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A STUDY TO DETERMINE A NEW PARADIGM FOR PARAMEDIC
EDUCATION IN SAN BERNARDINO COUNTY

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Vocational Education

by
James Robert Holbrook

June 1994

A STUDY TO DETERMINE A NEW PARADIGM FOR PARAMEDIC
EDUCATION IN SAN BERNARDINO COUNTY

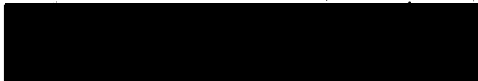
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June 1994

Approved by:


Dr. Joseph English, First Reader

June 13, '94
Date


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ABSTRACT

This study was designed to determine if a need exists to teach decision making skills to paramedic students in San Bernardino County. Perhaps one respondent best characterized the need for the study when he commented, "the biggest problem I see is the whole process. Paramedics are educated one way, by the book, trained in two ways, and required to perform in another. Therefore make the training consistent with the demands, expectations, and reality you are required to perform in." Questionnaires were given to physicians, registered nurses, and paramedics. The study determined that decision making skills need to be part of the paramedic curriculum, especially if the graduates are to meet the demands of a continually changing work-place. Also, the study determined the best method to teach decision making skills and where to include decision making skills in the curriculum. Data indicated that decision making should be taught to paramedic students through formal presentations in the didactic component of the program.

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You can do nothing alone. All of us are intertwined. Everyone that shared along the way thanks. There are a few people who have stimulated my brain and have contributed to my success in extraordinary ways. Daved van Stralen M.D. and Ron Perkins M.D. from Loma Linda University Medical Center Children's Hospital Center for Pediatric Prehospital Care planted the initial seed of critical decision making skills in emergency medicine. Dr. Joseph English as my major advisor and the modern day Socrates. Dr. Ron Pendelton from California State University San Bernardino School of Education. Betty Byron and Dr. Jane Beitscher from Crafton Hills College who helped with the final manuscript. Firefighter paramedic, Matthew Topoleski of the San Bernardino City Fire Department who helped collect data. Special thanks to Daniel Martinez who helped with the statistical analysis and interpretation. Special thanks to my colleges at Crafton Hills College Emergency Medical Care Department, Donna Ferracone, Sandi Andrews, and Mary Pritchard, who provided support during the process. Most of all thank you to my family Cindy, Lynn, David, and Dan.

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CHAPTER ONE

INTRODUCTION

The human brain is one of the greatest decision making units known. Can this inherent ability be enhanced through specific tools? The patient care decisions that paramedics make have changed rapidly in the past few years. Paramedic education and the practicing protocols appear to be rigid rules that delineate students, patients and emergency situations into some predetermined outcome. As the prehospital work environment changes, complex decision making skills are necessary for paramedics to function. Is it possible to project thought into an unstable environment?

Background

Since the development of mouth to mouth resuscitation in the 1950's and closed cardiac chest compressions in the 1960's, non-medically trained individuals have provided out of hospital life saving techniques. In the late 1960's paramedics and mobile intensive care units were created to manage myocardial infarction and to reduce mortality from cardiac arrest soon after the onset of symptoms, and to provide safe transportation. (Pantridge 1967)

Originally mobile intensive care units were staffed by physicians and nurses because of the advanced level skills

required. But as emergency medicine began to take shape in the United States in the late 1960's, it was cost prohibitive to staff the prehospital units with physicians and nurses. Physicians then began to train individuals, fire fighters and ambulance technicians who were familiar with the out of hospital environment in advanced life support techniques. Many of the procedures and guidelines that were used in the prehospital setting were adopted from aeromedical evacuation procedures used in Vietnam.

In 1966, a report by the National Academy of Science and National Research Council identified significant problems of accidental death and disability, and demanded standards for prehospital care. Eventually laws began to shape emergency services as we know it. The initial law, the Emergency Medical Services Systems Act 1973 started the legislative process.(Public Law 93-154) Emergency medical services has been reshaping itself ever since. From 1980 to 1990 there were fifty-one new pieces of legislation that affected Division 2.5 of the California Health and Safety Code.

"Within the past ten years the field of emergency medicine has expanded in knowledge and practice beyond the bounds of the emergency room." (Stewart,1979, p. 11) Ironically, when Stewart made this comment blood borne pathogens, hazardous materials, critical stress debriefing,"do not resuscitate" orders, and incident command

systems were not part of the prehospital arena. From 1979 to present, emergency services has redefined its role beyond patient care to the management of critical incidence.

The basic curriculum standards for paramedic education have changed little since their original designs during the early 1970's. New drugs, adjuncts and various procedures have been added to the scope of practice based on new developments in the medical field, but these additions have not made substantive changes in the basic curriculum standards.

However, what has dramatically changed is how the paramedic decides when the new drugs, adjuncts and procedures are used. Because of the changes, medical decision making skills are necessary by the paramedic to function effectively within the emergency medical services systems constraints in San Bernardino county.

For example, five years ago a San Bernardino county paramedic was able to perform oral endotracheal intubation on an adult patient only, and under the direction of a Base Station physician or mobile intensive care nurse. (Salinas 1989a) However, now a San Bernardino county paramedic is able to perform any of seven advanced airway procedure, on adult and pediatric patients without the requirement to contact a base station Hospital physician for medical direction. (Salinas 1994b) This change in the function of the paramedics, not the procedure or drug, has not been

addressed by curriculum.

This change in job requirements of the paramedic, and ultimately the scope of practice, requires the additional responsibility for critical decisions without on-line medical direction. San Bernardino county paramedics are now making decisions that were previously made under direction by a physician. This new job requirement needs to be addressed through curriculum changes in the primary education of paramedics.

Emergency medicine is not the only field to experience rapid changes in technology including the necessity for decision making skills. Berryman and Bailey identified that "workers increasingly need to be able to operate more independently of their supervision and to work in a less well defined area. This requires a greater facility for creative thinking, decision making, and problem solving." (1992, p. 39)

Nature of the Problem

Kuhn (1962) identified paradigms as a way of looking at situations to determine problems and eventually suggestions for solutions.

It is taught in paramedic training programs that the main object of the paramedic is to support patients' vital functions and if these are unstable, then you must forget about anything more detailed than support and provide rapid

transportation to an appropriate facility.

What has changed significantly in the last 20 years is how the paramedic supports the patients vital functions. With new technology and advanced life saving devices available, the level of possible prehospital intervention has changed dramatically. Paramedics are now required to process critical information differently to effectively treat patients and meet the current standards of care.

The Department of Transportation Curriculum Standards for paramedic education requires 440 hours for course completion of paramedic training.(USDOT-1986) Completion of paramedic training in the State of California requires 320 hours of classroom instruction, 160 hours of clinical instruction, and 480 hours of field externship. (Title 22, H.S. 1992 s. 100158) These curriculum standards identify the content of the knowledge and skills of the paramedic. However, the curriculum standards do not identify the decision making skills necessary to carry out the practice of paramedicine effectively.

No component of the curriculum identifies how these skills or knowledge will be applied in the local prehospital patient environments or emergency medical services systems. Fowler (1989) in the National Association of EMS Physician EMS Medical Directors' Handbook identifies the problem succinctly; "geopolitical systems evolve EMS systems pursuant to geographic, political, and economic pressures

unique to those areas. Consequently, vast differences are found in EMS systems from area to area." (1989, p. 13)

Various counties offer various degrees of support. For example, not all counties in the State of California allow advanced airway procedures in pediatric patients. Some counties require on-line medical direction for advanced airway procedures on pediatric patients. In San Bernardino county however, no on-line medical direction is needed to perform any advanced level airway procedures.

Historically, the primary sources of prehospital care personnel were public safety services and private and public ambulance technicians. Most of these personnel had only high school education and minimal to nonexistent education in biology or medicine or any social sciences.

The initial elements of paramedic training as well as the understanding of their function was dictated more by local needs and instructors preference than any scientific evaluation of the needs of the paramedic. (Schafermeyer1993) Because no model existed for prehospital care, the training of paramedics was similar to other medical fields using diagnostic based educational methods. Treatment algorithms were based on making diagnosis and placing the patient into the predetermined protocol.

Recognizing the need for modifications in the scope of practice and instruction, minor changes in the standards have been instituted. "The newer algorithms that have been

developed are based on presenting signs and symptoms. Now epidemiology, and assessment based curriculum ... are essential component of the educational program for the EMT'S and paramedics."(Schafermeyer, 1993, p. 40)

Even with assessment based education and protocols none of the new changes have placed attention on the function of the paramedic within a continually changing environment.

The new modification of assessment based learning and protocols are still only addressing the patient treatment options. The new designs do not take into account how the patient fits into the environment. The paramedic must be able to make effective decisions regarding more than just the patient.

Paramedic training dictates that we must divide the decision making process into both situational assessment and patient assessment. This may seem artificial at first glance, but is done to emphasize that the environmental situation may be of prime concern. Paramedics and other emergency services workers are trained to assess the scene prior to any patient contact.

An old saying in prehospital care is all other health care workers provide care in a well lighted and controlled environment. However, significant differences in the environment the paramedic function within that must be taken into consideration in the training and practice of the paramedic.

Perkins (1993) identifies a concept of degrees of control that is brought to a particular situation. The prehospital team has the smallest degree of control. As you enter the patient into the various hospital setting each unit brings more control and stability to the situation. "The role of prehospital and emergency medical personnel is to gain control over the environment, moving the patient along this spectrum toward more deterministic conditions."(Perkins, 1993,p. 187)

General medical care has an environment that is well controlled with consultation services immediately available and numerous resources at the disposal of the health care team. The emergency services environment contains potentially hazardous situations with time urgency and limited personnel and recourse capabilities.

These environmental differences can lead to problems not experienced in the normal hospital setting. The practice of medicine developed from a deterministic model in which diagnostic techniques are used to identify diseases for which specific therapies can be prescribed. (Perkins 1993)

The emergency medical services environment is the most significant difference between the function of the paramedic and other medical care workers. Sutherland (1983) identifies four various types of systems or environments: deterministic, moderately stochastic, severely stochastic,

and indeterminate. (Sutherland, cited in Orr, 1983) These systems or environments range from simple and predictable to complex and unpredictable.

Deterministic systems are identified by the fact that for any initial state or condition there is only one outcome with any significant probability. (Orr, 1983, p. 51) Simple mechanical systems are good examples of deterministic systems. (Orr 1983)

Moderately stochastic systems are identified by the fact that for an initial state or condition a limited number of outcomes are possible with any significant probability. An example of this system is genetic processes. (Orr 1983)

Severely stochastic systems identified by Orr (1983) differ in the fact that for any given initial state or conditions a significantly larger number of outcomes are possible. Conflicts between humans is a good example of this system.

The indeterminate system or state is where no outcome can be identified as more significant than any other possible outcome. "Psychotic human behavior is a good example of this state." (Orr, 1983. p. 52)

Orr identifies how each of these different systems might be addressed through decision making tools or skills. The deterministic system or state can be controlled by systems performance that are precisely controlled by manipulating the initial condition. Moderately stochastic

systems are controlled in much the same as deterministic systems.

To deal with the severely stochastic systems, branching techniques or complicated mathematical models are necessary. And to deal with indeterminate states "one must proceed intuitively ... protecting as well as possible against disaster at each point while attempting to learn about the system [rather] than to control it." (Orr, 1983, p. 52). "The basic tools necessary to deal with indeterminate systems are deductive analysis based on assumed fundamental properties of the process, scenario building, and normative systems analysis." (Orr, 1983, p. 52)

The requirement of a paramedic to deal with patient care issues in any of the possible environmental states helps to identify the complex decision making skills necessary.

In addition to the environmental constraints the paramedic has patient care priorities that are different due to fundamental educational philosophical differences. In clinical medicine the risks and benefits of care can be weighed and time can be used to evaluate the care or condition. In the paramedic setting the risks are assumed high and all actions should be directed toward reducing the risks. The patient evaluation is directed at the priority and time is not used to determine or weigh the risks to the patient. All problems are assumed a high priority.

These philosophical differences have not been taken into account as algorithms or procedure checklists are created. These procedural checklists or protocols have specifically determined patient outcomes.

The protocols and standards in emergency medicine grew out of criterion based education which was designed to identify specific performance expectations rather than compare one student against another. The criterion based style became the standard in emergency medical education and protocols. However, this educational model was inappropriately expanded. The performance expectation or criterion based checklist became the only way a skill or procedure could be completed. Regulatory agencies further designed freedom of variance protocols based on these rigid checklists. Agencies have instituted this freedom of variance stance as a way to measure and ensure quality.

Part of the problem with this system is that these rigid checklists or protocols require the patient or multiple patients to fit into very specific parameters. This rigid philosophical stance has further underprepared the prehospital provider in his decision making skills because of the unique constraints of the patients and changing environments the paramedics function in.

This deterministic view has become the basic framework for much of emergency services. Emergency services systems tend to have the same response to all emergency situations.

If problems arise, simply increase the requested resources. This presents problems when in extreme situations or in an unpredictable situation, the ability to respond to the possible lack of more resources is prohibited by protocol or systems training.

Because of the unknowns in emergency services, a new model that can assist the paramedic through basic parameters is critical. "The stochastic conditions that exist in the setting of a rapidly deteriorating patient without an observed clinical course and inadequate history require a different decision making model." (Perkins, 1993, p. 187)

Part of the difficulty with this posture is that no new decision making model or skill has been formally added to the paramedic curriculum. Even though the current educational style and protocols for paramedics are deterministic in nature, the environment the paramedic functions within is stochastic. There are a myriad of acronyms for all components of prehospital emergency care, from the assessment and treatment of the environment and the patient to specific disease pathology.

The education of paramedics is standardized much like most of the traditional educational institutions. The focus is on the outcome and the specific recall of facts and statistics. Skills and procedures are measured on specific and rigid procedural checklists. However, the training style of the emergency services provider must prepare them

to function in a stressful environment and constantly changing patient condition. "Many educators recognize the need for a new approach to education for the prehospital care provider, and current objectives and skills training revision." (Schafermyer, 1993, p. 40)

If the paramedic environment is stochastic and ever changing should the training and ability to think be rigid and deterministic ?

Significance of the Problem

This problem is significant because of the changing job requirements, the continually changing prehospital environment, and the multiple possible patient conditions that the paramedics deal with as part of their normal job function. The deterministic educational and functioning style used in prehospital care are no longer adequate for the requirements of prehospital patient care. The curriculum and training of paramedics no longer meet the system requirements placed upon them by the patient and stochastic environments. Without the addition of decision making skills it is questionable if paramedics can function at their intended level.

Statement of the Problem

Ritualistic or deterministic styles of education and protocols can create patient and environmental decisions

that can be potentially harmful to the health-care worker and the patient. The current curriculum and procedural protocols complicate paramedic decisions and care by restricting the patient and the environment to some predetermined outcome.

If the state of emergency prehospital education and paramedic protocols are to keep pace with the emergency services systems requirements, the paramedic should be trained to make decision that are appropriate for the specific patient and the environmental constraints that exist. If new protocols and procedural guidelines are created to assist the paramedic in making decisions in stressful situations and also to allow the flexibility to apply the decision as the patient or environment dictates, then should the curriculum for the paramedic be amended to include formal decision making skills that are appropriate for the specific patient and the environmental constraints that exist?

Purpose of the study

Therefore, the purpose of the study was to determine the need to change the instructional paradigm for paramedic education.

Overview of Research Questions

Given the continually changing work-place, should

paramedic training in San Bernardino County include formal decision making skills as part of the standard paramedic curriculum? Where is the best place in the curriculum to teach decision making skills to paramedics so they will have the necessary cognitive entry behaviors? Which style should be used to teach decision making for the greatest retention? Is there a logical and measurable relationship between patient care and practicing protocols?

Limitations

There are two primary limitations to this investigation. First, the relevance of this study to other regions and systems is unclear because of the varying degrees of medical control. Secondly, the investigation is limited to advanced level emergency prehospital paramedics, and this question is only one of many influences on paramedic education and the practice of paramedicine. However, this investigation should have implications for individuals who work in a stochastic environment because of the similar environmental and decision making skills.

Definitions

Stochastic: a process involving a randomly determined sequence of observations. Implies randomness as opposed to a fixed rule.

Deterministic: having defined limits

Emergency Medical Services System: Fowler (1989) in the National Association of EMS Physician EMS Medical Directors' Handbook identifies, "an EMS system is medicine practiced outside the hospital, using physician assessment and management skills to exercise a patient-physician contract through the use of EMS personnel." (1989,p. 9)

Advanced Life Support "means special services designed to provide definitive prehospital emergency medical care, including, but not limited to cardiopulmonary resuscitation, cardiac monitoring, cardiac defibrillation, advanced airway management, intravenous therapy, administration of specified drugs and other medicinal preparations, and other specified techniques and procedures administered by authorized personnel..." (Division 2.5 of the Health and Safety Code. p. 3)

CHAPTER TWO

LITERATURE REVIEW

Introduction

The literature review focused on the history of prehospital care to include the nature of prehospital care and education and the medical decision making skills and models that are used in environments similar to prehospital emergency services.

Because of the recent creation of prehospital care as a recognized area of expertise very little formal research has been written. Prehospital advanced life support as we know it today begin in the late 1960's.

History of Emergency Medical Services

The first component of the literature review evaluated the history and creation of prehospital emergency care. The information spans from early Egypt to the distinct realities of current times.

It seems evident that throughout history people have been caring for the sick and injured outside of organized medical institutions. "The myths of ancient Egypt suggested that life could be restored, at least by the gods, by breathing into the body." Baker's study (cited in Stewart, 1971, p. 11) The Bible is also full of examples where people heal others. As we move further through history there are examples of groups of individuals that rescue

others.

"The Crusades, for example saw the advent of a special order of knights, the Venerable Order of Saint John of Jerusalem, to serve the health needs of the Crusaders on and off the battle field." Darmody study (cited in Stewart, 1976, p. 12)

As we approach the eighteenth century Napoleon's conquest of Europe produced such significant injuries that "Baron Jean-Dominique Larrey designed and put into service the first ambulance, a horse drawn carriage in which patients were sped off toward the rear." (Stewart, 1976, p. 12)

War continued to play a significant role in the creation of transportation and out of hospital emergency care. In the early history of the United States during the Civil War, medical services were inadequate and the increasing number of patients was more than the systems could handle. "However Clara Barton, aided by colleagues such as Dorothea Dix, fought her own battles for better emergency care and won. Clara's cry of 'treat em where the lie'." (Stewart, 1979, p. 13) This cry is the current philosophy for advanced prehospital care.

As time continues toward the twenty-first century there are several advances in treatment and therapies. The early beginnings of mobile coronary care happened in Russia when Irish physician Pantridge set out beyond the confines of his

coronary care ward to take the new ideas and procedures to the patients home. (Pantridge 1976)

It was recognized during the Vietnam conflict that specially trained corpsmen treated the soldiers where they were hurt often made the difference between death and survival. From the 1960's prehospital care has been redefining itself and its role in emergency care. (Pantridge 1969)

We meet the current design because "it is now possible to extend the resources of the hospital emergency departments to the community by means of the mobile intensive care unit." (Stewart, 1979, p. 11)

Medical Decision Making Models

The available literature on decision making identified the nature of decision making; the various types of medical decision making models; how these models originated; the impact these tools have on medical decisions; and identification of the best place to teach decision making in a formal classroom structure.

The review also focused on military decision skills as a substitute for medical decision models because the military models for decision making seem to match the decision making requirements of emergency services workers more effectively than the medical models.

There was an enormous amount of information on decision

making, from organizational, political, military, medical and even how individual influences can affect decision making. Basically, medical decision making models were considered adjuncts that assist clinicians in making complex medical decisions. Colice indicated that medical decision making is designed to "help choose among diagnostic possibilities". (1989, p. 191) Other experts described decision making as a "systematic approach to decision making under conditions of uncertainty." (Weinstein, cited by Colice, 1980, p. 191) Various techniques such as Bayesian theorems and utility assessment; other decision making models were designed to supplement the intuitive abilities and reasoning skills of clinicians.

There are a variety of decision making formulas: Bayesian updating, decision automation, decision trees, utility assessment, sensitivity analysis. Recently, computer program software D-Maker, Dartmouth College was created that will assist clinicians in various diagnostic possibilities.

Although most clinical reports of various studies documented in professional journals use classical hypothesis testing which estimates the rate or frequency at which an event repeatedly occurs, these methods do not give the clinician the most efficacious information most are looking for. (Lewis 1993)

Moving away from classical hypothesis testing, Bayes in

1763 identified methods that allow the estimation of the probability outcome that one treatment is more effective than another given all other equals. Bayes could be considered deterministic or descriptive whereas the classical hypothesis could be considered frequentist. Lewis states that "Bayesian thinking is in closer alignment with our natural mode of clinical reasoning." (Lewis, 1993, p. 116) Meaning that thinking skills used in clinical settings where patient care and the environment are controlled or are in fairly fixed states. Descriptive research is concerned more with the findings of deviation from normal values than pure description of outcomes. (Hershey 1987) The standard treatment guidelines for paramedics follow this descriptive method in that "protocols are standardized written procedures for diagnosis." (Kuehl, 1989, p. 158)

Even though there are significant tools that help medical practitioners to make decisions, there does not appear to be a great use of these techniques. "It is fair to say that the use of decision analysis has not penetrated deeply into the practice patterns in any branch of medicine." (Lillington, 1989, p. 94)

First practitioners see the techniques as inappropriate. (Politser 1981 , Sox 1987) Secondly, routine clinical decisions do not fit into the standard control method of evaluation. (Bockenholt 1992) Third, these

methods are considered controversial. Others complaints state that the assessment tools are too static and unrealistic for normal use. A recent study asked how often formal decision making was used in standard medical journals. The authors report that less than 1% of the 20 articles in clinical literature mentioned or discussed the use of formal decision making. (Bockenholt 1992)

There are three basic reasons medical practitioners do not use formal decision making skills. First a lack of formal training, or training that was completed without the clinical experience. Second, the cognitive entry behaviors necessary to understand or apply the data. Third these skills were not used in the time it takes to complete a decision analysis, sometimes up to 24 to 48 hours. (Colice 1989)

Even though a diagnosis is a process not an event, in the normal setting the diagnosis is uncertain and the decision maker must make the decision to start therapy even without a known diagnosis or beginning known state. (Lillington 1989) This immediate response to the patient and his presenting condition is critical for paramedics. By nature emergency services is time sensitive. (Mosesso 1993)

It appears that most medical decisions are learned through externship training. Regardless of how decisions are learned "evidence continues to accumulate that physicians' intuitive judgements are often fundamentally

flawed" (Bockenolt, 1992, p. 298) and there still does not seem to be a rapid growth toward formal decision making models.

One researcher indicates that "clinical situations are invariably far more complex than a simplified do or don't." (Colice, 1989, p. 266) This is the significant difference between emergency services workers and physicians.

Comparing prehospital personnel against standard scoring mechanisms shows that a basic emergency medical technician can make judgments "as accurate as the various score." (Emerman, 1991, p. 1369)

Because of the emergent nature of prehospital care environment and the normal human resources and equipment constraints, many times the emergency services worker is required to think in a "do or don't do" matrix. No medical research suggested that various decision making skills could be applied to constraints outside of the classical clinical setting.

All of the medical models presented the benefits and difficulties in a normal medical practice. These standards were then used to write the protocols for emergency services workers. Obviously, these protocols are based on deterministic or descriptive models. This certainly presents problems in an emergency services arena because the model does not prepare the emergency services worker to function in a "stochastic environment". (van Stralin, 1994,

p. 179)

Even though Bayes theorems are able to handle more than simple dichotomous outcomes (Lewis 1993), emergency services span the spectrum from simple single outcomes to multiple transitional states to unknown multiple outcomes which none of the models identify. All of the models that were evaluated took into account the patient, the disease process, and the therapies. These models fit only into the patient care components of the decision making skills necessary for emergency services. "Situations involving multiple transitions require a choice for implementation." (Orr, 1983, p. 37) This flexibility is not allowed in standard emergency services workers protocols.

One instructional text Teaching Clinical Decision Making identified different students with varying different backgrounds will require different techniques. (Cebul 1985) Yet all of the examples reviewed were essentially clinically oriented and not prehospital oriented. For example, in addition to the physiological threats to the patient, emergency services workers must also consider the social, environmental and physical threats that affects the patients' morbidity and mortality.

Teaching decision making skills brings out an entirely new set of problems. It is suggested that students have some clinical experience before they are exposed to decision making models. (Cebul 1985) This suggestion would fit with

known educational models of cognitive entry behaviors. In addition to the location in the training components it is suggested that highly complex theory is unnecessary and probably more confusing for the students. (Cebul 1985) Many of the texts and journal articles are inappropriate because of their complexity.

The person to teach decision making should also be an experienced clinician. (Cebul 1985) This will facilitate the various components of decision making that are used. The teaching clinician should have situations that can describe how the techniques were used. This is termed case studies in emergency prehospital care education.

Because of these differences and incomplete applications for prehospital care in medical decision making models, I evaluated military models of decision making.

Military Decision Making Models

The major difference is that the military identifies the models as operation process. "The power distribution model and the military problem solving process model" (Orr, 1983, p. 23) appear to match the functions of a prehospital worker more closely than the medical models. The military models by design take into account multiple other factors. These items are called (C3I), command, control, communications, and intelligence.

The Department of Defense's definition for command and

control is "the exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission". (cited in Orr, 1983, p. 23) This definition matches the emergency services worker structure in that the paramedic is in the designated commander over the prehospital patient care arena that may deal with all of the possible field constraints.

There are various models or processes that the military uses. The model that seems to correct the identified problems in both the medical and military models is the O-O-D-A loop structure designed by Boyd. (Orr 1983) The observe, orient, decide, and act loop structure is very simple and adaptable to the emergency services needs. This was the only model that considered the environment as a critical assessment requirement. The military models also inherently identify the psychological basis of command by stating " the human mind provides the most effective command and control system found in nature." (Orr, 1983, p. 31) All tools we expose the practitioner to must take into account the human mind. This philosophy identifies the most current theories in education. All learning must take into account the human brain and its physiology to be the most effective.

Summary

Paramedics have been faced with rapid introductions of new technologies and skills since their original design.

The curriculum standard need to be revised to include new skills and techniques. The curriculum additions must take into account the environmental constraints. The military models of decision making mirror the decision made by out-of-hospital workers more appropriately than medical decision making models.

CHAPTER THREE

RESEARCH DESIGN

Introduction

The purpose of the study was to determine the need to change the paramedic curriculum. The literature identified the lack of decision making in medical education. Also identified was the need for new educational models for paramedic programs.

Population Sample

Emergency room physicians, registered nurses, and paramedics (n = 106) in San Bernardino and Riverside Counties were surveyed that have direct knowledge of paramedic practices and decision making skills.

The emergency physicians and nurses practiced at various size private and public hospitals. The common denominator for all the physician was the role of direct medical supervision for paramedics.

The nurses in the study all function within the emergency room and receive patients that have been treated by prehospital personnel. In many hospitals, the emergency room nurse provides the education and the initial direct contact for the paramedic.

The paramedics surveyed provide emergency services in multiple public and private prehospital provider configurations. Emergency services providers in San

Bernardino and Riverside counties are extremely varied in that some fire departments provide advanced life support but no transportation, some public agencies and all private companies provide transportation in addition to advanced life support.

Population Demographics

Demographic data were collected on the respondents in seven areas, (a) level of formal education, (b) the numbers of hours of formal decision making education, (c) the level of patient care responsibility, (d) the number of years in emergency medicine, (e) the gender and age.

Research Questions

The following research questions were developed to guide the study: Research question I. Should Paramedic Training in San Bernardino County include formal decision making skills as part of the standard paramedic curriculum?

Research question II. Where is the best place in the educational program to teach decision making skills to paramedics?

Research question III. Which instructional model should be used to teach decision making?

Research question IV. Is there a logical and measurable relationship between patient care and practicing protocols?

Study Design

A questionnaire was designed to measure (a) the abilities of certified paramedics decision making skills, (b) is it necessary to teach decision making skills to paramedic students, (c) where is the best place in the paramedic program to teach decision making skills, (d) which method of instruction is most appropriate for teaching decision making skills, (e) is there a difference between emergency services patient care and the way emergency services protocols are designed.

The data were evaluated to determine the frequency and distribution of each of the questionnaire components.

Many of the five primary areas in the overall design had multiple questions. Question one on the survey instrument was designed to answer research question I.

Questions two, three, four and five on the survey were designed to answer research question II. Survey questions two, three, four and five contained the following definitions: (a) didactic [defined as awareness], (b) clinical [defined as understanding], (c) field externship [defined as application], or (d) in all areas of the program.

Questions six, seven and eight on the survey were designed to answer research question III. Questions eighteen and nineteen were designed to answer research question IV. The information was determined by the use of a

diagram defining four possible transitional states, (a) known condition through a known transition to a known state, (b) unknown condition through a known transition to a known condition, (c) unknown condition through an unknown transition to a known condition, and (d) unknown condition through an unknown transition to an unknown condition.

Methods and Treatment of the Data

The data were evaluated to describe the frequency of distribution for each of the nineteen questions. A measure of central tendencies and measure of variability was calculated for each response.

The first 8 questions used a likhert scale 1-5. The following categories were used: 1 represented strongly agree, 2 represented agree, 3 neither agree nor disagree, 4 disagree, 5 strongly disagree.

Question 9 determined paramedic decision making abilities and used the following categories: 1-excellent, 2-good, 3-fair, 4-poor, and 5-very poor.

Questions 10 through 16 were demographic questions used to determined the following information (a) the level of patient care responsibility, (b) the number of years of services, (c) the amount of decision making education, (d) and their formal education.

Question 17 was an open ended question that determined how the respondents would teach decision making skills.

Questions 18 and 19 determined the differences between emergency prehospital patient care and protocols design. These two questions were measured to determine the difference between training and the presentation of emergency prehospital patient and the protocol design the paramedic must function under. The treatment of these data were previously discussed.

CHAPTER FOUR
FINDINGS AND DISCUSSION

Findings

Out of 180 questionnaires distributed, 58.8% were returned. (n = 106)

Research question I determined if it is necessary to teach decision making skills to paramedics. The majority of the respondents chose 1 = strongly agree 76.2% (n = 80).

The following table represents all information collected on survey question number 1.

TABLE 1
Results for Survey Question 1

Value	1	2	3	4	5	0	S.D.	Mean
Number	80	19	3	0	3	1	.796	1.352
Total	n = 106							

Research question II determined where in the program is the best place to teach decision making. Four survey questions were designed to answer this question.

Survey 2 question results: didactic [defined as awareness] 13.5% (n = 14) strongly agree, 35.6% (n = 37) agree, 28.8% (n = 30) neither agree nor disagree, 14.4% (n = 15) disagree, and 7.7% (n = 8) strongly disagree. The mean was 2.673 and the standard deviation was 1.119.

Survey question 3 results: clinic [defined as understanding] 8.7% (n = 9) strongly agree, 37.5% (n = 39) agree, 29.8% (n = 31) neither agree nor disagree, 15.4% (n =

16) disagree, and 8.7% (n = 9) strongly disagree. The mean was 2.779 and the standard deviation was 1.088.

Survey question 4 results: field [defined as application] 42.9 % (n = 45) strongly agree, 32.4% (n = 34) agree, 16.2 % (n = 17) neither agree nor disagree, 7.6% (n = 8) disagree, and 1.0% (n = 1) strongly disagree. The mean was 1.914 and the standard deviation was 0.991.

Survey question 5 results: all program areas. 60.4% (n = 64) strongly agree, 21.7% (n = 23) agree, 6.6% (n = 7) neither agree nor disagree, 6.6% (n = 7) disagree, and 4.7% (n = 5) strongly disagree. The mean was 1.736 and the standard deviation was 1.141.

The following four tables represents all information collected on research question number II.

TABLE 2

Results for Survey Question 2

Value	1	2	3	4	5	0	S.D.	Mean
Number	14	37	30	15	8	2	1.119	2.673
Total	n = 106							

TABLE 3

Results for Survey Question 3

Value	1	2	3	4	5	0	S.D.	Mean
Number	9	39	31	16	9	2	1.088	2.779
Total	n = 106							

TABLE 4**Results for Survey Question 4**

Value	1	2	3	4	5	0	S.D.	Mean
Number	45	34	17	8	1	1	0.097	1.914
Total	n = 106							

TABLE 5**Results for Survey Question 5**

Value	1	2	3	4	5	0	S.D.	Mean
Number	64	23	7	7	5	0	1.141	1.736
Total	n = 106							

Research question III determined what is the best method to teach decision making. Three questions were designed to answer this question.

Survey question 6 results: discovery method. 18.3% (n = 19) strongly agree, 20.2% (n = 21) agree, 36.5% (n = 38) neither agree nor disagree, 16.3% (n = 17) disagree, and 8.7% (n = 9) strongly disagree. The mean was 2.769 and the standard deviation was 1.184.

Survey question 7 results: formal presentation. 8.5% (n = 9) strongly agree, 50.0% (n = 53) agree, 22.6% (n = 24) neither agree nor disagree, 17.0% (n = 18) disagree, and 1.9% (n = 2) strongly disagree. The mean was 2.538 and the standard deviation was 0.938.

Survey question 8 results: experience 15.1% (n = 16) strongly agree, 23.6% (n = 25) agree, 17.9% (n = 19) neither agree nor disagree, 33.0% (n = 35) disagree, and 10.4% (n = 11) strongly disagree. The mean was 3.000 and the standard

deviation was 1.265.

The following three tables represents all of the information collected on research question III.

TABLE 6

Results for Survey Question 6

Value	1	2	3	4	5	0	S.D.	Mean
Number	19	21	38	17	9	2	1.184	2.769
Total	n = 106							

TABLE 7

Results for Survey Question 7

Value	1	2	3	4	5	0	S.D.	Mean
Number	9	53	24	18	2	0	0.938	2.538
Total	n = 106							

TABLE 8

Results for Survey Question 8

Value	1	2	3	4	5	0	S.D.	Mean
Number	16	25	19	35	11	0	1.265	3.000
Total	n = 106							

Because of the closeness between the methods of instruction a t-tests for paired samples was computed. Table 9 identifies the variables used to determine the probability. Table 10 identifies the significant difference was between formal presentation and experience. Two participants did not complete this question possible due to the lack of clarification on the definition of the discovery method of education.

TABLE 9**Variables of Learning Styles**

variable	number of pairs	correlation	mean	standard deviation	standard error
formal	106	-.289	2.5377	.938	.091
experience			3.0000	1.265	.123

TABLE 10**Paired Differences of Learning Styles**

mean	standard deviation	standard error of mean	t-value	2-tail significance
-.4623	1.779	.173	-2.68	.009

Survey question nine measured paramedic decision making abilities. The results are: 22.8% excellent (n = 23), 53.5% good (n = 54), 21.8% fair (n = 22), and 2.0% poor (n = 2). There were five participants which did not respond to this question.

Survey question 10 results: Level of formal education. 17.9% (n = 19) doctorate, 0.9% (n = 1) masters, 10.4% (n = 11) bachelors, 31.1% (n = 33) associates, 0.9% (n = 1) license, 38.7% (n = 41) certifications.

Survey question 11 results: the number of decision making hours the participants have taken. 22.1% (n = 23) no classes, 18.3% (n = 19) 1 - 5 hours, 6.7% (n = 7) 6 - 10 hours, 11.5% (n = 12) 11 - 20 hours, 41.3% (n = 43) 21+ hours, and 2 participants did not respond to this question.

making in the field setting, the respondent used specific terms of "synthesis laboratory," [the] "dynamics necessary", "mastery level" "real life", "priority decision making" to identify the field setting. Next, to teach decision making throughout program (n = 17) or 18.8%. And finally to instruct faculty in decision making process (n = 12) 13.3%. The participants also identified that shared information / clinical experience and "direct teaching by physicians" and having designated preceptors with these [decision making] abilities critique at the time of delivery. (n = 10) 11%. All the other responses were varied from the ability to make decision should be tested to teach the skills as part of a group because the paramedic will be working as a group.

Question 18 offered the respondents four diagram to select which most represented patient care to them.

The following table represents all information collected on question number 18.

TABLE 11

Results for Survey Question 18

Value	1	2	3	4	0	S.D.	Mean
Number	11	61	16	8	10	0.757	2.219
Total	n = 106						

Question 19 offered the respondents four diagram to select which most represented protocol design.

The following table represents all information collected on survey question number 19.

making in the field setting, the respondent used specific terms of "synthesis laboratory," [the] "dynamics necessary", "mastery level" "real life", "priority decision making" to identify the field setting. Next, to teach decision making throughout program (n = 17) or 18.8%. And finally to instruct faculty in decision making process (n = 12) 13.3%. The participants also identified that shared information / clinical experience and "direct teaching by physicians" and having designated preceptors with these [decision making] abilities critique at the time of delivery. (n = 10) 11%. All the other responses were varied from the ability to make decision should be tested to teach the skills as part of a group because the paramedic will be working as a group.

Question 18 offered the respondents four diagram to select which most represented patient care to them.

The following table represents all information collected on question number 18.

TABLE 11

Results for Survey Question 18

Value	1	2	3	4	0	S.D.	Mean
Number	11	61	16	85	10	0.757	2.219
Total	n = 106						

Question 19 offered the respondents four diagram to select which most represented protocol design.

The following table represents all information collected on survey question number 19.

TABLE 12

Results for Survey Question 19

Value	1	2	3	4	0	S.D.	Mean
Number	64	17	12	3	10	0.757	2.219
Total	n = 106						

Discussion

The data indicated that decision making skills were necessary for paramedic. The participants indicated that decision making should be included in all areas of the paramedic program with an emphasis on the field component. This data would reflect the way the participants indicated that they were trained. The significant difference was that the respondents included formal presentations as a mechanism for learning decision making. However, the literature pointed out that very few medical programs included this level of training.

With the program divided into three components, the application of the decision making presentations should gradually reflect more of a contextual approach as the students progress through the program.

Surprisingly, data indicated that the amount of formal decision making hours identified by over 40% of the respondents was greater than 21 hours. However, this data seems unlikely. One possible explanation may have occurred was that emergency medical education programs present case studies and discussion techniques to determine the most

effective patient care . The method may have been confused with a more formal model for decision making.

Also of significance from a training standpoint, was that the majority of respondents stated that emergency medicine and protocol are not identical. This difference may lead to the comments made by Mr. Rameriz made regarding paramedic training and the job demands. "The biggest problem I see is the whole process. Paramedics are educated one way, by the book, trained in two ways, and require to perform in another. Therefore, make the training consistent with the demands, expectations, and reality you are required to perform in." It seems evident that a new paradigm needs to be designed to deliver paramedic education. From the above discussion, several conclusions will be offered in the next chapter of the research study.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The overall results indicate that it is necessary to teach decision making, and that decision making should be included in all areas of the program with an emphasis during the field component of the program. The respondents identified that decision making can be learned from formal presentations. A majority of participants indicated that decision making was included in all areas of their education. The participants also identified a difference between emergency medicine and protocols.

Decision making skills have the potential to transform our understanding of the education required for the preparation of paramedics. The study indicated that decision making skills should be taught throughout the entire paramedic program. The participants identified a known educational theory by Bloom that ties together cognitive entry behaviors and specific educational outcomes.

Paramedics will continue to be faced with rapid increase in new technologies. These new technologies will require new skills. The addition of decision making skills as a component of paramedic training will place the emphasis on prehospital care and the quality of patient care decision making.

Recommendations

Based on the findings and discussions, the following recommendations are offered:

The concept of teaching decision making skills needs to continue to be refined to identify the most effective model.

The decision making model in the paramedic program should be contextual in nature.

Some hybrid between the medical models and the military models needs to be created for emergency services workers.

Decision making skills should take on increasing complexity throughout the program.

The educational goal of teaching decision making must be to assure that paramedic students will be able to apply the material in a continually changing work-place.

The paramedic curriculum should be expanded to a four year clinical based Bachelors in Science degree.

Future research needs to investigate decision making models to improve the understanding of higher order skills.

Most importantly the data overwhelmingly showed that a new paradigm is necessary in emergency medical paramedic education.

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