of data accuracy
  - b) Validation method is subject to approval by the EMS Agency Medical Director
5. Providers may use electronic, manual or scanned patient records for data collection; however, data must be in an electronic format meeting EMS Agency requirements for submission.

#### C. Data Transfer

1. Providers using hard copy PCR's shall transmit all LEMSIS data for each month to the EMS Agency no later than 45 days after the end of that month.
2. Providers using electronic PCR's shall transmit all LEMSIS data and an electronic copy of the PCR to the EMS Agency according to deadlines established by the EMS Agency.
3. Data will be in an electronic form that is importable to the EMS Agency data system.
4. Each provider shall have a HIPAA compliance protocol that addresses data security during transfer to the EMS Agency.
5. The EMS Agency abides by the San Francisco Department of Public Health HIPAA compliance protocol as it pertains to the transfer and receipt of EMS data for LEMSIS.
6. Investigators of EMS research studies who request data from LEMSIS must have approval by an Institutional Review Board prior to submitting their request to the EMS Agency (refer to Research Studies Policy 6030).

#### D. Retention of Data

1. The EMS Agency shall maintain the LEMSIS data repository and establish procedures for retention and secure storage of LEMSIS data.

#### E. Data Reporting and Analysis

1. The LEMSIS Steering Group provides technical expertise and oversight of data collection, analysis, and reporting as it relates to quality improvement activities. The LEMSIS Steering Group will be comprised of quality improvement representatives from the EMS Agency, each ambulance provider, the Base Hospital, and the Department of Emergency Management, Division of Emergency Communications. The LEMSIS Steering Group will meet on a quarterly basis and be responsible for the following functions:
  - a) Oversee development and implementation of locally and state determined EMS system indicators for evaluation
  - b) Maintain responsibility for collecting and evaluating data for reporting to the EMS Advisory Committee on state required and optional EMS System indicators

- c) Provide recommendations to the EMS Advisory Committee and EMS Agency Medical Director on benchmarking and best practices based upon analysis of EMS System Quality Indicators.
2. EMS System Quality Indicators are determined using LEMSYS data elements, Base Hospital data, Trauma Center data, and EMS Agency certification and accreditation data.
3. The EMS Agency shall produce a quarterly EMS System report of EMS System Quality Indicators for review at the EMS Advisory Committee.

**APPENDIX A: LEMSIS DATA ELEMENTS & QUALITY INDICATORS**

<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
<i><b>EMS Incident Data</b></i>		
PSAP Identifier	EMS Agency code set	Identity of the dispatch center providing the data
Incident identifier	Dispatch CAD	Unique numeric identifier for each EMS incident
Incident address number	Dispatch CAD	Number of street address of the incident
Incident address street name	Dispatch CAD	Street name of incident
Apartment number	Dispatch CAD	Apartment number if incident is in a building with suite, apartment, office numbers
Incident address cross street	Dispatch CAD	Nearest cross street of incident
Incident City	Dispatch CAD	City of Incident
Location type	Dispatch CAD or PCR	Code set based upon types of locations
Transferring facility identifier	Dispatch CAD	Name of facility transferring patient (for interfacility transfers); may be HIPAA identifier number
Date incident reported	Dispatch CAD	Date of incident
Time incident reported	Dispatch CAD	Time incident first captured in the CAD computer (call pick up time)
Response unit number	Dispatch CAD	Identifier of response unit by locally approved identifier number
Response Agency	Dispatch CAD	Identifier of response agency
Time dispatch notified of EMS call	Dispatch CAD	Time dispatch center first captured call if transferred from a primary PSAP
Date dispatch notified of EMS call	Dispatch CAD	Date dispatch center first captured call if transferred from a primary PSAP
<i><b>EMS Incident Data</b></i>		
Time incident entered	Dispatch CAD	Time call taker completed entry of incident information into the computer so that the call is available for dispatch (in the queue)
Date incident entered	Dispatch CAD	Date call taker completed entry of incident information into the computer so that the call is available for dispatch (in the queue)
Time response unit notified	Dispatch CAD	Time response unit dispatched on the incident
Date response unit notified	Dispatch CAD	Date response unit dispatched on the incident

<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
Time response unit mobile	Dispatch CAD	Time response unit reports enroute to the incident
Date response unit mobile	Dispatch CAD	Date response unit reports enroute to the incident
Lights/sirens to scene	Dispatch CAD or PCR	Code 2 Code 3 Cancelled enroute
Time vehicle stopped at scene	Dispatch CAD	Time unit reports on scene of the incident (wheels stopped)
Service type	Dispatch CAD	Scene response Interfacility transfer
Treatment crew member identifier	Dispatch CAD	Numeric County identifier for each responder
Treatment crew member type	Dispatch CAD	EMT-1 EMT-P Public Safety EMT-P intern Field Supervisor Other
Vehicle type	Dispatch CAD	BLS first responder ALS first responder BLS ambulance ALS ambulance Aeromedical Other
<b><i>Patient Data</i></b>		
Patient name	PCR	Patient's name as indicated on driver's license
Patient street address	PCR	Number, street name, and unit number of patient's residence
Patient city of residence	PCR	City of residence
Patient State of residence	PCR	State of residence
Patient zip of residence	PCR	Postal code of residence
Patient social security number	PCR	Last 5 digits of patient's SSN in format N-NNNN
Patient date of birth	PCR	Date of birth in format MMDDYYYY
Patient age	PCR	Numeric entry of patient's age
Patient age units	PCR	Years Months Days
Patient gender	PCR	Female Male Unknown
Patient weight	PCR	Approximate weight in kg. ki
<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>

PCR identifier	PCR	Unique identifier for each PCR (chart number)
Time arrived at patient side	PCR	Time unit documents first contact with the patient
Patient chief complaint	PCR	Free text field of patient's chief complaint
Primary impression	PCR	Code set of Medical and Trauma categories that reflects the provider's clinical impression that was most important in determining care given to the patient
Secondary impression	PCR	Code set of Medical and Trauma categories that reflects the provider's secondary clinical impression that completes the description of the patient
Cause of injury	PCR	Code set of injury mechanism types
Injury Contributing factors	PCR	Code set of factors that may have contributed to the injury severity
Pre-existing condition	PCR	Code set of medical history conditions
Safety factors	PCR	Code set of safety factors that affected the incident
Factors affecting EMS delivery of care	PCR	Code set of factors that affected delivery of care
Suspected ETOH/drug use	PCR	Yes No
Witnessed cardiac arrest	PCR	Yes No
Estimated time of witnessed cardiac arrest	PCR	Time that identifiable witness saw or heard collapse
Initial pulse rate	PCR	Numeric value in beats per minute
Initial cardiac rhythm	PCR	Code set of cardiac rhythms
Initial respiratory rate	PCR	Numeric value in breaths per minute
Initial respiratory effort	PCR	Normal Labored Absent

<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
<i>Patient Data</i>		
Initial lung sounds left side	PCR	Normal Rales Wheezes Rhonchi Diminished
Initial lung sounds right side	PCR	Normal Rales Wheezes Rhonchi Diminished
Initial systolic blood pressure	PCR	Systolic blood pressure in mmHg
Initial diastolic blood pressure	PCR	Diastolic blood pressure in mmHg
Perfusion	PCR	Based upon skin signs: -Normal -Decreased
Initial GCS-eye opening	PCR	1-4 score for eye opening
Initial GCS-verbal	PCR	1-5 score for verbal responsiveness
Initial GCS-motor	PCR	1-6 score for motor response to pain
GCS Total	PCR	1-15 total of E,V,M components
Revised trauma score	PCR	Numeric score calculated from: Respiratory Rate (0-4 scale) Systolic blood pressure (0-4 scale) Neurologic-GCS (0-4)
Base Hospital contact	PCR	Yes No
Estimated time CPR started	PCR	Time CPR first initiated by any provider
Initial provider of CPR	PCR	First responder EMT-1 EMT-P Bystander Other
Time CPR discontinued	PCR	Time CPR
Time of first defibrillatory shock	PCR	Time of first defibrillation performed by any provider

Data Element	Data Source	Definition/Code sets
<i>Patient Data</i>		
Provider of first defibrillatory shock	PCR	First responder EMT-1 EMT-P Bystander Other
Return of Spontaneous Circulation	PCR	Yes or No
Procedure Name	PCR	Code set of approved procedures in local scope of practice
Procedure performed by	PCR	County EMT-P number
Procedure attempts	PCR	Numeric value representing number of attempts made by the EMT-P at the procedure
Procedure result	PCR	Improved No change Deteriorated
Medication Name	PCR	Code set of approved medications in local scope of practice
Medication Dose	PCR	Numeric value
Medication Dose Unit	PCR	mg grams cc mEq units
Medication Route	PCR	IV IM ETT SQ Rectal IO Lingual Sublingual
Medication Administered by	PCR	County EMT-P number
Medication result	PCR	Improved No change Deteriorated
Pain scale prior to treatment	PCR	Item on 1-10 scale assessed prior to treatment
Pain scale after treatment	PCR	Item on 1-10 scale assessed after treatment



<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
<i>Patient Data</i>		
Incident/Patient disposition	PCR	Transport Nontransport (specify GOA, AMA, refusal, field pronouncement, SFPD, other)
Destination	PCR	Hospital or facility of destination (precoded list of Receiving Hospitals and free text field to enter other options)
Destination Determination	PCR	Reasons for choosing the destination: Patient preference Closest hospital Specialty Care (specify) Diversion
Lights/Sirens from scene	PCR	Code 3, Code 2, or N/A (nontransport)
Scene departure time	PCR and/or Dispatch CAD	Time enroute to hospital
Destination arrival time	PCR and/or Dispatch CAD	Time of arrival at hospital
Patient condition on arrival	PCR	Unchanged, Improved Deteriorated
Destination cardiac rhythm	PCR	Final cardiac rhythm entered on the PCR upon arrival at destination facility
Special Studies	PCR	Yes: free text field to identify research study No
ED disposition	Destination ED	Admitted to Ward Admitted to ICU Discharged from ED AMA from ED Expired in ED Transferred from ED
ED primary diagnosis	Destination ED	ICD-9 code of primary diagnosis made by ED physician
ED secondary diagnosis	Destination ED	ICD-9 code of secondary diagnosis made by ED physician
Hospital disposition	Destination ED	Discharged Transferred Expired in hospital
Length of hospital stay	Destination ED	Number of days patient was admitted to the hospital

**V. QUALITY INDICATORS**

Name	Source of Variables	Definition
<b>Cardiac Arrest</b>		
Bystander CPR	LEMSIS-PCR data	% of incidents that patients received CPR from a bystander
PAD-AED	LEMSIS-PCR data	% of incidents that patients received initial defibrillation by layperson AED program
BLS-AED	LEMSIS-PCR data	% of incidents that patients received initial defibrillation by BLS or public safety personnel
Time to first shock	LEMSIS-PCR data	Mean +/- sd of time from witnessed arrest to initial defibrillation
Epinephrine Use	LEMSIS-PCR data	% Cardiac arrest patients receiving epinephrine
Antidysrhythmic Use	LEMSIS-PCR data	% Cardiac arrest patients receiving antidysrhythmic drug
ROSC	LEMSIS-ED data	% of total cases with ROSC=yes
Survival to ED admit	LEMSIS-ED data	% of cardiac arrest patients admitted to ED
Survival to hospital discharge	LEMSIS-ED data	% of cardiac arrest patients discharged or transferred as hospital disposition
<b>Chest Pain</b>		
Oxygen administered	LEMSIS-PCR data	% of incidents with primary or secondary impression is chest pain and oxygen administered
Nitroglycerin administered	LEMSIS-PCR data	% of incidents with primary or secondary impression is chest pain and nitroglycerin administered
Morphine administered	LEMSIS-PCR data	% of incidents with primary or secondary impression is chest pain and morphine administered
Aspirin administered	LEMSIS-PCR data	% of incidents with primary or secondary impression is chest pain and aspirin administered
Decrease/Relief of symptoms	LEMSIS-PCR data	% of incidents with primary or secondary impression is chest pain and medication result = improved; may be evaluated also using pain scale prior to treatment and pain scale after treatment if number reduced by at least 1 point on pain scale after treatment; also evaluated with patient condition on arrival = improved

<b>Name</b>	<b>Source of Variables</b>	<b>Definition</b>
<b>Chest Pain</b>		
Prehospital Impression match ED diagnosis	LEMSIS-PCR data, Destination ED data	% of incidents with primary of chest pain-cardiac origin and ED ICD-9 code matches cardiac origin
Survival to hospital discharge	LEMSIS-PCR data, Destination ED data	% of incidents with primary or secondary impression is chest pain and hospital outcome = discharged or transferred
Destination hospital	LEMSIS-PCR data	Hospital transport distribution of incidents with primary or secondary impression of chest pain and
<b>Shortness of Breath</b>		
Signs or symptoms of bronchospasm	LEMSIS-PCR data	% of incidents with lung sounds = wheezes and/or primary or secondary impression is bronchospasm
Signs or symptoms of fluid overload	LEMSIS-PCR data	% of incidents with lung sounds = rales and/or primary or secondary impression is CHF
Oxygen administration	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath and oxygen administered
NTG administration	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath and NTG administered
Morphine administration	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath and morphine administered
Furosemide administration	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath and furosemide administered
Relief of symptoms	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath and medication result = improved; may be evaluated also using pain scale prior to treatment and pain scale after treatment if number reduced by at least one point on pain scale after treatment; also evaluated with patient condition on arrival = improved
Adherence to protocol	LEMSIS-PCR data	% of incidents with primary or secondary impression of CHF or bronchospasm and associated EMS Agency protocol used

Name	Source of Variables	Definition
<b>Shortness of Breath</b>		
Prehospital impression matches ED diagnosis	LEMSIS-PCR data	% of incidents with chief complaint shortness of breath when primary or secondary impression matches ED ICD-9 code
Admission to hospital	LEMSIS-PCR data, Destination ED data	% of incidents chief complaint of shortness of breath and ED disposition is admission to Ward or ICU
Survival to hospital discharge	LEMSIS-PCR data, Destination ED data	% of incidents with primary or secondary impression is congestive heart failure and hospital outcome = discharged or transferred
<b>Critical Trauma</b>		
Frequency blunt	LEMSIS-PCR data	% of incidents with primary or secondary impression = blunt trauma mechanism
Frequency penetrating	LEMSIS-PCR data	% of incidents with primary or secondary impression = penetrating trauma mechanism
Frequency Head	LEMSIS-PCR data	% of incidents with primary or secondary impression = head trauma
Frequency Chest	LEMSIS-PCR data	% of incidents with primary or secondary impression = chest trauma
Frequency Abdomen	LEMSIS-PCR data	% of incidents with primary or secondary impression = abdominal trauma
<b>Critical Trauma</b>		
Frequency Burns	LEMSIS-PCR data	% of incidents with primary or secondary impression = burns
Lapse time on scene > 10 minutes	LEMSIS-PCR data	% of incidents with destination Specialty Care = Trauma Center and scene time >10 minutes (scene time calculated as interval from arrival on scene-wheels stopped to scene departure time)
Triage criteria	LEMSIS-PCR data	% of incidents with Specialty Care = Trauma Center and distribution of trauma triage criteria used to determine specialty care destination
Advanced airway	LEMSIS-PCR data	% of incidents with primary or secondary impression = trauma and patient intubated in field
Oxygen administered	LEMSIS-PCR data	% of incidents with primary or secondary impression = trauma and oxygen administered
Destination for all trauma	LEMSIS-PCR data	% of incidents with primary or secondary impression = trauma and hospital destination distribution to non-Trauma Centers

<b>Name</b>	<b>Source of Variables</b>	<b>Definition</b>
<b>Critical Trauma</b>		
% patients with trauma triage criteria transported to non-Trauma Centers	LEMSIS-PCR data	% of incidents with primary or secondary impression = trauma and trauma triage screen of PCR data elements determines + trauma triage criteria and hospital destination = non-Trauma Center
<b>ALS Skills (Pediatric patient = 16 years and under)</b>		
Adult ET oral	LEMSIS-PCR data	frequency performed per year
Adult ET nasal	LEMSIS-PCR data	frequency performed per year
Adult ET oral success rate	LEMSIS-PCR data	% confirmed placement with auscultation, adequate chest rise and ETCO <sub>2</sub> colorimetric change
Adult ET nasal success rate	LEMSIS-PCR data	% confirmed placement with auscultation, adequate chest rise and ETCO <sub>2</sub> colorimetric change
Pedi ET oral	LEMSIS-PCR data	frequency performed per year
Pedi ET success rate	LEMSIS-PCR data	% confirmed placement with auscultation, adequate chest rise and ETCO <sub>2</sub> colorimetric change
Pedi IV	LEMSIS-PCR data	frequency performed per year
Pedi IO	LEMSIS-PCR data	frequency performed per year
Needle cricothyrotomy	LEMSIS-PCR data	frequency performed per year
Combitube	LEMSIS-PCR data	frequency performed per year
Needle thoracostomy	LEMSIS-PCR data	frequency performed per year
Transcutaneous pacing	LEMSIS-PCR data	frequency performed per year

<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
<b>Access and Utilization</b>		
PSAP call load	LEMSIS-Dispatch CAD	Number of EMS incidents per month
911 call pick up	LEMSIS-Dispatch CAD	90 <sup>th</sup> percentile lapse time from first ring to call pick up
911 QUEUE-entry	LEMSIS-Dispatch CAD	90 <sup>th</sup> percentile lapse time from call pick up to call entry
911 QUEUE-response	LEMSIS-Dispatch CAD	90 <sup>th</sup> percentile lapse time from call entry to response unit notified
<b>Response</b>		
Response unit QUEUE	LEMSIS-Dispatch CAD	90 <sup>th</sup> percentile Lapse time from unit notified to unit enroute
Response unit ROLL	LEMSIS-Dispatch CAD	90 <sup>th</sup> percentile Lapse time from enroute to onscene
<b>Receiving Facilities</b>		
Transports	LEMSIS-PCR data	Distribution (%) of EMS transports by destination ED
Diversion	LEMSIS-PCR data	% of hours per month total diversion (corrected using suspension times)
Transfers from ED	LEMSIS-PCR data, Destination ED data	% of EMS transports with ED outcome = transferred
<b>Base Hospital</b>		
Caseloads per 24 hours	Base Hospital	Average number of prehospital Medical Control contacts per day
Case loads by Type	Base Hospital	Types of contacts by category
Base Hospital MD pick up time	Base Hospital	Lapse time from initial contact to MD call pick up
Number of hours of prehospital CE provided	Base Hospital	Total hours per year of CE's offered to prehospital personnel per year
Number of locally certified/accredited personnel attending CE programs	Base Hospital	Total number of EMT-1, EMT-P certified/accredited in SF who attended Base Hospital CE programs per year

<b>Data Element</b>	<b>Data Source</b>	<b>Definition/Code sets</b>
<b>Trauma Center</b>		
Trauma caseload	Trauma Center	Average number of Trauma cases received per 24 hours
Prehospital trauma cases per 24 hours	Trauma Center	Average number of Trauma cases from prehospital setting received per 24 hours
Prehospital trauma cases scene times	LEMSIS-PCR data, Dispatch CAD	Average lapse time from on scene to scene departure time
Prehospital trauma cases transport times	LEMSIS-PCR data, Dispatch CAD	Average lapse time from on scene departure time to hospital arrival time
Prehospital trauma cases advanced airway	LEMSIS-PCR data, Trauma Center	% of critical trauma patients with advanced airway management in field
Prehospital trauma cases outcome	LEMSIS-PCR data, Trauma Center	Prehospital critical trauma patients with hospital disposition = discharged or transferred
<b>Public Education and Prevention</b>		
AED	EMS Agency database	Number of layperson AED sites registered with local EMS Agency
<b>EMS Education and Training</b>		
EMT-1 certified	EMS Agency database	Number of EMT-1's certified each year
EMT-P accredited	EMS Agency database	Number of EMT-P's accredited each year
Approved CE Providers	EMS Agency database	Number of approved CE providers
Approved EMS training programs	EMS Agency database	Number of EMT training programs (EMT-1 and EMT-P)
<b>ALS Staffing Levels</b>		
2 EMT-Ps on critical patient contacts	LEMSIS-PCR and Dispatch CAD	% of incidents with Code 3 transport to hospital and 2 EMT-Ps on scene
2 EMT-Ps transporting	LEMSIS-PCR and Dispatch CAD	% of incidents with Code 3 transport to hospital and 2 EMT-Ps in transport ambulance