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**Smola, John Keith**

**EVALUATION OF THE TRAINING AND CONTINUING EDUCATION FOR  
EMPLOYMENT AS AN EMERGENCY MEDICAL TECHNICIAN -  
AMBULANCE**

*Iowa State University*

**PH.D. 1981**

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**Smola, John Keith**

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**Evaluation of the training and continuing education  
for employment as an emergency medical  
technician - ambulance**

by

**John Keith Smola**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirement for the Degree of  
DOCTOR OF PHILOSOPHY**

**Department: Industrial Education  
Major: Industrial Education (Industrial Vocational-  
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**Iowa State University  
Ames, Iowa**

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## CHAPTER ONE

Introduction to the Research

Ambulance services have been in existence in urban centers and some rural areas for more than 50 years. The development of a special vehicle to carry the injured, and trained attending persons to accompany the injured, dates back to the European War of 1918. The role of attendant, of those early emergency services, was considerably different from the role of the present day ambulance attendant (Hampton, 1972). The concept of formal prehospital emergency care for the accident victim was formulated the latter part of the 1960s but has its roots in the experiences of World War II and the Korean War (Curry, 1959). World War II demonstrated the advantages of early care of the injured. During the Korean War, specially trained individuals gave almost immediate care to the wounded. This care greatly reduced the mortality rate and the incidence of permanent disability. The increased mobility of the nation, during the 1950s, led to a marked increase of highway traffic accidents throughout the nation. There was an especially high mortality rate in the rural areas (National Safety Council, 1975). The high mortality rate was due to the longer response time and prolonged periods of transportation in the rural areas. Clearly, change was needed.

The emergency medical technician (EMT) occupation developed because of general social pressure for qualified emergency personnel. The occupational area within which the EMT works is unique in several

ways. In spite of the fact the majority of ambulance units in the nation are run by volunteers, the knowledge and skill expectations are the same for all EMTs. The majority of the ambulance units are located in the rural areas of the nation. (Rockwood, 1976).

Societal intervention, during the 1950s crisis of increasing highway accidents, caused a chain of events which eventually led to increased performance expectations of ambulance attendants. The early measure of the ambulance attendants service performance was a function of time. Most bystanders, and the victims themselves, judged the performance of ambulance attendants by how fast the attendant could "scoop up" the victim and transport him to the nearest medical facility. This "time" criterion was based upon the assumption that speed was of primary importance since care for the victim could not begin until the victim was turned over to medical authority (Rockwood, 1976).

The "scoop and run" method of emergency care was questioned by both medical authorities and organizations concerned with safety and welfare. The American Red Cross, U.S. Bureau of Mines, International Rescue and First Aid Association, Ambulance Association of American, and National Ski Patrol all provided training in first aid measures given at the scene of an accident (Rockwood, 1976). The goal of these first aid measures was to reduce the lasting effects of trauma. There were two medical organizations which worked to improve the capabilities of emergency service. The two medical organizations that provided leadership in the development of emergency medical techniques for trauma in the civilian domain were the American College of Surgeons

(ACS) and the American Academy of Orthopaedic Surgeons (AAOS) (Committee on Injuries, 1971). A lack of central leadership was identified as the cause of two basic problems: obtaining national recognition and formulating a plan for the resolution of the situation. These problems were solved when the federal government was pressed into action.

According to Rockwood (1976),

Probably one of the single most provoking stimuli to improve emergency services was the 1966 publication of Accidental Death and Disability: The Neglected Disease of Modern Society by the Division of Medical Sciences, National Academy of Sciences/National Research Council, which explicitly outlined the severity of the situation. It stresses the difference competent initial emergency medical care, efficient transportation, and active treatment could make in survival rates among the critically injured (p. 300).

The public sector's thrust came through the President's Commission on Highway Safety which advocated federal leadership in this area of concern. The Highway Safety Act of 1966 established "Standard 11" which provided for withholding federal highway funds from states which did not upgrade their ambulance services to meet the specified standards. There were eight categories of concern addressed within Standard 11, one of which was the problem of training ambulance attendants (U.S. Department of Transportation, 1969).

To meet the Standard 11 guidelines, most states adopted the course of instruction for Emergency Medical Technicians-Ambulance (EMT-A) developed by Dunlap and Associates, Incorporated. This private research organization developed an 81 hour course for training EMT-As under a

contract funded by the National Highway Traffic Safety Administration. The 81 hour course was based primarily on a medical model provided by the American Academy of Orthopaedic Surgeons (AAOS). The course development had some input from the U.S. Department of Transportation, branches of the armed forces, and the previously mentioned first aid and rescue organizations (National Highway Traffic Safety Administration, 1971 a). The course was developed and tested in and near Stamford, Connecticut.

The Dunlap course uses a textbook written primarily for EMT-As by the Committee on Injuries, American Academy of Orthopaedic Surgeons (AAOS). The textbook, Emergency Care and Transportation of the Sick and Injured, is endorsed by the American College of Surgeons (ACS), American Medical Association, American National Red Cross, and the National Research Council/National Academy of Sciences (Committee on Injuries, 1971). The Dunlap course and its associated textbook has become the foundation for training leading to initial job entry for EMT-As throughout the nation.

Standard 11 of the Highway Safety Act of 1966 encourages the establishment of "an emergency care career pattern which provides attractive compensation, prestige, and recognition commensurate with the services provided by ambulance personnel" (U.S. Department of Transportation, 1969, p. 4). In 1972, the National Highway Traffic Administration published a job description for EMT-As (National Highway Traffic Safety Administration, 1972). The Employment and Train-

ing Administration, U. S. Department of Labor, published the standards for the apprenticeship and training of EMTs in 1978 (Employment and Training Administration, 1978).

The initial Dunlap course encouraged training control agencies, usually state level governmental agencies, to include items which reflected local needs for emergency services. Several medical developments since the inception of the Dunlap course have caused training control agencies to initiate change to their original course content. These developments include, but are not limited to, basic life support and specific treatment changes in care of shock victims.

The increased national concern for deaths due to heart related incidences in the early 1970s brought about the development of cardiopulmonary resuscitation (CPR) techniques. The technique for CPR was developed and disseminated by the American Heart Association through its state affiliates (Standards of Cardiopulmonary Resuscitation, 1974). In many areas of the country, CPR evolved into a unit of emergency medical knowledge known as Basic Life Support (BLS). Basic Life Support replaced a portion of the Dunlap course (Emergency Medical Section, 1976).

Advances in equipment and techniques brought about rapid change in the EMT field. Emergency medical technicians who received their basic training in the early years found their knowledge base nearly outdated by 1980.

The organizers of the job preparation course for EMTs visualized continuous learning as important for the maintenance of skills and the

update of knowledge. Therefore, at about the same time the initial Dunlap course was published, the Department of Transportation (DOT) published a refresher course (National Highway Traffic Safety Administration, 1971 b). Most states and training control agencies have mandated some form of continuing education for EMT-As (Guely, Note 1).

In 1973, the Emergency Medical Services System Act (EMSS Act) concentrated on developing a regional systems concept for emergency medical services within given geopolitical regions. This act addressed many elements of the EMS system such as central emergency telephone numbers, emergency service dispatching centrals, categorical identification for emergency facilities, and both prehospital and hospital pools of emergency services resources. Ambulance services are considered to be within the prehospital pool of resources. Mandatory review of services, facilities, organization, and evaluation techniques is required under this act. Because of this mandatory review principle, the role of the EMT-A changed from that originally visualized by the Highway Safety Act of 1966. The role changed from an individual technician to the wider role of team member within an emergency care system.

From the beginning, federal money financed the improvement of ambulance services. Initially, highway safety funds covered approximately 70 per cent of the cost of ambulances and as much as 100 per cent of the cost of training EMT-As. Highway safety funds were withdrawn from this program in 1976 (Guely, Note 1). Funds provided under the EMS Systems Act "seeded" some regions in equipment and instructional

costs. At present, there are no federal or state funds spent for training in Iowa. Most training costs are covered by student tuition and state and federal educational reimbursement to the Department of Public Instruction, Vocational Division.

The course of instruction used in the state of Iowa was revised in 1977. The course currently "consists of 31 lessons involving 94 hours of classroom training plus 20 hours in-hospital and field training" (Emergency Medical Section, 1976, p. 2). Lessons are typically three hours long and conducted two times per week. The cost is usually \$120 to the student. Iowa's course of instruction is very similar to the Dunlap course with added time for developing skills in Basic Life Support.

In 1975, there were 316 ambulance and rescue services in Iowa (Governor's EMS Council, 1975, p. 10). In the beginning of 1980, there were approximately 484 ambulance or rescue services in the state which employed EMT-As. More than 70 per cent of the citizens of Iowa are served by volunteer units ("An Assessment of Emergency Medical Services in North America: Third Annual Survey," 1979, p. 120).

In Iowa, there is no current legislation for minimum requirements for the operation of ambulance or rescue services. Ambulance or rescue services may function without trained or certified EMT-As. Also, there is no law requiring ambulance attendants to be certified. To be certified as an EMT one must "successfully complete the training program, pass the written examination, and pass the practical examination"

("An Assessment of Emergency Medical Services in North America: Third Annual Survey," 1979, p. 120).

#### Problem of the Study

The problem of this study was to determine whether the specified training for initial entry into the EMT-A job assignment in Iowa is consistent with a compilation of worker's perception of the job and the social referends from which the job has evolved. The problem consisted of isolating expected behaviors set by occupational identity, assessing the output of the mandated training program, and determining if there was a discrepancy between these two factors. Implicit to the problem was a measure of validity and utility in the job preparation training. Validity referred to the accomplishment of the objectives of the training program while utility addressed the worthiness of those accomplishments.

#### Purpose of the Study

The study's main purpose was to provide decision making tools to persons responsible for revision of the basic training course content, and/or development of a viable continuing education program.

The broad purpose of the study was to delineate specific educational subject areas required in the prehospital phase of the EMT-As occupation. These areas reflected societies expectations of the occupation and therefore could be classified as knowledge, skills, and attitudes required in that career pattern. This broad purpose fulfilled the needs of vocational curriculum planners involved in establishing

the career education pattern for EMT-As.

The specific purpose of the study addressed a more immediate need, the content of continuing education courses. The present job preparation process, completion of a single course of instruction in medical aid techniques, seems short of fulfilling the entire educational needs of persons who act in the position of EMT-A. This is especially true for the volunteer EMT-As who are part time workers in the emergency care field. Once EMT-As enter the occupation, the present continuing education program concentrates on "more of the same" course work. While it is true that basic skills must be maintained through "refresher" type study, iteration of subject matter provides little chance for personal development and growth.

If curriculums for both basic EMT-As and continuing education for EMT-As are to be developed to satisfy both the career educator's needs and the needs for growth and development for persons in the career track, the curriculum should have utility and validity. The curriculum should be valid for the work requirements and worth the expenditure of time and effort to attain (Kaufman & English, 1979).

Such curriculums can be developed from the results of a needs assessment. This evaluation research study provided a system approach assessment by studying what is currently provided for training and what is needed on the job.

#### The Methodology

This study involved the systematic collection of data concerning the utility and validity of the job entry training program. The study

used three methods to determine contemporary conditions relating to the training/education process. A course content analysis was performed to determine training outcomes or results. Existing ambulance unit records were perused to identify society's demands on the training/educational system and to assess the EMT-As response to those demands. Finally, the opinions of persons active in the occupation were solicited in an effort to determine their values of specified operational elements as the elements related to training.

The study had an obligation to utilize scientific methods and techniques. Within the context of the scientific approach certain measurements were taken and certain statistical analysis were made in order to establish the validity of the study itself. Statistical hypotheses were stated prior to the statistical analysis.

#### Assumptions of the Study

This study included the following assumptions:

1. That the EMT-As, within each Ambulance Unit studied, filled out the victim's records to the best of their knowledge at the time of the incident.
2. That an analysis of records, which individually may contain omissions or errors, would collectively and over a period of time determine trends or reflect performance of individuals and units.

#### Limitations of the Study

This study included recognition of the following limitations:

1. This evaluation research study was limited to a discussion of

the course subject matter and the relation of that content to the work requirements.

2. The study identified the goals which the program developer attempted to achieve. This list of goals came from an analysis of the guidelines used by the course developer as manifested in the course content and delineated by a content analysis. These goals were stated in operational element terms rather than as behavioral objectives. Behavioral objectives would indicate a listing of observable outcomes, criteria for successful performance, and situational context in which the behavior is to be performed (Mager & Pipe, 1976). The course content developer did not state the objectives in behavioral terms.

3. The study did not address resources, procedures, or management for occupational entry training.

4. The study isolated influences of societies expectations on the occupation. For the purpose of this study these expectations are listed as indicators of knowledge, skills, and attitudes which are expected of the individuals who fill the occupational positions.

5. These limitations of the study exist because performance standards have not been identified by either the course developer or society.

6. The records used to help establish societal demands on the occupation are from three rural ambulance units. They reflect the most recent two years of operation.

7. Each unit's records were slightly different in format. There-

fore, the indicators of performance were limited to those which could be extracted from each observed unit.

8. The units visited to complete interviews and questionnaires were within a single EMS System region. Most EMT-As had received basic training through the same community college system. Course instructors and course coordinators were different for each community.

#### Key Word List

The following words have been defined in relation to this study.

Analysis. Analysis indicates an intentional separation of a whole program into its parts in order to determine component amounts or form.

Assessment. Assessment means a systematic process of data collecting. Assessment includes data collection, analysis, and the formulation of a judgment (Anderson, Ball, & Murphy, 1975, pp. 26, 27).

Behavioral objective. A behavioral objective specifies the behavioral outcome of training. Behavioral objectives specify three things; observable behaviors, levels of performance in that behavior, and the situation or condition within which the level is measured (Anderson, Ball, & Murphy, 1975, p. 182).

Block. A block is a division of work. Blocks are based upon training requirements rather than production or work results. Blocks are collections of similar operations which have a beginning and an end. Blocks sequentially lead to the end of a project. Each block could be a job of its own, related to, but not dependent upon another block within the occupation (Allen, 1919).

Evaluation. An evaluation implies a judgmental process applied to the results of a program. Measurement is not evaluation, but measurement can provide useful data for evaluation.

General information. General information indicates that information which is desirable in the work assignment, but not necessary in order to make judgments about the work. This type information includes such items as occupational history, safety, social or economic factors (Fryklund, 1970, p. 72).

Goals. Goals are the desired organizational or institutional results. Goals are usually broad concepts stated in global terms. They may be described by nominal or ordinal scales of measurement. (Anderson, Ball, & Murphy, 1975, p. 179).

Goal-free evaluation. Goal-free evaluation means the determination of results, both positive and negative, which can be observed after-the-fact without planning measurement or previously identified evaluation procedures or vehicles. Goal-free evaluation is designed in a way that eliminates disruption of the observed phenomena due to the intervention (Kaufman, 1979, p. 343).

Guidance information. Guidance information is vocationally oriented information for the purpose of selection, preparation, securing, holding, coping with, and progressing through an occupation (Fryklund, 1970, p. 75).

Job analysis. Job analysis is the process of determining, by observation and study, pertinent information relating to the nature of a

specific job. It is the determination of the tasks that comprise the job. It is the identification of skills, knowledge, abilities, and responsibilities required of the worker for successful performance (Beach, 1975, p. 199).

Job description. The job description is that portion of the job analysis which contains the job title, location, a summary of the job duties, tools or equipment used, material and records used, supervision given or received, and the expected working conditions and hazards (Beach, 1975, p. 200).

Job specification. Job specification indicates that portion of a job analysis which is a statement of the human qualifications required of persons in the work assignment. It covers items such as education, experience, training, judgment, initiative, physical effort, physical skills, responsibilities, communication skills, emotional characteristics, and unusual demands (Beach, 1975, p. 200).

Means. The means indicates the processes, procedures, tools, or knowledge which are used or usable in converting inputs to an end. These ends could include products, outputs, or outcomes. Means are not results, but are the methods of achieving results.

Needs. The needs are the measurable gap, or discrepancy, between current results and desired/required results. Needs are not a gap in processes, or means, but a gap between ends.

Objectives. Objectives are desired trainee behaviors. When taken together, objectives will lead to fulfilling goals (Anderson, Ball, & Murphy, 1975, P. 179).

Occupation. An occupation is a composite of many closely related jobs. Where a job is usually thought of in a single position or locality, occupation is a more global term. Occupation generalizes the description designated by the type of work. Occupations are listed in the Dictionary of Occupational Titles, Volumes I and II, 1980 (U.S. Department of Labor, 1980).

Related information. Related information is that information a worker should possess for the job assignment. Related information should be provided in the training process. Related information has three categories; technical, general, and guidance (Fryklund, 1970).

System analysis. This type of analysis is a formal planning and doing process which intends to identify and list problems based upon social needs. A system analysis is conducted from outside an organization or institution. There are no assumed organizational or institutional aims or goals with which to start. Rather, expected outcomes taken from social indicators establish the level for which training and educational outputs are compared (Kaufman & English, 1979).

Systems analysis. Systems analysis is a type of analysis which accepts the established goals or aims of the organization or institution. The purpose of the analysis is to identify problem areas which can be treated through training. This type analysis is usually made from inside of an organization or institution. The process is introspective (Laszlo, 1972).

Task. A task is a manipulation, an item of information, or a duty. Task means a unit or component of work. Tasks are one of three types;

physical, mental, or interpersonal (Beach, 1975, p. 202).

Technician. A technician is one who performs all operations of the work assignment. This person has the dexterity to perform expected manipulations and can form judgments about the work. The technician knows the scientific facts, can make calculations, read instructions, and plan for the work. The technician can solve problems in the work field. Technician, as used in this study, relates closely to the term "skilled mechanic" used by Fryklund (1970). Beach (1975) states, "A technician is one who possesses some formal education and training beyond the high school level, generally in the field of science and technology. A technician is semiskilled professional or a subprofessional" (p. 204). It is important to this study to recognize that there is an attitudinal dimension to the person acting as a technician. Because the training period of the technician is lengthy and draws heavily on learning from experience, the technician must develop an attitude of continuous learning. The technician's educational process never ceases.

Technical information. Technical information is that information which must be known by the workers in order for them to make judgments on the job.

Training. Training is a process of job preparation. It is a function of manipulative skills, judgments, and demeanor required on the job. Training is a process of experiencing the requirement. The trainee should be totally aware of the expectation that actually exists

in the occupation. Implicit in this definition is the effort to keep pace with a changing occupational environment.

Training/education. Training, as opposed to education, is usually thought of as having relatively immediate and limited objectives. Training is the gaining of competencies needed for work or some other defined social role. For the purpose of this study, two classifications of training/education are defined: 1) instructional programs conducted by organizations to meet their own needs, and 2) instructional programs which have more general personal and societal goals. The latter of these classifications is the focus when the study addresses the assessment of training output and social expectations. The former classification is used in addressing the problems of continuing education in the job field (Anderson et al., 1975, p. 440).

Utility. Utility is defined as "the value or worth of something, especially an accomplishment or result of the application of a method" (Kaufman & English, 1979, p. 347).

Validity. Validity is defined as "the extent to which something accomplishes that which it set out to accomplish" (Kaufman & English, 1979, p. 347).

Validity of training. Validity of training includes four areas:

1. The information taught in the course content is used on the job.
2. All information peculiar to the work is taught in the training course. This includes technical, general, and guidance informa-

tion.

3. There is a balance between the emphasis of the training. A balance exists between the importance to the individual instructor and trainee, and the frequency of use of the subject on the job.

4. A timely relationship exists between the learning of a subject and using the skill and knowledge on the job.

Victim. This study uses the term victim to singularly identify those persons who are the recipients of EMT-A services. This word, victim, is chosen over "patient." "Patient" is accepted by the social customs of this country to mean "a person treated by a doctor." Victims, entering the prehospital phase of the emergency medical service system, are not yet patients.

## CHAPTER TWO

Review of the Literature

The review of representative literature and research relevant to five major areas of the study is presented in this chapter. These five areas are: 1) history of the development of the occupation for EMTs, 2) job preparation goals envisioned by the course developer, 3) social guidelines which should influence the educational process, 4) the process of making occupational analysis, and 5) evaluation and needs assessment as a means of research.

History of the Development of EMT-A

In 1965, a report from the President's Commission on Highway Safety targeted the emergency care and transportation of the sick and injured as a major community action program. A direct consequence of this commission report was the inclusion of "Standard 11," entitled "Emergency Medical Services," in the Highway Safety Act of 1966. This portion of the act directed states to demonstrate their intent to develop appropriate emergency medical services programs which were outlined in Standard 11. Penalty for noncompliance was severe. Provisions were made for withholding up to 10 per cent of the state's federal highway construction funds. There were eight elements in Standard 11. Training ambulance attendants was one of these elements. Guidelines for the implementation of Standard 11 were published in the Highway Safety Program Manual, Volume 11 (U.S. Department of Transportation, 1969), and supplemented in 1971.

The Division of Medical Sciences, National Academy of Sciences/

National Research Council (NAS/NRC), published a specially prepared report, Accidental Death and Disability: The Neglected Disease of Modern Society, in September, 1966. This publication, along with a report made by an NAS/NRC Task Force on Ambulance Services in April, 1967, had an impact. Both drew attention to the increased mortality and morbidity rates due to highway related accidents. These two publications affirmed that the majority of ambulance attendants were inadequately trained and there were no accepted standards for performance or training (Division of Medical Sciences, 1967). The Division of Medical Sciences, both NAS and NRC, recommended standardized programs for ambulance attendants.

Based upon the recommendations for a standardized training program for ambulance attendants, the Public Health Service requested the NAS/NRC develop "nationally accepted guidelines and recommendations for advanced specialized training for ambulance attendants, policemen, firemen, rescue personnel, and other public servants involved in providing immediate care to emergency sick and injured." The Public Health Service requested the NAS/NRC, "to make recommendations on a course of action to assure development of a nationally acceptable training course for ambulance attendants and other lay personnel for use in emergency care." These tasks were given to the Committee on Emergency Medical Services, Division of Medical Sciences (Division of Medical Sciences, 1968, p. ii).

This request resulted in the document that set the course of events for training EMT-As. The document provided national guidelines for training ambulance personnel in the three areas of; emergency care,

ambulance services, and in-hospital training. The document provided five recommendations on the course of action required in order to develop a nationwide training program. The document, published in 1968, was entitled, Training of Ambulance Personnel and Others Responsible for Emergency Care of the Sick and Injured at the Scene and During Transport (Division of Medical Sciences, 1968, pp. 4, 16).

Job Preparation Goals as Determined by the Course Developer

Among the five recommendations provided by the Committee on Emergency Medical Services was a request for the publication of a comprehensive textbook for training ambulance personnel. One of the physicians who served on the task force which made the plea for a textbook was also the chairman of the Committee on Injuries of the American Academy of Orthopaedic Surgeons. By coincidence, or by design, his committee had started work on such a textbook the year before. There was little reason to wonder why the internal structure of the section of the national guidelines for training ambulance personnel in emergency care and ambulance services and the internal structure for the textbook Emergency Care and Transportation of the Sick and Injured are nearly the same (Committee on Injuries, 1971).

In 1969, the National Highway Traffic Safety Administration awarded Dunlap and Associates of Darien, Connecticut, a contract to develop a course of instruction for ambulance personnel. The course of instruction was to be based upon the recommendations of the Division of Medical Science, the national guidelines. Using the preliminary draft of the forthcoming textbook by the Committee on Injuries, and working with

a privately owned ambulance service in Norwalk, Connecticut, and the Norwalk hospital, Dunlap provided the National Highway Traffic Safety Administration (NHSTA) with a packaged course called the Basic Training Program for Emergency Medical Technician-Ambulance (National Highway Traffic Safety Administration, 1971 a).

The U. S. Department of Transportation (DOT) 81-hour course, as it became known, was revised in 1977 (National Highway Traffic Safety Administration, 1977). Discussion of the objectives of the course will be limited to the revision. This limitation is because Iowa's course of instruction was also changed to reflect the revision. The 1977 revision lists the course objectives as follows:

This course was developed to provide the first phase of training in the career structure of the . . . EMT. It covers all techniques currently considered to be within the responsibilities of a basic EMT providing emergency medical care with an ambulance service. Specifically, after successful completion of the program, the student will be capable of performing the following functions:

Recognizing the nature and seriousness of patient's condition or extent of his injuries to assess requirements for emergency care.

Administering appropriate emergency care to stabilize the patient's conditions.

Lifting, moving, positioning and otherwise handling the patient in such a way as to minimize discomfort and further injury.

It is obvious that EMT's provide a service in a special environment requiring special skills and knowledge in such areas as communication, transportation, record keeping, and liaison with other emergency services. The course does not attempt to develop proficiency in these operational aspects of the EMT's job (National Highway Traffic Safety Administration, 1977, p.6).

The course guide also lists four general performance objectives. These objectives use behavioral terms, however, they lack the completeness associated with behavioral objectives. The following is an

example of the course guide's performance objective: "Given a hypothetical ambulance call, the student will: Describe the roles and responsibilities of the EMT during each phase of an ambulance call" (National Highway Traffic Safety Administration, 1977 p. 7). In the course guide, the Dunlap developers state once again that the training course does not develop skill in all job functions but emphasizes the EMT-As emergency medical care responsibility.

Immediately following the development of the original basic course, Dunlap was contracted to produce a refresher course. The refresher course was published by the NHTSA in March, 1971. The refresher course had the following objectives:

To review the basic skills and knowledge of emergency medical care.

To bring the student up-to-date on new knowledge in patient care skills, employment of acceptable newly developed equipment, faults of new equipment that is not acceptable, and changes in state licensure or medico-legal requirements (National Highway Traffic Safety Administration, 1971 b, p. 1).

Almost simultaneously with the publishing of the AAOS textbook, Grant and Murray (1971) published the textbook Emergency Care. This textbook was also based upon the national guidelines, however, its internal structure was different from the guidelines. This textbook used some innovative techniques for instruction. It also contained much more vocational and general type information than did the AAOS textbook (Grant & Murray, 1971).

The AAOS Committee on Injuries hosted a National Workshop on the Training of Emergency Medical Technicians in July, 1971. The AAOS committee was chaired by the same physician who sat on the task

force which formed the national guidelines, acted as consultant to the Dunlap course, and chaired the committee which published its own textbook designed for training ambulance personnel. Representatives at this National Workshop were from 10 organizations of American medicine and federal agencies involved in emergency medical services. The National Workshop on the Training of EMT-As shared the results of the workshop in a publication entitled Recommendations and Conclusions for an Approach to an Urgent Problem. Three of these recommendations are capsulated as:

1. Endorse the Dunlap course of instruction for the national standard for basic training and the refresher course for continuing educational requirements.
2. Basic instruction should be on a district or regional basis coordinated by an EMS coordinator.
3. The textbook written by the AAOS, Emergency Care and Transportation of the Sick and Injured, be adopted to support the endorsed Dunlap course (National Workshop, 1972).

The Governor of Iowa, Robert Ray, appointed the Governor's Emergency Medical Services Advisory Council in response to the provisos of Standard 11 of the Highway Safety Act. In addition, the Iowa State Department of Health formed the Emergency Medical Section. These two entities became the agencies primarily responsible for the dissemination of training and certification of EMT-As in Iowa. The Governor's EMS Advisory Council adopted the Dunlap course and the AAOS textbook as the basis for training of Iowa EMT-As who wished to be certified.

(Emergency Medical Section, 1971). The initial course content was almost verbatim with the Dunlap course. The course consisted of 74 hours of classroom work in 25 sessions which included more than six hours of tests and evaluations. In addition to the classroom work, the course also called for seven hours work and observation in a clinical setting. The Iowa basic course was revised in 1976 at which time it was lengthened to a total of 114 hours; 94 hours of classroom training and 20 hours of in-hospital observation and field training. The primary difference in classroom time in the revised course was due to the addition of 17 hours allocated to Basic Life Support (previously CPR) and three hours additional in situational review (Emergency Medical Section, 1976).

The course objectives for the Iowa course of instruction are:

To teach students the overall roles and responsibilities of the Emergency Medical Technician in performing both the emergency care and operational aspects of his job.

To develop student skill in diagnosis and all emergency treatment procedures short of those rendered by physicians or by paramedical personnel under the direct supervision of a physician.

To develop student skill in the use of and care for all equipment to accomplish his job (Emergency Medical Section, 1976, p. 1).

There are no further statements about additional training for functions not covered in the course. There are no performance criteria listed.

The Emergency Medical Section of the Iowa State Department of Health adopted a continuing education program which commenced June 30, 1975. The continuing education program did not follow the Dunlap re-

fresher course, but was established by the subcommittee of the Governor's EMS Advisory Council. (Menefee, Note 2). The course was updated in August, 1979 (Guely, Note 1).

### The Social Guidelines

The National Workshop in July, 1971, and the residual effects of the Highway Safety Act had an impact upon the individual states. By 1974, the NHTSA 81 hour EMT course had been adopted by 47 states. The remaining states had adopted an equivalent course. By 1976, more than 150,000 people had received the 81-hour training or its equivalent (Rockwood, 1976, p. 304). In January, 1972, President Nixon, in the state of the union address, directed the Department of Health, Education, and Welfare to find new ways to organize emergency medical services. The Department of Health, Education, and Welfare and the Congress moved rather quickly on this problem. Within the same year, the Department of Health, Education, and Welfare (HEW) had awarded 8.5 billion dollars to develop model EMS systems. Within one and one-half years, the 93rd Congress had formulated the Emergency Medical Services Systems Act (U.S. Congress, Senate, & House, 1973).

The EMS Systems Act has the stated purpose of providing " . . . assistance and encouragement for the development of comprehensive emergency medical services systems throughout the country and thereby improve the quality of patient care and reduce morbidity and mortality." The act is organized in three sections: feasibility studies and planning, establishment and initial operations, and expansion and improvement. The act also provided monies for research. However, research

funds were controlled by a different agency. Funds for training to support the implementation of this act were available under Titles XII or VII of the Public Health Services (PHS) Act (U. S. Congress, Senate, & House, 1975, pp. v-vi).

Chapter III of the EMS Systems Act lists the special program guidance. A summary of the special program guidance stated there are approximately 80 million people who seek help from the emergency departments of the nations' hospitals each year. Of these, 80 per cent are considered to be "not true" emergencies, 15 per cent are real emergencies and five per cent are the critically ill and injured patients. This last group was not considered salvageable a few years ago, "but these lives can be saved today if initial definitive and rehabilitative care is given in time . . ." (U.S. Department of Health, Education and Welfare, 1975, p. 13). The clinical capabilities required for the critical group, consisting of five per cent who are critically ill and injured, are divided into five specific areas for control. One non-specific area included other medical and surgical emergencies. It was anticipated that the latter area of emergency conditions would be handled by the EMS System but special organization for the category was not required in a regional concept. The act stressed the inclusion of local needs in the emergency medical services plan. A regional EMS system was defined as one that is geographically described by the existing natural patient care flow. The EMS Systems act mandated that 15 separate components be addressed in the regional plan. Finally, this chapter discussed evaluation of EMS as a component of the total

health care delivery system and suggested some guidance on the management of federal funds (U.S. Department of Health, Education and Welfare, 1975, pp. 13-20).

The five categories of critical care requirements and the 15 mandated components of the system added new dimensions to the prehospital phase of the system. Training which evolved from the DOT 81-hour medical model course concentrated on developing individual knowledge and skills in support of the medical needs of the patient or victim. Preparation for performance under the EMS Act, however, calls for knowledge beyond emergency medical care. Performance under the EMS Act requires an in-depth knowledge of the demography of the area being served. Performance under the EMS Act concentrates on coordination between elements of the system and between the public and the system, and it mandates periodic accounting for services being offered and the costs of those services.

Major problem areas. Three broad problem areas developed almost immediately as more states developed their resources in support of Standard 11. First, it became evident to persons in the rural areas of the nation that the course material and general theories of instruction contained in the Dunlap course were oriented toward urban center needs. Second, due to an absence of performance standards, persons in management positions and persons who were responsible for liability were frustrated in trying to measure performance of EMTs. Finally, there emerged a need for a viable continuing education program rather than a refresher of material already covered in the basic course.

Urban versus rural. One of the developments which confused the issue of urban versus rural was the National Guidelines encouragement to provide some EMTs with knowledge and advanced skills and permit them to act as physicians extenders. In a section of the National Guidelines called "Ambulance Attendants of the Future," the National Guidelines stated:

Although the levels of proficiency to be attained by the course of instruction recommended in this report are goals that can be reached in most areas of the country within a reasonable time, the greatest potential for the saving of life and the reduction of preventable disability at the scene of accidental injury or onset of life-threatening illness will not be realized until ambulance personnel are qualified to carry out measures now applied by lay assistants in emergency departments or by medical corpsmen in combat areas. They should be qualified to carry out, independently or with guidance and supervision provided by physicians through voice communication, such procedures as the giving of medication by hypodermic or intravenous routes, transfusion, decompression of tension pneumothorax, tracheal intubation, tracheotomy or cricothyroidotomy, defibrillation, mechanical external cardiac compression, and control of hemorrhage (Division of Medical Sciences, 1968, p. 18).

The emphasis on the difference between the needs of the rural and urban populations is reflected in a 1973, Journal of the American Medical Association article, "Rural communities are not merely miniaturized versions of cities and suburbs and, thus require different approaches to emergency care than are relevant to urban areas" (Waller, 1973, p. 1441). This author pointed out the major differences between urban and rural areas lay in the number of health professionals available, which also effects training of paraprofessionals. Low population density rates of rural areas effect the number of emergencies per given period. There is less financial support for the EMS resources in the

less densely populated areas in spite of the fact that there may be a larger per capita burden. Also, most services in small communities are run by volunteers (Waller, 1973, pp. 1441-1446).

In discussing advanced training for EMT-As, this same author stated, "It is apparent that the training needs for personnel in rural areas differ from those of these same personnel in more densely populated regions . . . rural needs are simple procedures, not easily forgotten. The advanced 480 hour EMT course probably is not appropriate to rural areas . . ." (Waller, 1974, p. 152).

Performance standards. The problem of determining performance standards for EMT-As has frustrated many organizations and individuals. Performance standards became an early issue because it related to liability in cases where physicians were involved.

The Division of Medical Sciences, NAS/NRC, in establishing the National Guidelines for training ambulance personnel recognized, ". . . there are no generally accepted standards of proficiency to be used by those empowered to certify ambulance personnel" (Division of Medical Sciences, 1968, p. 3). They further stated that they "recognize that the levels of proficiency to be attained by the course of instruction . . . are goals to be reached in increments . . ." (Division of Medical Sciences, 1968, p. 3). Apparently the term "proficiency" as used in the guidelines referred to the number of subjects covered in a course of instruction. The term "proficiency" did not seem to be related to a standard of performance. There was no mention of observable behavioral outcomes, indicators of correct performance, or identification of

conditions under which the behaviors are to be performed.

The only mention of performance in the literature is in the "Performance Objectives" of the 1977 revision of the NHTSA Course Guidelines. These performance objectives, however, are not written in behavioral terms. Therefore, they do not lend themselves to measurement.

Frazier and Cannon (1978) set the stage for attempting to evaluate EMTs performance with a lengthy research project completed at the Yale University School of Medicine in New Haven, Connecticut. Up to the time of their research project, which began in June of 1976, performance evaluation had been left to paper and pencil tests. Simulation testing had been attempted under a project headed by the National Registry for EMTs. Simulation testing proved to be both unreliable and expensive. Finally, the National Registry estimated performance would have to be evaluated by observing the EMT within the occupational assignment (National Registry of Emergency Medical Technicians, 1977).

In an earlier survey within the New Haven area, Frazier observed there were predictable patterns to the EMT's interventions (New Haven Health Care, Inc., & Yale Trauma Program of Yale University, 1976, p. 89). Frazier and Cannon (1978) developed a list of "mandated treatments" which reflected the manner in which the DOT 81-hour course was taught by instructors from the New Haven Health Care, Incorporated. Terminal behavior of the EMT in actual interventions was compared to the behavior of the physician who made the diagnosis in the emergency department of the hospital receiving the victim. The primary analytical instrument was a 2 x 2 matrix which measured the number of times that a case

requiring a mandated treatment was correctly/incorrectly "diagnosed" and the number of times the mandated treatment was successfully/unsuccessfully completed. Observations were made post hoc from the completed ambulance reports. One of the summary statements concluded, "Variations in diagnostic accuracy and therapeutic appropriateness may be accounted for by numerous variables, but probably not the course curriculum per se" (Frazier & Cannon, 1978, p. 38).

In a research project conducted in Arkansas, Tennessee, and Mississippi, Diggs (1976) investigated the performance of EMTs to permit modification of the training and to identify problems in malpractice for the EMTs and the physicians who support them (Diggs, 1976, p. 16).

At the University of Pennsylvania, Cayten (1978) designed a research project to improve EMT performance through the use of algorithms. It was proposed algorithms could be both a teaching and an evaluation tool (Cayten, 1978, p. 113).

One of the more elaborate attempts to determine performance measurements of EMT was conducted by the Department of Psychology, Florida State University, from the period of July 1, 1977 to June 30, 1979. The results of this project have not been published to date. However, the project director, Lee Sechrest, has presented a paper at a workshop held at the Dulles Airport in June, 1978. The paper set forth the experiences of the author in developing and testing the methodology of observing the performance of EMTs in their work environment. Sechrest's method involved the observation, by trained observers, of EMTs in their job assignment. The project, which received \$333,667 over the three

year period, was proposed in order to "cast considerable light on the characteristics of various ways of assessing EMT performance and . . . result in newly developed, psychometrically acceptable measures where possible and desirable" (Sechrest & Peterson, 1978, p. 12).

Sechrest and Peterson (1978) stated that their project would provide five significant aspects of EMT training and deployment:

1. A more detailed task analysis will be determined which will be the base of more rational training.
2. With the instruments being developed in the project a more useful and adequate method of evaluation of training can be made.
3. It will address the nature and timeliness of continuing education needs.
4. It will include procedures for monitoring units for deterioration of skills.
5. It will study the structured roles of team members and identify better ways for deployment (p. 121).

Sechrest's project was conducted in Jacksonville, Florida, for several reasons. First, the Jacksonville EMS system was considered a model of metropolitan areas. Secondly, the central administration had a deep commitment to the study. Finally, the rescue service was separate from the fire department and EMTs had their own career ladder to top rank administration positions. There are plans to repeat this study in several "mature" EMS systems (National Center for Health Services Research, 1979, p. 28). It is important to note that "mature" systems would only exist in urban centers under the EMS Systems Act because the

original EMS Systems Act money went into the more populated regions of the nation.

### Occupational Analysis

Occupational analysis is a process designed for the purpose of determining instructional units in an occupation. It is a technique used to make an inventory of operations which are essential to the occupation. The inventory is used to select and organize subject matter for the purpose of developing an effective training program.

Inherent in occupational analysis is a complete understanding of the person in the work role. The end product of the analysis process is identifiable operational elements which depict the behavior of persons as opposed to operations for production purposes. Job analysis is used for the purpose of identifying production techniques. Occupational analysis is used for the purpose of identifying human management techniques (Fryklund, 1970, pp. 1-14).

Fryklund (1970) stated that regardless of the area of work involved there are two considerations in analyzing the work. First are the elements peculiar to that work. Second, there are problems to be solved. He stated that whether ". . . there is a project, an idea, bill of goods sold, a nursing assignment, or a police assignment, standard elements are likely to be involved and there is something similar to a problem to be solved" (Fryklund, 1970, p. 7).

Preparation for work in an occupational area requires attaining skill in the elements and knowledge of problem solving techniques. The responsibility of the educational/training process is to provide

experience in handling elements and problems. In order to establish the effective educational process, the elements and problems must first be identified.

Operational elements come from an analysis of the job required of the person within the occupation. Allen (1919) thought of the job in the sense of what a person does for wages. Selvidge (1923) used the term job as meaning that which one does in order to complete a project. Fryklund's (1970) analysis of these two meanings led to his definition of operations. He lists the following eight points of an operation:

1. It occurs frequently in an occupation with considerable uniformity of content; it is relatively constant in time and geography.
2. It involves teachable content.
3. It is a distinct unit which, when completed, makes the worker feel that he has come to a good stopping place.
4. It has its greatest value when combined with other operations; alone it is usually of little value.
5. The length is such as to make suitable content for a class demonstration.
6. When it is put with other operations in combination, they produce or service something larger without gaps or overlapping between them.
7. It involves depicting, shaping, forming, or assembling.
8. It can be broken down into definite steps of procedure (Fryklund, 1970, p. 61).

Fryklund (1970) spoke primarily of "custom" work, i.e. production. Therefore, item 7 above may seem out of order in the case of a service occupation. However, Fryklund goes on to say,

Whatever the interpretation of the word job, the elements must be taught if training is intended. Many kinds of payroll jobs are not directly connected with production. Some are service and some auxiliary jobs. It is not important to classify them. The important thing to know is that if training is involved, and if the job requires considerable ability, analysis is necessary to determine what should

be taught (Fryklund, 1970, p. 62).

### Evaluation and Needs Assessment as Research

According to Borg and Gall (1979), "Evaluation research involves the systematic collection of evidence on the worth of educational programs, products, and techniques" (pp. 36-37). There are several types of evaluation research. These include: evaluating completed programs, making selections of educational material, and performing needs assessment. Evaluation research has two major purposes, formative and summative evaluation. Formative evaluation is carried out while a product is being developed. Summative evaluation is designed to consider the effectiveness of a product.

Needs assessment is a process of identifying conditions in which there may be a discrepancy which is defined as the "need" (Anderson et al., 1975, p. 254).

According to Kaufman and English (1979),

Needs assessments are tools for constructive and positive change - not change solely driven by controversy, "quick-fixes," and situational crises, but rational, logical, functional change which meets the needs of citizens, educators and learners. They represent formal, systematic attempts to determine and close the more important gaps between "what is" and "what should be" (p. 8).

Anderson, Ball, and Murphy (1975) stated that the discrepancy between what is and what should be can be measured either objectively or subjectively. In the case of subjective needs assessment, the following steps are conducted:

1. Identify goal areas important to the instructional program.

2. Select or develop measures for these goal areas.
3. Develop a rating scale for judging the degree to which present performance in the goal areas is acceptable. Goal areas could be ranked according to acceptability of performance, or the acceptability of performance in each goal area could be rated on an interval scale.
4. Obtain ratings from a group of judges and average the ratings to obtain indices of need (Kaufman & English, 1979, p. 255).

Anderson, Ball, and Murphy (1975) concluded that it is possible to have various combinations of objective and subjective assessments (Anderson et al., 1975, p. 255).

Kaufman and English (1979) stated that unless special consideration is made for the starting point of the assessment, problems and errors presently in the program will be perpetuated rather than eradicated.

As things stand now, not using an external needs assessment referent (and thus not obtaining external validity and utility criteria) means that we will just continue that which is now going on, or only find more efficient ways and means to do what it is we are already accomplishing (Kaufman & English, 1979, p. 73).

In order to utilize an external referent, Kaufman and English (1979) suggested the system approach.

A system approach model is a generic process for identifying and justifying as well as resolving problems. It commences with an external referent and proceeds from there to identifying requirements for resolution.

## CHAPTER THREE

Methodology

The problem of this study was to determine if the technical, occupational and general knowledge offered during preentry training supported the work expected of the EMT-A. The method of studying the problem evolved into three steps: 1) determining what the training provided, 2) determining what persons working in the field perceived as their job, and 3) determining what society demands of the person in that occupation.

This chapter discusses the method used to establish usable data to identify each of the three steps. The latter portion of the chapter further discusses how the data from each step were used to determine the strength of relationship between what the curriculum specifies as elements of the occupation and what the empirical records indicate the pattern of expected behavioral elements actually are.

Based upon the fact that the national curriculum for training was delineated from a relatively narrow data base, the two research questions evolved from the observation of the problem. First, the observer asked: is there a gap between the elements of the occupation covered in the curriculum and the elements of the occupation required to fulfill the job assignment? Second, the observer inquired: is there a difference of occupational elements needed, depending upon the geographical location of where those elements are to be used?

### The Research Question

Two research questions developed during the period of observation of the problem and research of the literature.

1. Is there a relationship among the curriculum delivered to EMT-A trainees (Knowledge), the attitudes expressed by EMT-As who are currently certified (Attitude), and the performance of EMT-As with regard to a sampling of behaviors expected of the EMT-A in the job assignment (Behavior)?

2. Is there a relationship among population density and type of service situation confronting the EMT-A with regard to the frequency of occurrence of certain medical service situations and certain attitudinal service conditions?

### Null Hypothesis

In the null form, two research hypotheses were stated as follows:

1. There are no significant canonical correlations among curriculum variables of time and space; attitude variables of importance, success and immediacy; and behavioral variables of Iowa and Connecticut services performed in the sampling of expected occupational elements of active EMT-As.

2. There is no association of geographic area and the type of medical and attitudinal elements service delivery.

### Description of the Variables

The variables of time, space, importance, immediacy, success, and certain variables taken from the records of victim's were defined and described through a combination of literature search of previous studies and interviews with curriculum researchers. The working descriptions were then refined by determining the most realistic description for this study.

### Variables for Research Question One

The variables for research question one are as follows: The time and space allocated to subject matter in the curriculum, the marking of importance, immediacy and success of job functions taken from a survey, and certain data extracted from the records of victim's who were treated by EMT-As in Iowa and Connecticut.

Curriculum variables (Knowledge). A content analysis of the curriculum was performed in order to organize the subject matter into two variables for later correlation with other research variables. The two curriculum subject variables became the combined variable herein called "Knowledge."

Complete course materials were studied in order to establish a subject matter listing that could be coded into occupational operational tasks. The subject matter listing is included as Appendix One. The listing of subject matter was followed by reducing elemental subject matter to a time and space rate. Course material included: course outline, instructor's lesson plans, student's study guide, primary referenced textbook, referenced audiovisual material, referenced supporting

handout material published by independent suppliers, and handout material supplied with the instructor's lesson plans which could be reproduced locally for supplemental material.

The rate for time was calculated as the amount of time, in minutes, allocated to a subject as listed in the instructor's lesson plan. Space was measured simply as the number of pages available to the student within the specified textbook, study guide, and from handouts which could be obtained or reproduced. Films and filmstrips with cassettes were counted as time elements. Overhead projection material, which could be reproduced, was counted as space.

The researcher recognized there could have been other measurements for data derived from an analysis. It is also recognized that a certain amount of time allocated for subject matter in the instructor's lesson plans does not guarantee each student was exposed to the exact content for the exact amount of time. Time and space were chosen primarily because they are: 1) observable, and 2) quantifiable. Time and space may be as reliable in differentiating teaching-learning situations as any other variables which could have been chosen.

The process for the content analysis was taught to four educators in a training session. In order to verify reliability in the content analysis, the process was then conducted in three different sessions one month apart. The results of the three examinations were then averaged in order to establish the base line from which the data was indexed. An interrater reliability was computed for the raw data among the educators. The interrater reliability was calculated at 0.998 for time and 0.988 for space. These coefficients demonstrated high agreement among

the four judges in rating content.

The survey (Attitudes). Individual EMTs were surveyed for information. They were asked about their perceptions of the importance, immediacy of need, and success attained in 42 operational elements. These 42 operational elements, when taken in total, represent the occupation. The three areas (variables), i.e., importance, success, and immediacy became a combined variable, herein called "Attitude."

#### Developing the Survey Instrument

Initially, the occupation was blocked into a flowchart form (see Appendix Two). The occupation's physical, knowledge, and attitudinal tasks were extracted from the flowchart diagram. Similar tasks were grouped together to make one item or operational element. As an example, "Recognize specific signs or symptoms," was listed as a single item rather than listing, "Recognize pallor, recognize anxiousness, recognize angulation or an extremity, and so forth." In the latter example, there could have been as many as 50 signs or symptoms which could be listed as a single elemental task. The original list of tasks contained 54 operational elements which represented the occupation.

After the operational elements were identified, biographic information and overall estimates of educational needs and satisfaction questions were added to the questionnaire.

Next, the instrument was given to a group of 17 persons who were active in this field both as EMT-As and as instructors or instructor coordinators. Using the comments from this group, the list was revised to the present 42 elements. In addition, the needs and satis-

faction questions were changed slightly to eliminate what was perceived to be biased wording. More specific information about rating items was included on the final draft. A copy of the questionnaire is presented in Appendix Three.

The 42 elements on the survey were grouped into four blocks for analyzing. The blocks were: Medical Aid with 13 elements, Transportation-Rescue with 13 elements, Admin-Management with seven elements, and Psychological-Sociological with nine elements.

#### The Surveyed Population

The test population for the survey was all active EMT-As in Iowa. A random sampling of this population was impractical to isolate. The data bank which is maintained by the Iowa State Department of Health contains the names of all persons who have been certified as EMT-As since 1971. This list contains the names of over 6,000 individuals, many of whom are not currently active EMT-As. Since 1975, active EMT-As have been required to recertify three years after completing initial training. Unfortunately, the State offices have not kept a listing of persons who have recertified. Rather than make a random mailing against the unknown 6,000, the researcher used a biased list which contained active participants who are professional association members and who live in five of the midwest states.

In order to reduce the effects of a biased sample, two experimentally accessible populations were chosen. First, the biased list of 213 persons or agencies which include active EMT-As, EMS instructors, physicians, and EMS planners was used for mailing the questionnaire.

Second, four ambulance units were chosen at random using a multistage cluster sampling technique (Borg & Gall, 1979, p. 187). An EMS region was randomly chosen, counties were then randomly selected, and finally, ambulance units within the counties were chosen. The researcher visited four units and supervised the distribution of the questionnaire.

From the mailing list of 213 questionnaires, 166 were returned of which 165 were usable. This was a 77.5% return rate. Fifty questionnaires were completed by the four ambulance unit visits. The total N for the survey, leading to the three variables called "Attitude" for this study, came to 215.

Of the respondents, 76% were EMT-As, 11% were EMT-As with Advanced ratings. Of the total, 63% classified themselves as volunteers. There were 56% within the range of one to five years experience, 4% claimed less than one year experience, 3% stated they had more than 17 years experience. According to the survey, less than 37% of the EMT-As are provided regular critique sessions with a medical department.

In order to test for sampling bias in the use of the questionnaire, a Student t was calculated. The test was between the means of the mailing list returns and the visited unit's returns in the three categories and the four blocks. This test hypothesized that two sample means do not differ beyond that expected by chance alone. The samples are assumed to be from independent populations with equal variances. The results of the test for the Variable "Importance" is shown in Table 1.

Using the t test, it was found that there was insufficient evidence to reject the null in the case of all three variables; importance, success, and immediacy as analyzed in the four occupational blocks.

Table 1  
 T Test for Mean Difference  
 Category - Importance  
 Mailing List Versus Units Visited

Block	Mailing (N=151)		Visited (N=43)		t	p.
	$\sigma$	means	$\sigma$	means		
Medical aid	7.276	87.43	6.688	87.39	0.0248	>.97
Transport & res.	7.402	70.03	6.821	71.18	0.7754	>.55
Admin.	7.423	73.51	6.861	71.39	1.424	>.15
Psy-Socio	6.668	80.92	6.417	82.97	1.398	>.16

Modification of survey use. At the time of mailing the questionnaire, it was assumed the instrument would be able to reveal three indicators useful to register a ranking of importance, indicate a priority of immediacy for the need of the knowledge or skill within the work assignment, and discriminate levels of success for the use of that skill or knowledge based upon the training received. It was planned that the three response categories would be used to look for relationships among these three indicators, for the purpose of curriculum design, as well as comparing these variables with other research variables derived from the records of victims and from the course content analysis. The initial analysis of the questionnaire data, however, indicated a suspicious relationship among the three survey variables, and especially between the rating of importance and the rating of success.

The degree of relationship between the marking for importance and success was tested across all subjects who responded to all questions in the four blocks of medical aid, transport and rescue, administration, and psycho-social elements. The results are shown in Table 2.

Table 2

Pearson Correlation Coefficients:

Importance vs Success

Block	d.f.	r	Significance
Medical aid	201	.3948	.000
Transportation-Rescue	201	.2052	.020
Administration	201	.3735	.000
Psy-social	201	.3308	.000

In the case of importance versus success, Table 2 shows a significant but low correlation. Under a systems concept of curriculum design, the means could be utilized to rank order subjects for the curriculum design improvement. If the subject topics lack relevance to the job, however, adjustment within the curriculum has little value. Since this evaluation research project was based upon Kaufman's system model, rather than the systems model, the researcher chose to look for external criteria with which to compare these responses (survey variables). The mean rating of total sampled populations marking of the 42 topics in the variables of importance, immediacy, and success became the composite of the canonical variable, labeled "Attitude." Each subvariable carried a

weight of one in the final canonical correlation analysis.

Ambulance unit's records (Behavior). A total of 838 Iowa ambulance service records, representing three different ambulance units, were analyzed. This was a post hoc analysis taken from records covering approximately two calendar years of operation. The three different units represented three rural population bases. Ambulance unit control included 1) city owned but hospital based, 2) municipally owned, and 3) individually owned and controlled. Additionally, the records represented two different type operated units; all volunteer versus paid cadre operated units.

Records of victims were analyzed in order to obtain a total of 16 factors which are summarized as follows:

1. The presence or absence of symptomatic data on record.
2. The presence or absence of treatment data. The equipment used was also recorded.
3. The category of injury or illness, including non-specified complaints.
4. The presence of the three main vital signs; blood pressure, heart rate, and respiratory rate.
5. The percent of records which were completed. Completeness was measured by the use of the data on the record, i.e., who, what, where, how, and when.
6. The victim's age.
7. Indications of alcohol abuse in the incident.
8. Indications of drug abuse in the incident.

9. Indications of abnormal behavior due to mental conditions in the incident. This category included suicide gesture.

10. Percent of incidents involving death.

11. Percent of cases when other health occupations persons were present at the site of pickup.

12. The amount of time the victim was in the custody of the ambulance crew.

13. Elapsed time and distance traveled with victim aboard the ambulance.

14. The composition of the ambulance crew including the number of members for each crew and the number of ambulance runs each crew member experienced during his/her career.

15. The classes of ambulance runs as recorded; emergency, routine, or transfer.

16. The proportion of times when rescue techniques were employed by crew members.

Detailed analyses are included in Appendix Four. These data became the composite variable "Iowa."

Rather than attempting to extract performance standard information from ambulance unit's records, which would require some type of performance indicators, frequency of occurrence was used as the measure. The index for rating this data was established as straight percentage of total records except where time, age, or distance was the criteria.

Ambulance unit's administrative and educational records were analyzed for the following information:

1. Records of major or minor accidents or incidences involving the vehicles or crew members.

2. Source of payment of the fee for the ambulance service.

3. Maintenance records of vehicles, equipment, and supplies.

4. Subject matter content, planning, and evaluation of the continuing education program for the unit.

5. Indications that social change had occurred in the community, in the two years covered by the analysis, which would cause changes in the ambulance service.

6. Mutual aid agreements and disaster control plans which existed.

Portions of the data presented by the Frazier and Cannon (1978) study were used to construct the variable "Connecticut." That study covered the records of 4,851 victims over a four and one-half month period. The victims were transported to three urban hospitals. Seven of the 16 factors used to analyze the Iowa records were also extracted from the Frazier-Cannon study. These seven factors were incorporated into the "Connecticut" variable. The seven factors were:

1. The presence or absence of symptomatic data on record.

2. The presence or absence of treatment data.

3. The category of injury or illness, including non-specified complaints.

4. The percent of records which were completed.

5. Indications of alcohol abuse in the incident.

6. Indications of drug abuse in the incident.

7. Indications of abnormal behavior, including suicide gesture,

due to mental conditions in the incident.

Detailed analysis are included in Appendix Five.

There were seven variables identified for the study of research question one. The variables time (minutes) and space (pages) represented the composite "Knowledge." The variables importance, success, and immediacy formed the composite "Attitude." Iowa and Connecticut were the two variables which represented the composite "Behavior."

#### Variables for Research Question Two

The variables for Research Question Two included the geographical locations representing a Standard Metropolitan Statistical Area (SMSA) versus rural area and the type of services rendered by EMT-As in these two different population density areas.

Population distribution. Research question number two required the comparison of certain data based on the different population density areas. One method of establishing population density variables was to use the acceptable demographic information of Standard Metropolitan Statistical Area (SMSA) versus non-SMA.

In Iowa there is an average population density of approximately 50 persons per square mile. In Iowa there are only four population centers, contained entirely within the state boundaries, which are treated as SMSA. The data from the three ambulance units which are included in this study do not represent any of the SMSAs. The population per service unit ratio of the Iowa units under study was approximately 6,300 persons per unit. Measurements made from this sample constituted the variable "Iowa" and represents rural criteria.

The area of study in Connecticut was located in New Haven and surrounding area. The population of that emergency medical service area totaled 320,836. There were 14 ambulance service companies located in the service area. The population per service unit ratio was nearly 23,000 persons per unit. The average population density was approximately 475 persons per square mile. New Haven, and its surrounding area, is treated as an SMSA. The measurements taken from this sample constitute the variable "Connecticut" and represents sampling from an urban population.

Type of service rendered. The types of services rendered were considered in two main categories; emergency medical response behaviors (not attitude affected), and situations which influenced the attitudes of EMT-As toward the persons who they were treating (attitude affected). Nine specific "not attitude affected" behaviors were isolated for comparison between the rural and urban areas. This comparison provided information as to the similarity or difference between population density areas and demands upon the routine emergency medical service skills required in the pre-hospital phase.

In addition to the nine "not attitude affected" behaviors, ten elements which are affected by personal values and can be reflected in service quality were also isolated for comparison. The elements affected by personal values and possibly reflected in service quality included the service provided the victim when the injury was accompanied by substance abuse or abnormal victim behavior, death or dying, perceived urgency, transport of the high risk infant or when obstetrical

delivery was imminent. "Not attitude affected" elements are listed in Table 7. "Attitude affected" elements are listed in Table 6.

Research Question Two has two variables, geographical location and behaviors of EMT-As. Geographical location is further divided into two categories; "Iowa" representing a rural population and "Connecticut" representing a SMSA. Behaviors of EMT-As are the various occupational elements recorded on the victim's records. The two variables are analyzed separately as "not attitude affected" and "attitude affected."

#### Units of Observation

An important step toward internal validity of this study was to define the target population across which the variables could be analyzed. The universe for this study was all occupational tasks (abstract or factual) which collectively identify the limited area of knowledge and endeavor contributable to the prehospital phase of the Emergency Medical Services System. The problem was how to draw a representative sample from a broadly defined population in order to make generalizations about the universe of occupational tasks based upon the tests of the sample. Since it was impossible to list all tasks identifiable within the occupation and select a random sample therefrom, an alternate system was devised. First, societal expectations referends were identified. Second, these referends were keyed to occupational tasks as reflected in the actual records maintained within the occupation.

Societal expectations. Five areas were searched for societal referends which could effect the prehospital phase of the emergency medical services system. The history of the development of the EMT-A occupation

provided goal areas (expectations) which emerged from the original national guidelines (Committee on Injuries, 1971). Legislation, subsequent to the occupational development, provided the expectations identifiable through law (U.S. Congress, November, 1973). Job descriptions, written at the U.S. Department of Labor, identified those areas which related to apprenticeship training expectations (Employment and Training Administration, 1978). Contemporary literature and recent research reflected performance expectations (National Center for Health Services Research, 1979). Most research, however, was based upon the medical model. Therefore, it reflected expectations primary to the medical aid block. Some recent literature touched upon the expanded role of EMT-As, within the EMS system, other than the role of paramedic or physician extender (Grant & Murray, 1978; Waller, 1973).

This study concentrated on the basic EMT-A occupational preparation. The results of the search of the literature for society's expectation produced a list of 24 expectations. These expectations are listed with their originating sources in Appendix Six.

The original societal expectations were stated in broad terms lending themselves to nominal data analysis. In order to be usable for the second step of a needs assessment, the societal expectations had to be measurable. Rather than establish performance standards and develop a quality control base for measurement, which would be far beyond the scope of this study, the societal expectations were used as the categories for the correlation of the canonical variable groups. The content subject matter (Knowledge), the survey items (Attitude), and the victim's records (Behavior) were mapped to the societal expectations. This mapping

process produced a list of 60 items, occupational elements, which represented a sampling of all "behaviors" associated with the persons working in the occupation.

It was the 60 occupational elements which comprised the units of observation for the two research questions. The canonical correlation analyses for question one are based on seven measures constructed on these 60 items. The Chi-Square analyses of question two are based upon two subsets of the isolated, but representative, occupational elements.

An example of the mapping process is provided for explanatory reasons:

1. Within the National Guidelines, the EMS System Act, and other sources, society mandates that EMT-As provide care for the accident victim (trauma victim).

2. The basic training provided cognitive material and skills practice in approximately 18 content areas which could be included in incidences of trauma.

3. The survey included approximately five items which were fundamental to trauma conditions.

4. Victim's records reflected subcategories of trauma induced conditions.

5. The single category "trauma" from the societal expectations emerged as 12 items on the final composite list.

Examples of trauma induced conditions include, but are not limited to fractures, spinal injuries, and internal injuries. These trauma listings were in contrast to, but not limited to, medical problems such

as stroke, heart attack, and burns.

The composite listing of the 60 items, occupational elements, which constituted the sampling of all behaviors expected of EMT-As while on the job is listed in Appendix Seven. The list of units of observation in Appendix Seven are listed showing which societal expectation they are mapped to and the units of measure for each of the seven variables; Minutes of Instruction, Pages of Instruction, Iowa Records, Connecticut Records, Importance, Success, and Immediacy.

#### Data Analysis

Research Question One. A canonical correlation was used in this research project to determine the product-moment correlations between two composite variables (sets). In canonical statistics, both multiple criteria and multiple predictors may be involved. In addition, computationally, it makes no difference which set of variables are considered to be the criteria or predictor set (left and right hand sets) (Cooley & Lohnes, 1962, pp. 35-36). Finally, it is possible to find more than one set of left and right hand coefficients which maximizes the relationship between the two sets even under the constraints that the different composite variables (within the sets) are uncorrelated (Miller, 1979, p. 79).

Calculation involved three matrices: 1) There is the intercorrelation among left hand variables, 2) the intercorrelation among the right hand variables, and 3) the intercorrelation among the left and right sets of variables. The three matrices are depicted as subsets of the larger matrix which includes all the variables. These matrices are

shown in Figure 1.

1	2 . . . i . . 1	1 + 1 . . . j . k
2	$R_{LL}$	$R_{LR}$
.		
i		
.		
1	<hr/>	
1 + 1	$R_{RL}$	$R_{RR}$
.		
j		
.		
k		

Figure 1. The Intercorrelation Matrices.

Interpretation was made from a simple product-moment  $r_{C_L, C_R}$  :

$$\text{where } C_L = \sum_{i=1}^1 B_i X_i \quad \text{and} \quad C_R = \sum_{j=1}^k B_j X_j \quad \text{and} \quad R_{LR} = R_{RL}$$

The root obtained from the analysis of these matrices is the squared canonical correlation coefficient corresponding to a set of coefficients. This root value, also known as the eigenvalue, represents the amount of variance in one canonical variate that is accounted for by the other canonical variate.

Tests for the canonical correlations were made using the chi-squared test calculated as follows:

$$\chi^2 = -[N - .5(m + n + 1)] \log_e L_1$$

where:

$N$  is the number of sampled behaviors

$m$  is the number of left hand variables

$n$  is the number of right hand variables

$L$  is the product of  $(1 - \lambda_1)(1 - \lambda_{(i+1)}) \dots (1 - \lambda_k)$

where  $\lambda$  is the  $i$ th root among the  $k$  roots.  $L$  is known as lambda as defined by Bartlett (Cooley & Lohnes, 1962, p. 37).

The degrees of freedom for the chi-square statistic was  $(m - s) \times (n - s)$  where  $s$  is one less than  $i$ , the sequence number of the root being tested.

Lambda is a measure of the percentage of improvement for prediction remaining in the relations once the maximization has been made. The higher Lambda, the less prediction remains.

Research Question Two. The units of observation for the analysis of question two were subsets of those units used for question one. In this case however, they were further delineated into two categories. The first, which constitutes those found listed in Table 6, were occupational elements whose variance may be subject to the personal values of the person who performs the elemental task. Second, Table 7 lists medical aid occupational elements which were empirically accounted for by the records completed by EMT-As working at their job. Each of the elements representing the two categories were performed by EMT-As in the two qualitative locations of Iowa and Connecticut. The test of the question, then, required a test for independence of frequency of occurrence of an occupational element to the geographical location. The chi-square statistic was used for that comparison.

If the two classifications, Connecticut and Iowa, were independent of Value Affects and Cognitive Affects, it implies that the type of medical aid service and the attitude toward value laden situations would not systematically vary from location to location.

The data were tabulated into two chi-square tables. For analysis purposes, the behaviors, occupational elements, were classified as a subpopulation of factors representing the population of behaviors required in the job assignment. Each occupational element was represented by a number of observed responses in each of the locations of Iowa and Connecticut. Figure 2 shows the form of the contingency table.

Not Affected/ Affected	Locations	
	Iowa	Conn.
Behaviors		
1	n	n
2	n	n
.	.	.
.	.	.
s	n	n

Figure 2. Contingency Chi-Square Model.

In this analysis, the researcher was interested in the way in which the rural/urban classification influenced the occupational response.

## CHAPTER FOUR

Results

The problem of this study was to determine whether the technical, occupational, and general knowledge provided the student during pre-entry training fulfilled the requirements in the occupation as indicated by societies demands upon the occupation. In order to address the problem, the following areas were investigated. The study had to determine what were the training outputs; what constituted importance, immediacy of need, and success for occupation elements trained EMT-As perceive as being within their role; and what behaviors society expected of EMT-As in their role.

Data Sources

The data sources to determine training outputs, perceived attitudes, and occupational behaviors were mixed. Major sources of data were the current curriculum for basic training adopted by the Iowa State Department of Health, a survey of opinions by active EMT-As, and records completed by EMT-As concerning their treatment and responses to victims needs.

Training outputs. A content analysis of the current curriculum published by the Iowa State Department of Health for the purpose of training basic EMT-As produced two items of data; time and space. Time represented the amount of time, in minutes, allocated to a subject area as delineated in the Instructor's Outline. Space represented the bulk of material, in pages by subject, available to the student for use in

preparing for job entry.

The data time and space were combined in the composite variable identified as "Knowledge." See Appendix One.

Perceived ranking of opinions about occupational elements. A 42 item survey completed by 215 active EMT-As located in five states provided three items of data; importance, immediacy, and success. Importance was indicated on a Likert type scale ranging from 0 to 99. The scale was designed to reflect the individual's perception of the need for specified knowledge, attitude or skill. Immediacy indicated the EMT-As perception of his/her urgency, within the job assignment, as to when the use of the knowledge, attitude or skill was required. Immediacy was recorded from 1 (on first call) through 5 (after 1 year). Success was indicated as the EMT-As perception of how well the respondent was able to function in the knowledge, attitude, or skill while in the job assignment. Recording choices for success was from 1 (Not applicable - Not successful) through 5 (Very successful). See Appendix Three.

Importance, Immediacy, and Success were combined to form the composite variable called "Attitude."

Societal demands. Analysis of 838 Iowa and 4,851 Connecticut victim's records, written by EMT-As, provided frequency counts on determinant factors which identified knowledge, attitude, or skill required of persons who act in the EMT-A job capacity. Frequency of occurrence was coded for each of the service areas, Iowa and Connecticut. These two data became the composite variable entitled "Behavior." See Appendices Four and Five.

Variables mapped to the population of occupational behaviors. The search of the literature produced 24 broad guidelines which were delineated by five main sources which identified society's intentions about the occupation within which the EMT-A works. The five sources were; the original guidelines set up by the National Science Foundation from which the occupation was born, the Emergency Medical Services System Act of 1973, the job description for apprenticeship written by the U. S. Department of Labor in 1978, contemporary research funded by the National Center for Health Services Research, and recent literature and periodical material which describe on-going alterations within the occupation. See Appendix Six.

The 24 broad guidelines were partitioned into specific elements that could be identified by behaviors which are performed by persons in the work assignment. The 24 broad areas were further partitioned into 60 occupational elements which could be counted among the population of behaviors performed by persons in the job assignment. The 60 behavioral factors represent a sample of the total population of behaviors performed by persons in the field, mandated by law, or otherwise dictated by societal demands upon the occupation within which the EMT-A works. The 60 behaviors became the research sample on which each of the variables were coded. See Appendix Seven.

#### Analysis of Research Question One

Research question one looked for the strength of the relationship among the curriculum variables of time and space (Knowledge), the variables of perceived importance, immediacy and success (Attitudes), and

the variables of job performances (Behaviors).

The strength of the relationship was calculated by canonical correlation methods. The means and standard deviations of the seven scales (variables) for Question One are given in Table Three and the significant intercorrelations are given in Table Four.

Table 3  
Question One Variables:  
Means and Standard Deviations  
(N = 60)

Variable	Means	S.D.
Knowledge		
Minutes	51.75	89.297
Space	4.648	4.684
Attitude		
Importance	84.823	8.073
Immediacy	1.979	0.387
Success	3.843	0.304
Behavior		
Iowa	19.346	30.299
Connecticut	18.586	31.848

Table 4  
 Correlation Matrices for Group Variates  
 Shown as Sub-Matrices of the  
 Intercorrelation Among All Variables  
 (N = 60)

	Min.	Page	Iowa	Conn.	Impt.	Immed. <sup>a</sup>	Success
Minutes	1	.642	-.096	-.081	.194	.148	.185
<b>KNOWLEDGE</b>							
Pages		1	-.148	-.105	.272	.241	.291
Iowa			1	.961	-.568	-.436	-.484
<b>BEHAVIOR</b>							
Connecticut				1	-.550	-.397	-.454
Importance					1	.740	.925
<b>ATTITUDE</b>							
Immediacy						1	.824
Success							1

<sup>a</sup>The signs of Immediacy were changed.

The canonical correlation analysis was computed using the five variables in the two group variates Behavior and Attitude as the left hand set of variables and the two Knowledge variables as the right hand set. Results of canonical correlation of five Behavior and Attitudinal variables with two Knowledge variables were nonsignificant at the .05 level.

This analysis indicates there is no significant relationship among the combined domains of Behavior and Attitude and the domain of Knowledge.

The test of the hypothesis for research question one was as follows:

1. Null hypothesis: There is no correlation among the curriculum (Knowledge), the EMT-A's perception of role needs (Attitude), and the occupational elements performed on the job (Behaviors).

2. Decision rule:  $\alpha = .05$ ,  $\alpha/2 = .025$

$n = 60$

d.f. = 10

Tabulated  $\chi^2 = 18.307$

3. Test Statistic:  $.05\chi^2_{10} = 6.418$

4. Decision: Since the calculated  $\chi^2$  is less than the tabulated  $\chi^2$ , there is insufficient evidence to reject the null hypothesis.

A similar analysis was computed using only the variables representing the group Behaviors against Knowledge, then again, using Attitude against Knowledge. The results of these computations were similar to the combined domains of Behavior and Attitude against Knowledge. Both of these calculations indicated little strength in the relationship of curriculum to job tasks or to the perceived role of the EMT-A.

Finally, a canonical correlation was computed to determine the strength of relationship between Behavior and Attitude. The results of that computation are shown in Table 5. In this case, the  $R_c$ 's were 0.589 and 0.14 and Chi-square was 25.456 with 6 degrees of freedom.

This Chi-square value has a chance probability of less than 0.01.

Lambda was 0.64.

Table 5  
Canonical Correlation of Behavior vs Attitude

Attitude	$\beta$	Behavior	$\beta$
Importance	1.729	Iowa	.987
Immediacy	.348	Connecticut	.16
Success	.959		

$R_C = .589$ ,  $\chi^2 = 25.456$ , d.f. = 6, Lambda = .64,  $p < .01$

From the calculation of Behavior versus Attitude it was predicted that about 35% of the variance of one composite is contained in the other. The test of  $\chi^2 = 25.456$  calculated, against a tabulated  $\chi^2$  of 12.592 for 6 d.f. indicated that there is a significant relationship between the three attitudes that the EMT-A perceived as important, his/her determined priority for need, and the perception of success in handling occupational elements, to what the empirical records indicate EMT-As are doing while in the job assignment.

#### Analysis of Research Question Two

Analysis of research Question Two was a matter of analyzing two cross-classification data sets. The researcher chose, as a method for comparison, the tests for independence of the qualitative variable "geographical location" and the variables "not attitude affected" and

"attitude affected" occupational elements. The tests for independence were made using the Chi-square statistic. Tables 6 and 7 are contingency tables showing the observed frequency and theoretical frequency in each cell of the table.

The test of the hypothesis for each of these cross-classification groups follow this format:

1. Null Hypothesis: The factors (either behaviors influenced by values (Table 6), or emergency medical behaviors (Table 7)) and the conditions of the response (whether in rural Iowa or SMSA Connecticut) are independent.

2. The design criteria: Alpha = .05

d.f. = (r-1) (c-1)

Table 6, d.f. = 9                      Tabulated  $\chi^2$  = 16.919

Table 7, d.f. = 8                      Tabulated  $\chi^2$  = 18.307

3. The test statistic:  $\chi^2 = \sum (O - E)^2 / E$

Calculated: Table 6,  $\chi^2 = 249$  ; Table 7,  $\chi^2 = 154$

4. Decisions: Table 6, reject the null; Table 7, reject the null.

The results of the tests for Question Two indicates that a sampling of the frequency of the use of occupational elements taken from those in the urban area of Connecticut, and when compared to the frequency of use of elements taken from those in rural Iowa, vary sufficiently to conclude that they may be considered dependent upon the geographical area.

Table 6  
 Frequency of Victim's Records Which Could Have Been  
 Affected by EMT-As Attitude

Elements	Category		
	Iowa	Connecticut	Total
1. Complaint listed (Theoretical)	606 (473)	2233 (2366)	2839
2. Records complete	699 (807)	4150 (4042)	4849
3. Trauma cases	234 (243)	1227 (1217)	1461
4. Medical cases	273 (333)	1730 (1670)	2103
5. No observed injury	232 (122)	503 (613)	735
6. O.B. delivery imminent or spontaneous abortion	6 (4)	20 (22)	26
7. Suicide gesture	3 (3)	18 (18)	21
8. Alcohol related	24 (56)	313 (281)	337
9. Drug related	5 (20)	117 (102)	122
10. Mental illness related	4 (23)	133 (114)	137
Totals	2086	10444	12530

Chi-square = 249, d.f. = 9, p < 0.000

Table 7

Frequency of Emergency Medical Treatments on Victim's Records  
(Not Attitude Affected)

Elements	Category		Total
	Iowa	Connecticut	
1. Fractures upper ext. (Theoretical)	20 (26)	107 (101)	127
2. Fractures lower ext.	41 (40)	154 (155)	195
3. Spine injuries	54 (16)	27 (65)	81
4. Fractured hip	34 (17)	49 (66)	83
5. Cardiac arrest	25 (21)	77 (81)	102
6. Cardiac nonarrest	67 (63)	243 (247)	310
7. Burns	4 (6)	27 (25)	31
8. Acute airway distress	131 (186)	783 (728)	914
9. Stroke	26 (27)	106 (105)	132
Totals	402	1573	1975

Chi-square = 154, d.f. = 8,  $p < 0.000$

## CHAPTER FIVE

Conclusions and Recommendations

This chapter presents three general areas in the discussion of conclusions and recommendations. The first areas presented are the methods required by the study for the purpose of completing an occupational analysis and relating it to the field of Industrial - Vocational-Technical Education. The second areas presented are the general findings of this study as related to the occupation under study, i.e., the Pre-hospital Phase of the Emergency Medical Services System. Finally, a discussion of recommendations for research both in the methodology of this model and in the needs of knowledge, skill, and attitudes for persons who are now, or soon will be Emergency Medical Technicians - Ambulance is presented.

Methodology

Evaluation research provides a vehicle to enhance the educational phenomenon. The research is initiated through the presentation of a hypothesis rather than being based upon determining the immediate worth or value of some portion of the educational process. Evaluation research provides the methods to define widely applicable principles that help explain the relationship among variables.

This study developed a unique evaluation research method for determining the relationship among the occupational training outputs, the opinions of active workers in the field, and quantitative evidence taken from the records of the occupation. This method of systemic col-

lection of data from three sources was helpful in several ways. It provided an alternative model for evaluative research. It provided concrete data as a basis for changes in the initial training or continuing education curriculum for the occupation under study. If initiated, these changes could prepare persons entering the occupation more effectively. This type of evaluation research also provided an outline of subject areas upon which a responsive continuing education plan could be built.

The strength of this study lies in the measurement methodology. Rather than returning to the original curriculum model and looking for relationships between training outputs and performance standards, the systems approach or traditional approach (Branson, 1975), this study utilizes the system approach (Kaufman & English, 1979) and determined the influence upon the occupation from the outside environment. In this case, the outside environment included the needs of the consumer (victim) of the systems output. This system approach provided a method to include opinions about knowledge, skills, and attitudes from the workers as well as societal expectations of the workers.

This summative evaluation research technique is responsive to the needs of the potential consumer of the pre-hospital phase of the Emergency Medical Services System and could have ramifications for any service oriented occupation. The summative evaluation research technique identified specific needs that should have been considered by those decision makers at the state and local level who have the authority to change training requirements for EMT-As. The results of this

study should have an impact on the persons who determine the continuing education requirements for active Emergency Medical Technicians-Ambulance.

The methodology of this study should be considered by the National Center for Health Sciences Research, the agency that has primary responsibility for research in this field. A model for alternative methods of research, beyond the typical Diagnosis - Treatment - Training - Performance model, is provided by this study.

#### Implications of the Findings

This study found no significant relationship between the elements of time and space allocated to subject matter in the basic training and the actual requirements of knowledge, skill and attitudes required of persons on the job in the pre-hospital phase of the Emergency Medical Services System. The lack of relationship raises serious doubt as to the validity of the training process which has been accepted nation wide.

Referring to Table 4, the coefficients of correlation between the training outputs and the actual occupational elements used on the job are not significant, but nevertheless are negative in direction. That is, the job calls for knowledge, skill and attitudes inversely proportional to those presented in the basic training.

It is recognized that the variable "Knowledge" is primarily a reflection of time and space allocated to learning and the variable "Behavior" is a reflection of the frequency of use of subject matter on the job. It can be argued that these are not true measures of the

needs of learning because they do not account for such things as the difficulty of subject matter and the significance of the resultant outcome of the practice of the skill or knowledge. As an example, it could be argued that even though the basic training allocates 540 minutes to training in Basic Life Support and an EMT-A may use it only once in a year, or even in a career, the resultant outcome of Basic Life Support supports its value in the basic training course. This study does not address the value or worth of subject matter presented in the curriculum.

The results of this study imply that certain subjects are included in the basic course which do not appear on the records of the activity of EMT-As in the field. For example, the subject of Emergency Child Birth is a major subject in the basic course curriculum but in the 5,419 records reviewed, there was not a single case of an EMT-A helping with the delivery of an infant under emergency conditions. A close look at the records indicate, however, that the supplementary subject matter of Transportation of the High Risk Infant and Spontaneous Abortion are not adequately covered. Similar conditions exist in other areas of job task needs. These areas generally are included in the two broad areas of "Crisis Intervention" and "Human Resources."

Crisis intervention include subjects such as Death and Dying, Battered Child/Women, Exigency Management, and others. Human resources subjects needed by the EMT-A on the job include; Value Clarification, Team Building, Human Resource Management, Role Identity, Health Care Systems, and others.

The analysis of the content of the curriculum, as compared to the records of the occupation, illustrated the strong influence of the medical model which is one of pathological diagnosis and treatment. The curriculum contains very little in the psychological-sociological occupational elements that appear in the analyses of records of the occupation.

The presence of the medical model implies that the basic course for EMT-As teaches what the physicians believe to be important, but all of the actual demands for knowledge, attitude and skill from the job are not included on the physicians' list.

The results of the study further imply, as do other contemporary research projects, that there is a significant difference between the knowledge, attitude and skills needed in various locations and situations. This difference indicates that one model for the basic curriculum does not necessarily fit all needs.

#### Recommendations

From the standpoint of training, as opposed to education, the curriculum for EMT-As should reflect valid subject matter and a realistic allocation of emphasis. These items can best be judged on the basis of empirical information obtained from experienced persons in the job assignment and from existing records of the work performed.

It is recommended, therefore, that additional research explore the model of evaluation research outlined in this study. That model included; 1) training outputs, 2) opinions of persons working in the field, and 3) observations obtained from records that reflect the work

performed by the worker.

It is recommended that the National Center for Health Sciences Research provide leadership in considering the use of this type research model as an alternative model. It is recommended the NCHSR fund a project which would explore a system approach to training needs assessment rather than continue to fund a search for performance standards which are based upon hypothetical conditions and can only exist in a medical model.

Finally, it is recommended that state and local officials who have the authority to change the requisite training, both basic training and continuing education, for EMT-As provide a curriculum which is based upon need as shown in records and determined by active EMT-A input.

#### Summary

This study provided a method of determining the needs of training by comparing the opinions of persons working on the job and the quantitative evidence of what records indicate the worker is doing on the job. In the case of EMT-As, the statistical conclusion indicated that less than one-half the requirements of the job are met by training.

This study diverged from the usual attempt to measure performance standards based upon the application of knowledge, skills, and attitudes derived from the embryonic training model. The occupation of the EMT-A today, was conceived in the 1960s using the medical model of diagnoses and treatment. That model is based upon human body systems and patho-physiological processes. The medical model teaches medical diagnosis and medical treatment, not emergency assessment and exigency

management. The medical model for EMT-As ignores interpersonal contacts and the complications caused by the emotions and values of both the EMT-A and the victim. The medical model for EMT-As denies death as a factor in decision making. The medical model for EMT-As assumed a homogeneous population of victims and/or Emergency Personnel regardless of geographical location.

The demands upon the occupation by society, however, go beyond the limits of that original medical model. Paradoxically, the records indicated that greater interpersonal skills are needed, as well as the technical skills, in order to provide the type of service wanted by victims entering the Emergency Medical Service System. These sociological, psychological, and philosophical needs are disparingly lacking from both the present basic training provided the entering EMT-A, and the continuing education offerings for the EMT-A.

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## APPENDIX ONE.

## CONTENT ANALYSIS - SUBJECT BY TIME AND SPACE

Subject	Time	Space
EMT Role and Responsibility	30	6
Medico-legal	60	6
Attitudes and Conduct	20	1
Vehicles, Equip. & Supplies	25	1
Skeletal System	35	7
Body Cavities	30	3
Muscular System	30	3
Nervous System	40	4.5
Respiratory System	60	5
Circulatory System	30	5
Digestive System	40	5.3
Genitourinary System	30	3.2
Mechanics of Breathing	20	2
Laryngectomees	30	2
General Care of Airways	15	1
Obstructed Airway	130	5.5
Airway of Chest Injuries	30	1
Mechanical Aids to Breathing	70	8
Oxygen Equipment	50	9.5
Mechanics of Circulation	60	4
General BLS Information	85	5.2

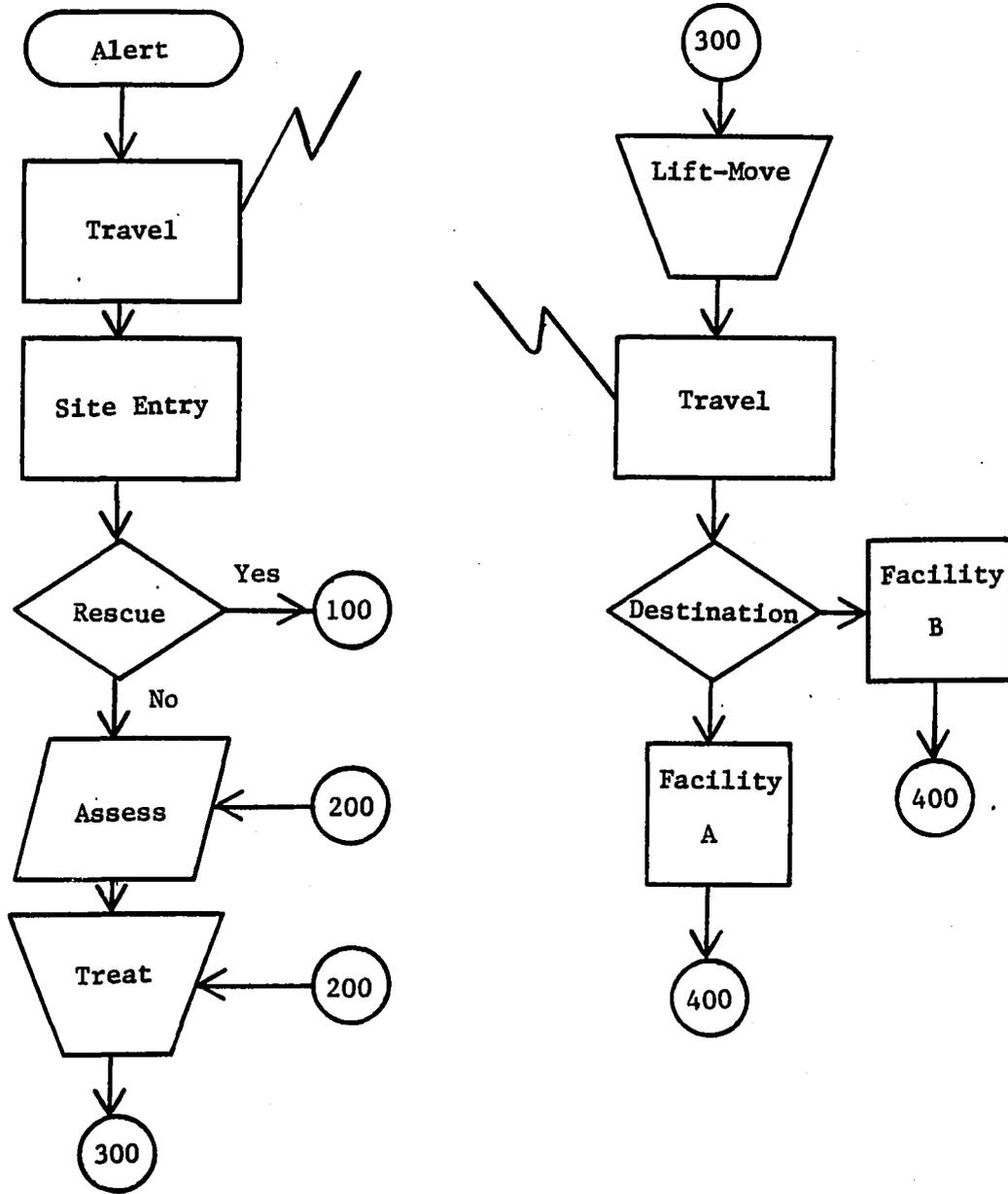
Basic Life Support (BLS)	540	19
Mechanics of Circulation (BLS)	45	3
External Bleeding	30	6
Internal Bleeding	20	1.8
Shock	60	12
O.B. Physiology	30	2
O.B. Considerations	40	5.5
Delivery	110	9.8
Children Patients	15	7
Patient Examination	175	8
Type of Injuries	10	1
Classification of Wounds	10	1
General Care of Wounds	20	2
Dressing and Bandaging	110	3
Musculo-Skeletal Systems	15	1
Concepts of Fractures	15	5
General Care of Fractures	15	6
Fracture - Upper Extremities	100	7
Fracture - Lower Extremities	145	6
Nervous System	20	1
Fracture of Neck and Spine	65	6
Skull and Brain Injuries	40	7.5
Injuries to Pelvis	50	0.6
Head, Face, Throat Injuries	40	2.3
Eye Injuries	30	5

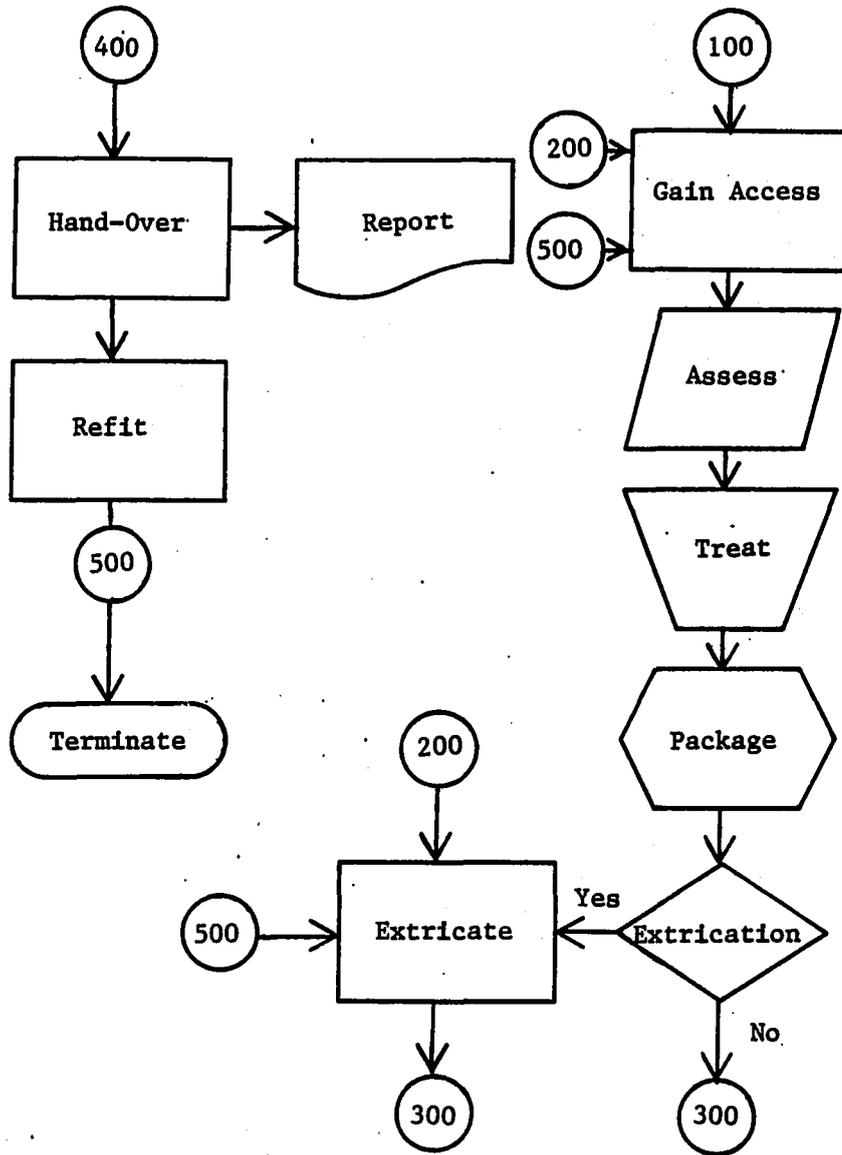
Chest and Back Injuries	40	8
Abdominal Injuries	55	4
Genitalia Injuries	10	3.5
Poisoning	25	12
Bites and Stings	20	6.5
Stroke	20	2
Dyspnea	20	3
Diabetes	40	3
Acute Abdomen	15	3
Communicable Disease	15	2
Abnormal Behavior	40	5
Seizures	10	1.5
Unconsciousness	30	10
Lifting and Moving (General)	15	1.5
Stretchers	30	3
One Person Carries	10	1.5
Two Person Lifts	15	2
Long and Short Boards	30	1
Burns	70	5.5
Heat Exposure	20	2
Cold Exposure	15	7
Drowning	15	4
Explosion	10	1
Extrication Basics	30	1
Extrication from Autos	165	12

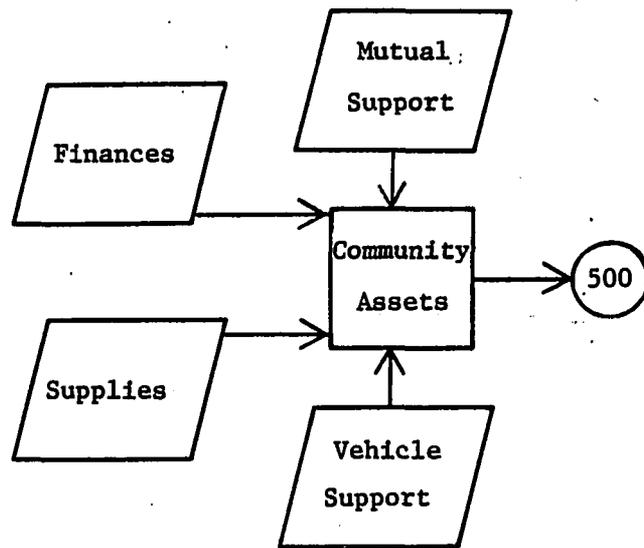
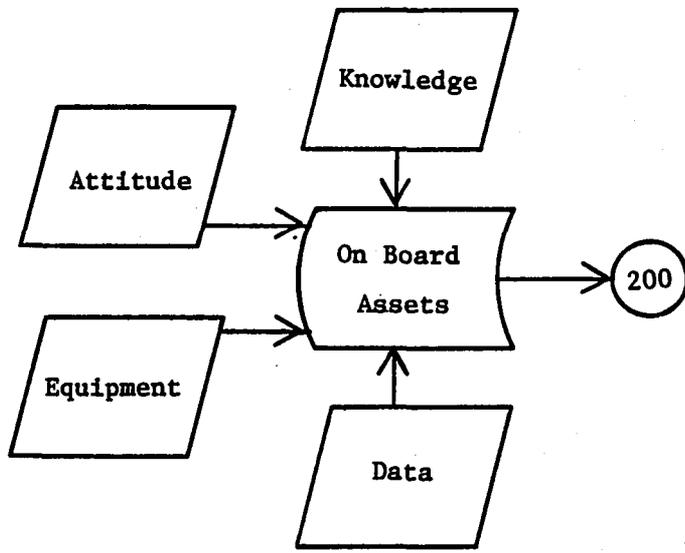
Radio Communications	135	4
Ambulance Communications	20	7
Driving an Emergency Vehicle	50	6
Vehicle Maintenance	20	3
Records and Reports	45	2
Phases of an Ambulance Call	35	1

APPENDIX TWO.

OCCUPATIONAL FLOWCHART







**APPENDIX THREE. QUESTIONNAIRE**

EMERGENCY MEDICAL TECHNICIAN-AMBULANCE  
OCCUPATIONAL QUESTIONNAIRE

Part I: Biographical Information

1. What is your relationship with the prehospital phase of emergency medical services (EMS)?

- |  |  |
|--|--|
| <input type="checkbox"/> EMT-A                 | <input type="checkbox"/> Physician       |
| <input type="checkbox"/> EMT Advanced standing | <input type="checkbox"/> EMS Planner     |
| <input type="checkbox"/> EMS instructor        | <input type="checkbox"/> Other (specify) |

2. How do you consider your relationship with EMS?  
 as a career person  
 as a volunteer (volunteers may receive pay for service)

3. What is the size of your ambulance service area?

- greater than 50,000 population  
 greater than 10,000 but less than 50,000  
 greater than 2,500 but less than 10,000  
 less than 2,500  
 not applicable

4. Do you receive regular critique sessions from a hospital emergency department?

- yes  
 no

5. How many years experience have you had in EMS?

- |  |  |
|--|--|
| <input type="checkbox"/> less than 1 year      | <input type="checkbox"/> between 9 and 11 years  |
| <input type="checkbox"/> between 1 and 3 years | <input type="checkbox"/> between 11 and 13 years |
| <input type="checkbox"/> between 3 and 5 years | <input type="checkbox"/> between 13 and 15 years |
| <input type="checkbox"/> between 5 and 7 years | <input type="checkbox"/> between 15 and 17 years |
| <input type="checkbox"/> between 7 and 9 years | <input type="checkbox"/> more than 17 years      |

Part II: Topic Selection Scales

Directions: The following topics are things which an EMT-A (basic) must know or do in the job assignment. These topics have been identified through an occupational analysis process and are categorized in order to shorten the list. Please make three responses per topic:

1. The first rating scale is IMPORTANCE. Enter a number between 0 and 99 to indicate the amount of importance you attach to each topic. The higher the number the greater the importance.

EXAMPLE:

	0 to 99 Importance
3. Know traffic ordinances and regulations.	45
35. Report verbally about observations and treatments made.	60

2. The second rating scale is IMMEDIACY. This rating scale deals with "how soon" the topic was used by you after becoming associated with the EMS system.

3. The third rating scale is SUCCESS OF IMPLEMENTATION. This rating scale deals with how successful you have been in using this topic. Circle your best estimate.

EXAMPLE:

	On 1st call	In 1st month	In 6 months	In 1 year	After 1 year	Not applicable	Not successful	Somewhat	Successful	Very successful
	1	2	3	4	5	1	2	3	4	5
3. Know traffic ordinances and regulations.	1	2	3	4	5	1	2	3	4	5

## DIRECTIONS:

- 1) READ ONE TOPIC AT A TIME.
- 2) BASED UPON YOUR EXPERIENCE PLACE A NUMBER IN THE FIRST COLUMN AND CIRCLE A NUMBER IN THE NEXT TWO COLUMNS.

	0 to 99	On 1st call	In 1st month	In 6 months	In 1 year	After 1 year	Not applicable	Not successful	Somewhat successful	Successful	Very successful
		1	2	3	4	5	1	2	3	4	5
	Importance	Immediacy					Success				
1. Drive and park an ambulance efficiently and safely.		1	2	3	4	5	1	2	3	4	5
2. Know addresses, locations and geographical area.		1	2	3	4	5	1	2	3	4	5
3. Know traffic and weather conditions for your area of operations.		1	2	3	4	5	1	2	3	4	5
4. Know traffic ordinances and regulations.		1	2	3	4	5	1	2	3	4	5
5. Know radio language and operations.		1	2	3	4	5	1	2	3	4	5
6. Know the availability of additional assistance (police, fire fighters, wrecker, coroner, etc.).		1	2	3	4	5	1	2	3	4	5
7. Know construction and hazards of autos, farm and heavy machinery, and special enclosures (silos, septic systems, chemical storage, etc.).		1	2	3	4	5	1	2	3	4	5
8. Gain entrance to houses, public, industrial, and special buildings.		1	2	3	4	5	1	2	3	4	5
9. Know types of light and medium industry in service area and know types of hazards with each.		1	2	3	4	5	1	2	3	4	5
10. Perform light rescue operations.		1	2	3	4	5	1	2	3	4	5
11. Perform hazard control operations (electric turn off, chemical spills, gasoline spill, etc.).		1	2	3	4	5	1	2	3	4	5
12. Solicit information about accident or illness from scene, observe, and inquire from bystander.		1	2	3	4	5	1	2	3	4	5
13. Speak to patient or victim (ask questions, provide reassurance, etc.).		1	2	3	4	5	1	2	3	4	5
14. Touch patient or victim (palpate, take readings, apply dressings, etc.).		1	2	3	4	5	1	2	3	4	5
15. Know life threatening vs. nonlife threatening symptoms.		1	2	3	4	5	1	2	3	4	5
16. Recognize, measure and record general diagnostic signs (BP, pulse, respirations, etc.).		1	2	3	4	5	1	2	3	4	5
17. Recognize and record specific signs or symptoms (approximately 50: i.e. local pain, heaviness in chest, anxiousness, etc.).		1	2	3	4	5	1	2	3	4	5
18. Interpret change in symptoms, as in conditions leading to shock.		1	2	3	4	5	1	2	3	4	5
19. Know types of trauma induced injuries.		1	2	3	4	5	1	2	3	4	5
20. Know types of medical emergencies.		1	2	3	4	5	1	2	3	4	5
21. Select and use aid devices (approximately 35: O <sub>2</sub> , bag mask, splints, dressing, etc.).		1	2	3	4	5	1	2	3	4	5
22. Perform CPR		1	2	3	4	5	1	2	3	4	5
23. Know and detect the effects of stress on patients.		1	2	3	4	5	1	2	3	4	5
24. Recognize the effects of stress on family members, friends or bystanders.		1	2	3	4	5	1	2	3	4	5

	0 to 99 Importance	On 1st call	In 1st month	In 6 months	In 1 year	After 1 year	Not applicable	Not successful	Somewhat successful	Successful	Very successful
		1	2	3	4	5	1	2	3	4	5
		Immediacy					Success				
25. Know how to reduce the effects of stress on yourself.		1	2	3	4	5	1	2	3	4	5
26. Know the difference between treating children and adults.		1	2	3	4	5	1	2	3	4	5
27. Control patients displaying abnormal behavior (drug, alcohol, mental).		1	2	3	4	5	1	2	3	4	5
28. Detect injuries to central nervous system, spine, head and neck.		1	2	3	4	5	1	2	3	4	5
29. Select and apply appropriate packaging aid (back board, scoop stretcher, etc.).		1	2	3	4	5	1	2	3	4	5
30. Effectively and safely lift and move patients or victims.		1	2	3	4	5	1	2	3	4	5
31. Know regulations concerning handling deceased or conditions indicating felonious acts.		1	2	3	4	5	1	2	3	4	5
32. Collect items from scene of injury or illness (personal effects, medalert, medication, etc.).		1	2	3	4	5	1	2	3	4	5
33. Assist with childbirth under emergency conditions.		1	2	3	4	5	1	2	3	4	5
34. Know types, time and distances to, and locations of various emergency facilities.		1	2	3	4	5	1	2	3	4	5
35. Report verbally about observations or treatments made.		1	2	3	4	5	1	2	3	4	5
36. Make written reports about observations and treatments made.		1	2	3	4	5	1	2	3	4	5
37. Work as a team member (crew member, emergency department, etc.).		1	2	3	4	5	1	2	3	4	5
38. Replace and maintain medical and unit supplies and equipment.		1	2	3	4	5	1	2	3	4	5
39. Maintain automotive vehicles used as unit transporter.		1	2	3	4	5	1	2	3	4	5
40. Manage and administer ambulance service accounting and financing (reimbursement sources, Medicaid, Medicare, etc.).		1	2	3	4	5	1	2	3	4	5
41. Plan for the maintenance of skills and attainment of new information concerning job performance.		1	2	3	4	5	1	2	3	4	5
42. Evaluate the effectiveness of the service being provided; evaluate cost effectiveness; evaluate service areas needs for additional or changing service requirements.		1	2	3	4	5	1	2	3	4	5



## APPENDIX FOUR.

## RECORD ANALYSIS OF THREE IOWA AMBULANCE SERVICES

Item	Unit "A"	Unit "B"	Unit "C"
	N/%	N/%	N/%
<b>Total number victim records</b>			
reviewed	166	532	140
Period covered by records	24 months	29 months	20 months
Population of area served	2500	6000	2500
Hospital in community	no	yes	yes
Type ownership	Individual	Municipal	Hospital
Type operation	Volunteer	Volunteer	Career Cadre
Fees not paid	27/16.27	271/50.94	17/12.14
Title IXX	71/42.77	196/36.84	63/45.00
<b>Victim's age categories</b>			
0 - 1 years	2/1.20	4/0.75	3/2.14
1 - 10	0/0	3/0.56	2/1.43
10 - 20	26/15.66	86/16.17	27/19.29
20 - 60	41/24.70	97/18.23	29/20.71
60 - 70	35/21.08	76/14.29	36/25.71
70 - 80	21/12.65	111/20.86	21/15.0
80 - 90	14/8.43	108/20.30	3/2.14
90 +	1/0.6	12/2.25	0/0

## Condition of response

Emergency	120/72.29	351/65.97	93/66.43
Nonemergency	46/27.71	181/34.03	47/33.57
Rescue operations performed	12/7.23	41/7.71	11/7.86
Symptomatic data listed	112/67.47	415/78.01	113/80.71
Treatment data listed	123/74.09	399/75.00	110/78.57

## Category of injury or illness

Trauma (Total)	57/34.34	117/21.99	39/27.86
Fracture - upper			
extremity	4/2.41	13/2.44	3/2.14
Fracture - lower			
extremity (not hip)	8/4.82	26/4.87	7/5.0
Spine	9/5.42	40/7.52	5/3.57
Hip	8/4.82	20/3.76	6/4.29
Skull & face	8/4.82	13/2.44	4/2.86
Soft tissue & misc.	20/12.05	3/10.56	12/8.57
Medical (Total)	38/22.89	191/35.90	44/31.43
Cardiac arrest	5/3.01	17/3.19	3/2.14
Nonarrest	14/8.43	42/7.89	11/7.86
Burns	0/0	2/0.38	2/1.43
Accute airway distress	26/15.66	85/15.98	20/14.29
Stroke	5/3.01	16/3.01	5/3.57
Spontaneous abortion	1/0.6	7/1.32	2/1.43
Delivery	0/0	0/0	0/0
Unclassified	53/31.93	125/23.49	47/33.57

Vital signs listed	31/18.67	290/54.51	73/52.14
Records complete	128/77.11	477/89.66	114/81.43
Custodial time (minutes)	37.65	18.69	20.11
Average travel rate (MHP)	50.90 mph	41.50 mph	44.68 mph
Light rescue performed	12/7.23	41/7.71	11/7.86
Incidences involving death	12/7.23	22/4.14	10/7.14
Incidences involving alcohol	4/2.41	18/3.38	2/1.43
Incidences involving drugs	1/0.6	3/0.56	1/0.71
Incidences involving abnormal behavior	0/0	3/0.56	1/0.71
Other health professionals involved	28/16.87	241/45.30	42/30.00
Composition of ambulance crew Three persons	154/92.77	524/98.50	134/95.71
Two persons	12/7.23	8/1.50	6/4.29
Motor vehicle related	25/15.06	79/14.85	20/14.29

## APPENDIX FIVE.

## COMPILATION OF CONNECTICUT VICTIM'S RECORDS

Item	Number	Percent
Total Number of Records Reviewed	4,851	
Symptomatic Data		
Present	2,233	46.03
Absent	2,618	53.97
Treatment Data		
Listed	2,964	61.10
Not Listed	1,887	38.90
Records Completed	4,150	85.55
Records Imcomplete	701	14.45
Category of Injury or Illness		
Trauma (Total)	1,227	25.29
Fractures and Dislocations		
Spine and Pelvis	27	0.56
Lower Extremity	138	2.84
Upper Extremity	88	1.81
Skull and Face	57	1.18
Soft Tissue and Misc.	844	17.40
Burns	27	0.56
Medical (Total)	1,730	35.66
Cardiac Arrest	77	1.58

Nonarrest	243	5.01
Accute Airway Distress	449	9.26
Stroke	106	2.19
Spontaneous Abortion	20	0.41
Delivery	0	0.00
Unclassified	1,894	39.04
Alcohol Related	313	6.45
Drug Related	117	2.41
Abnormal Behavior	113	2.74
Suicide Gesture	18	0.31
Motor Vehicle Related	558	11.50

## APPENDIX SIX.

## SOCIETAL EXPECTATIONS BY NOMINAL CATEGORIES FOR THE OCCUPATION:

## PRE-HOSPITAL PHASE OF THE EMERGENCY MEDICAL

## SERVICE SYSTEM

Category	Source(s)
1. Care for accident victim (trauma)	A,B,C,D,E
2. Care for burn victim	A,B,C,D,E
3. Care for heart attack victim	A,B,C,D,E
4. Care for high risk infant families	B,D,E
5. Other environmental, medical/surgical emergencies	A,B,C,D,E
6. Care for poison victims and substance abuser	A,B,C,D,E
7. Care for nonspecific complaint victims	D,E
8. Lift and move ill or injured persons	A,B,C,D,E
9. Provide transportation for sick or injured	A,B,C,D,E
10. Maintain an emergency vehicle	A,B,C,D,E
11. Communicate on emergency radio networks	A,B,C,D,E
12. Perform light rescue	A,B,C,D,E
13. Choose appropriate emergency facility for type of injury	B,C,D,E
14. Stock and maintain special emergency supplies	A,B,C,D,E
15. Maintain prehospital medical and unit records	A,B,C,D,E
16. Act as community service unit manager (plan, guide, evaluate)	B,D,E
17. Continued learning and training new EMTs for replacement	A,B,D,E

- |   |         |
|---|---------|
| 18. Provide leadership in disaster control<br>and mutual aid agreements | B,E     |
| 19. Treat all persons who enter the EMS system the same                 | B,E,F   |
| 20. Perform work in teams   | B,C,D,E |
| 21. Initiate intervention in "loss-grief" or "crisis"<br>situations     | D,E     |
| 22. Manage human resources  | C,E     |
| 23. Manage stressful situations   | C,D,E   |
| 24. Provide public information and education                            | B,E     |

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Source Key	Reference
A = National Guidelines	(Committee on Injuries, 1971)
B = EMS Systems Act	(U. S. Congress, Senate, & House, 1973)
C = Job Description	(Employment and Training Training Administration, 1978)
D = Records	(Victim's Records - Appendix 4,5)
E = Literature	(Grant, H. & Murray, R., 1978; Rockwood, 1976; Waller, J.A., 1974)
F = Research	(National Center for Health Services Research, 1979)

**APPENDIX SEVEN. OCCUPATIONAL ELEMENTS BY VARIABLE DATA**

Element No.	Occupational Element	Societal Referend No.	Minutes Instruc= tion	Pages Instruc= tion	Iowa Records	Conn. Records	Import= ance	Success	Immediacy
1	Internal bleed	1	20	1.8	3.58	0.87	90.098	3.995	1.769
2	Wounds	1	180	13	10.14	20.32	90.863	4.098	1.649
3	Neckinj	1	32.5	3	9.55	0.07	91.047	4.029	1.878
4	Spineinj	1	52.5	7	5.73	0.32	91.178	4.004	1.911
5	Upperfract	1	122.5	13	3.34	2.57	90.457	4.019	1.766
6	Lowerfract	1	167.6	12	7.76	3.76	90.511	4.045	1.817
7	Skull-brain	1	40	7.5	2.15	0.48	91.339	3.978	1.848
8	Face	1	40	2.3	2.86	0.72	88.933	4.017	1.763
9	Eye	1	30	5	0.23	0.01	90.74	4.08	1.713
10	Chest	1	50	5	1.31	0.07	91.165	4.02	1.789
11	Abdomen	1	55	4	0.95	1.03	90.233	4.017	1.738
12	Genitalia	1	10	3.5	0.23	0	87.575	3.986	1.832
13	Airwaymain	1	175	8.5	1.31	0.43	91.348	4.022	1.769

14	Respdistress	1	140	22.5	5.61	10.0	92.128	4.062	1.756
15	Thermalburn	2	35	2.25	0.27	0.63	91.385	4.057	1.753
16	Chemburn	2	35	2.25	1.31	0.02	84.078	3.829	1.977
17	Nonarrest	3	135	12	10.02	10.11	90.516	4.014	1.744
18	Arrest	3	625	14.2	3.1	1.86	91.729	3.985	1.787
19	Birth	4	110	9.8	0	0	88.775	3.845	2.004
20	Sponabort	4	40	5.5	1.19	0.45	87.259	4.038	1.819
21	Highrisk	4	0	0	1.55	0	88.968	3.913	1.962
22	CVA	5	20	2	3.22	2.55	89.458	3.978	1.805
23	Dyspnea	5	20	3	3.10	3.93	90.032	4.032	1.734
24	Diabetes	5	20	1.5	0.83	0.85	88.292	3.986	1.733
25	Acuteabd	5	15	3	1.79	2.34	92.137	4.106	1.609
26	Commdisease	5	15	2	0.12	0.07	87.539	3.991	1.698
27	Insulinshok	5	20	1.5	0.35	0.55	86.941	3.851	2.005
28	Seizure	5	10	1.5	1.31	3.13	86.656	3.901	1.861
29	Unconscious	5	30	10	0.95	0.12	89.636	4.029	1.716
30	Heatinj	5	20	2	0.36	0	91.69	4.038	1.669
31	Coldinj	5	15	7	0.24	0	91.497	4.092	1.607

32	Drowning	5	15	4	0	0.15	88.809	3.949	2.032
33	Other	5	80	8	7.16	20.59	89.108	4.009	1.676
34	Suicidegest	6	0	0.5	0.24	0.43	87.954	3.88	1.995
35	Drugod	6	15	3	0.36	2.82	84.366	3.771	2.111
36	Alcohol	6	20	5	3.82	7.54	85.449	3.793	2.159
37	Mental	6	5	1.5	0.72	3.2	81.842	3.78	2.127
38	Poison	6	25	12	0	0	84.804	3.86	1.996
39	Nonspecif	7	0	0	22.79	11.29	86.47	3.899	1.883
40	Speciallift	8	30	3	37.95	35.66	90.399	4.066	1.987
41	Routinelift	8	40	5	62.05	64.34	90.748	4.142	1.882
42	Backboard	8	30	1	6.56	0.66	90.547	4.026	2.007
43	Transport	9	20	8	99.05	99.42	69.713	3.142	2.749
44	Autoextr	12	165	12	7.64	0.05	75.489	3.71	2.383
45	Otherrescue	12	30	1	4.53	0.15	69.982	3.533	2.607
46	Emergvehic	10	50	6	69.33	89.01	74.186	3.656	1.938
47	Nonemervehic	10	0	4	30.67	10.99	73.17	3.665	1.906
48	Communicate	11	155	11	99.64	99.9	71.186	3.716	2.021
49	Supply/equi	14	25	1	60.86	69.81	84.528	4.013	1.556

50	Victimrecord	15	25	1.5	83.39	85.55	82.752	3.894	1.754
51	Unitrecord	15	20	0.5	99.00	99.00	60.336	2.98	2.893
52	Mutualsup	16	0	0.25	0.15	0.04	63.919	2.807	1.903
53	Continueed	17	0	0.25	63.661	54.545	73.708	3.166	3.165
54	Substanceab	19	40	1	71.17	30	78.667	3.489	2.579
55	Sociostat	19	0	0.25	42.85	58.5	71.72	3.583	2.258
56	Medperson	19	0	0	30.99	5.06	90.003	4.068	1.489
57	Teamwork	20	0	0.5	78.313	89.49	87.633	4.033	1.53
58	Loss/death	21	0	0.5	5.69	1.45	74.035	3.463	2.602
59	Crisis	21	35	0.5	3.62	10.79	75.928	3.47	2.647
60	Humanresors	22	0	0	83.66	97.54	68.45	2.987	3.404

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