

## MODULE 23: RESEARCH

### Cognitive goals

At the completion of this module, the student-instructor will be able to:

- 23.1 Describe the nature and characteristics of research as it relates to the practice of EMS
- 23.2 Understand the common types and methods of conducting research
- 23.3 Distinguish between the different types of research commonly conducted in the EMS setting
- 23.4 Understand how research studies are designed and conducted
- 23.5 Describe methods used to read the research literature with understanding
- 23.6 Identify sources for locating relevant research materials and findings

### Psychomotor goals

There are no psychomotor objectives for this section

### Affective goals

At the completion of this module, the student-instructor will be able to:

- 23.1 Defend the importance of teaching research methods in the curriculum
- 23.2 Value the importance of research in the clinical and educational settings of EMS
- 23.3 Value the need to assist in the research process and data collection activities
- 23.4 Explain the value of research to the EMS provider and the EMS Educator

### Declarative

- I. Why this module is important
  - A. The professional literature of EMS is expanding every year
    1. Most of that literature deals with research results
  - B. Historically, EMS have relied on observation and common sense approaches to treatment and clinical interventions
    1. Currently the focus is on scientific evidence to determine the efficacy of treatment and clinical interventions
  - C. EMS educators should design and conduct educational research that forms a scientific basis for instructional methodologies and interventions dealing with EMS education settings
  - D. EMS providers and educators should be familiar with research
    1. Should participate in research
    2. Possess an understanding of the basic tenets of the research process
      - a. Instill knowledge about and appreciation for the research process in students
      - b. Model appreciation of benefits of research
        - i. Participating in and design research projects for clinical and education practice

- E. Research is a tool
  - 1. Allows our profession to expand and provides for meaningful advancement of knowledge in EMS education and practice
  - 2. Responsibility of professional EMS educators to strive to understand what leads to student's success, retention of information, retention of skills and transference of classroom experiences into successful clinical experiences and career satisfaction
  
- II. Overview of EMS research
  - A. EMS Agenda for the Future
  - B. Revision of BLS and ALS curricula
  - C. NAEMSE Educator NSC development
  
- III. The nature of research
  - A. Research should be empirical, valid, reliable and follow a scientific method
  - B. Empirical
    - 1. Empiricism is the doctrine that all knowledge is derived from experience
    - 2. Evidence derived from research is in the form of some type of data
    - 3. Research is directed towards one of two outcomes
      - a. Extension of existing knowledge
      - b. The solution of an existing problem
  - C. Validity
    - 1. Internal validity: The extent to which the results can be accurately interpreted
    - External validity: The extent to which the results can be generalized to populations
  - D. Reliable
    - 1. Consistency of the study
    - 2. Ability of other researchers to replicate the study
    - 3. Necessary for validity
  - E. Systematic in approach
    - 1. Scientific method
      - a. Identification of problem
      - b. Reviewing of existing information related to problem
      - c. Collecting data
      - d. Analyzing data
      - e. Drawing conclusions from data
    - 2. EMS research should be systematic
      - a. Systematic research increases both the reliability and validity of the findings
  
- IV. Activities in the research process
  - A. Identification of the research problem
  - B. Hypothesis are generated (tentative guesses about what is being studied)
    - 1. Review of the existing literature (to determine what others have done and how they designed their research)
    - 2. Identification of what data will be collected (variables of the study)

- C. Data collection
  - 1. The experiment is conducted at this point and observations are made
  - 2. Data is assembled and prepared for analysis
- D. Analysis
  - 1. Data are summarized
  - 2. Statistical analysis is conducted
- E. Summarize results and draw conclusions
  - 1. Conclusions drawn as to how the results relate to the research problem
  - 2. Conclusions drawn as to how the results relate to the existing knowledge
  - 3. Possible explanations of the results are provided
  
- V. Classification of research
  - A. Basic research
    - 1. Primary purpose is the extension of knowledge
  - B. Applied research
    - 1. Primary purpose is the solution of an immediate problem
  
- VI. Qualitative research
  - A. Conducted for the purpose of understanding social phenomena
  - B. Relies on the researcher inclusion in the situation being studied
  - C. Relies on narrative descriptions
  
- VII. Quantitative research
  - A. Conducted to determine the relationship and effects and causes of the relationship
  - B. Relies on statistical results represented as numbers
  - C. This is the type of research most often conducted in EMS clinical and educational settings
  
- VIII. Experimental research
  - A. A type of quantitative research
  - B. Involves situations in which at least one variable is deliberately manipulated or varied by the researcher to determine the effects of the variation
    - 1. The researcher determines the variable and the extent to which it will be varied
    - 2. Possible to have more than one variable in an experiment
  - C. Participants are randomly assigned to groups
  - D. Researcher controls all of the factors that could bias or slant the outcome of the experiment
  - E. Considered the “gold standard” for clinical research design
    - 1. Virtually impossible to conduct in true emergency settings, since it requires withholding of standard treatment from a randomly selected patient
    - 2. This research design has a high probability of producing valid and correct findings
  
- IX. Quasi-experimental research

- A. Similar to experimental research, but the participants are in naturally assembled groups, for example, a paramedic class
  - B. Not conducted in a laboratory but in a natural setting
  - C. Results are less straightforward than true experimental research and more susceptible to ambiguity when interpreted
- X. Survey research
- A. Deals with the incidence, distribution and relationships between educational, psychological and sociological variables
  - B. No experimental variables are manipulated
  - C. Variables are studied as they exist in a natural situation
- XI. Understanding the components of a research article
- A. Introduction section
    - 1. Defines the topic being investigated in clear specific terms
    - 2. Terms used in describing the research problem are defined
  - B. Review of the literature
    - 1. Provides the background and context for the research problem
    - 2. Establishes need for further research in the area
    - 3. Establishes that the researcher has a good understanding of the topic to be researched
  - C. Methods
    - 1. The heart of the research project
    - 2. Describes the measurement instruments used or developed.
    - 3. Describes the individuals participating in the research (subjects.)
    - 4. Describes the sample (design and numbers.)
    - 5. Describes the data collection methods
    - 6. Describes the specific data analyses methods used
  - D. Results
    - 1. The products of the data analyses
    - 2. Descriptive statistics
  - E. Conclusions
    - 1. Identifies all noteworthy results
    - 2. Interprets results relative to the research problems and in the context of related research and theory to draw conclusions
    - 3. Explains any inconsistency
    - 4. Discusses the limitations of the study
    - 5. Identifies directions for future research
    - 6. Address the degree to which the results of the study can be generalized to a larger population or group
- XII. The role of statistical analysis in the research process
- A. Descriptive statistics
    - 1. Summarize or describe the characteristics of a set of data in a clear and convenient manner

- a. Example: your grade point average is a convenient summary of all the grades you received in school
  - B. Inferential statistics
    - 1. Makes it possible to draw inferences about what is happening in the entire population based on a sample from the population
      - a. A population is defined an entire group of people, objects, or events having at least one characteristic in common
      - b. Populations are typically very large
      - c. A sample is a subgroup selected from the complete population
        - i. A sample must be selected in such a manner that it is representative of the entire population
        - ii. Use of random selection processes makes certain the every person, object or event from the population has an equal chance of being included in the sample
        - iii. In this way, inferences can be drawn from sample regarding the population
          - a.) This is referred to as the ability to “generalize” the results of research conducted on a sample to the entire population
      - d. Using the techniques and mathematics of inferential statistics it is possible to be reasonably confident that the results are representative of the entire population
        - i. Statistics help the researcher decide if the results are true differences or just coincidences
- XIII. The value of understanding research methods and literature
- A. Three major reasons why knowledge of research methods is essential for EMS providers and educators
    - 1. To understand the professional literature
    - 2. To understand the rationale underlying research in EMS
      - a. Ability to comprehend the essential nature of the strengths and weaknesses of the techniques used to collect information and draw conclusions
    - 3. To conduct or to assist in the conduction of research projects
      - a. Can influence change in professional standards and practice

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