EMS Subspecialty Certification Review Course

3.1.1 Data Collection, Management & Analysis

2025

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Learning Objectives

Upon the completion of this program participants will be able to:

- Describe the federal initiatives and recognized databases that apply to EMS data collection
- List essential elements of NEMSIS and Utstein definitions
- Describe methods for data collection
- Provide examples of data analysis

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Federal Initiatives Regarding EMS Data

- 1993 NHTSA Uniform Prehospital Data Set
  - —81 elements (49 of which are essential)
- 1996 EMS Agenda for the Future – 5 essential characteristics of EMS data:
  - —Uniform dataset with definitions
  - —Valid and reliable mechanism to generate and transmit
  - — Focus on entire patient encounter (e.g., outcomes)
  - —Integration with entire healthcare system
  - —Research/performance improvement/evaluations

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National EMS Information System (NEMSIS)

- **Goals**
  1. Establish a nationwide dataset with definitions for EMS systems
  2. Establish an electronic data collection system for all local EMS systems
  3. Establish statewide databases to assure quality of care, appropriate coverage, etc.
  4. Establish an aggregate nationwide database based on the 3 goals above
- **Over 500 structured data elements with definitions**
- **Used in all 56 US States and Territories**
- **Version 3.5 (2021)**

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Components of an ePCR System

- **Front End**
  - Where data is entered and viewed
- **Database**
  - It's not just the image of a PCR, it's really a bunch of data points
- **Exchange or Interactive Engine**
  - Uses health information exchanges (HL7)
- **Back end**
  - Used to generate reports and analyze data

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Health Insurance Portability and Accountability Act (HIPAA)

- 4 major components of security and confidentiality (as it applies to us in EMS)
  - —Patient privacy and confidentiality
  - —User policies and procedures
  - —Physical security
  - —Software security

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Utstein Template

- First published in 1991 by the AHA for cardiac arrest performance benchmarking
- Considered the first data tool that called for integration of PSAP, EMS, hospital, and patient outcome data
- Revised in 2004 with simplified data definitions
- Considered the minimum data set for EMS cardiac arrest analysis

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Tip #4

When you read a question ask yourself (in this order):

1. Is there a national standard, statute, guideline, etc?
2. Is there a specific text reference?
3. Is there an answer that is so vague it must be true?
4. What do I think is the right answer?
5. How do we do it in my agency?

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Utstein Template

- Key Elements:
  - —% of bystander CPR
  - —Witnessed status
  - —Any shock delivered?
  - —Initial rhythm
  - —Any ROSC
  - —Survival
  - —CPC score

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CPC score

Used to measure a patient's functional status (after cardiac arrest)

- 1 – normal
- 2 – minimal deficit (able to hold a part time job)
- 3 – needs assistance with ADLs
- 4 – persistent vegetative state
- 5 – brain death

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National Trauma Databank (NTDB)

- American College of Surgeons Committee on Trauma (ACS-COT)
- Largest trauma databank in the US

Crash Outcome Data Evaluation System (CODES)

- NHTSA maintains the funding for this data system
- Provides funding for states to integrate crash and healthcare databases
- Purpose: Better identify and implement injury prevention initiatives

Paul Coverdale National Stroke Registry

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Cardiac Arrest Registry to Enhance Survival (CARES)

- Began in 2004 - sponsored by Emory University and Centers for Disease Control and Prevention
- Purpose is to provide source for benchmarking EMS systems and improve cardiac arrest outcomes
- Contains hospital and prehospital data

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Data Analysis

- Key concept is the utilization of appropriate statistical methods
- Must determine if perceived differences are real or more likely due to random chance
- The following few slides review basic statistical concepts and examples of data analysis

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Statistical Methods

- Enumerative studies
  - examine a data set over a fixed timeframe
  - evaluate the effect of one action on the study population
  - traditional clinical studies utilize this method
- Analytical studies
  - examine performance data in an ongoing manner
  - evaluate the effect of a provider's actions on a process
  - performance improvement studies utilize this method

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Clinical vs. Performance Data Analysis

Clinical

- AKA "Enumerative"
- Traditional statistical methods such as regression, t-test, etc.
- Statistical significance:
  - P < 0.05 (most commonly)
  - 2 standard deviations from the mean
  - 95% confidence interval

Performance

- AKA "Analytical"
- Non-traditional methods such as creation of control charts
- Confidence limits:
  - Calculated by utilization of the median moving range value
  - Approximates 3 standard deviations from the mean
  - Accounts for special cause vs common cause variation

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Variations

- **Common cause variation**
  - differences in performance due to natural variation
  - examples: patient type, season
  - This is to be expected. No action is needed.
- **Special cause variation**
  - changes in performance due to system changes
  - examples: new, unfamiliar equipment, etc.
  - DO SOMETHING!!

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Take-Home Points

This topic is part of the EMS core content Quality Management and Research – 10% of the test

- Data definitions from NEMSIS
- Commonly known registries and databases are the National Trauma Databank and CODES (Crash Outcome Data Evaluation System)
- Clinical data are analyzed by enumerative/traditional methods while performance data are analyzed by analytical/non-traditional methods

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Day 1 DONE!

See you tomorrow!

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