The Relationship of Locus-of-Control and Altruism to Prehospital Emergency Medical Care Providers Universal Precaution Practices

Joanne L. Wakeham
Old Dominion University

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THE RELATIONSHIP OF LOCUS OF CONTROL AND ALTRUISM TO PREHOSPITAL
EMERGENCY MEDICAL CARE PROVIDERS UNIVERAL PRECAUTION PRACTICES

by

Joanne L. Wakeham

B.S. May 1978, Old Dominion University
M.S. May 1985, Hampton University

A Dissertation submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the degree of

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ABSTRACT

THE RELATIONSHIP OF LOCUS OF CONTROL AND ALTRUISM TO PREHOSPITAL EMERGENCY MEDICAL CARE PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES

Joanne L. Wakeham
Old Dominion University, 1993
Director: Dr. Gregory H. Frazer

The purpose of this study was to determine the relationship between locus of control, altruism, occupational risk, and personal factors to the frequency of universal precautions practices of prehospital emergency medical care providers. The effects of OSHA's Occupational Exposure to Bloodborne Pathogens; Final Rule on reducing prehospital emergency medical care providers occupational exposure to bloodborne pathogens were also examined. Prehospital emergency medical care providers from municipal and private EMS agencies in the Tidewater Emergency Medical Services region participated in this study. Prehospital emergency medical care providers self-reported perceptions of locus of control, altruism, occupational risk, and universal precautions practices were obtained. The randomly selected sample consisted of 359 prehospital emergency medical care providers. Several statistical analyses were applied to the data which revealed that there was no relationship between locus of control and the frequency of universal precautions practices by prehospital emergency medical care providers. There was a small, inverse relationship between altruism and the frequency of universal precautions practices by a provider, and there was a
small, inverse relationship between locus of control and altruism. There was no relationship between occupational risk and the frequency of universal precautions practices by a prehospital emergency medical care provider. Several personal factors contributed to predicting the frequency of universal precautions practices. It was demonstrated that prehospital emergency medical care providers are engaging in activities that place them at significant risk for exposure to bloodborne pathogens. Universal precautions are practiced intermittently despite the reported ready availability of personal protective equipment at the worksite. Significant differences were found in the prehospital emergency medical care providers compliance with universal precautions practices in all of the twelve OSHA criteria as measured by comparing infection control practices prior to the Final Rule and after the Final Rule was implemented, May 1992. Recommendations were made for further research and policy development in the area of exposure incidents and application of universal precautions practices.
DEDICATION

To the one whose noble profession calls upon him to fight fires, save lives and protect property.
ACKNOWLEDGEMENTS

The author is grateful to all who assisted in the completion of this work. Expressions of appreciation go to those agencies within the Tidewater Emergency Medical Services region and all those who participated in this study.

I am thankfully indebted to Gregory Frazer, Ph.D., for his expert guidance and cordial helpfulness with this dissertation. He was "the calm in the face of a storm". I shall strive to emulate those qualities that were so helpful to me, as I work with others in assisting them to reach their life goals. Recognition is given as well to those experts in Urban and Health Services who worked closely with me, namely, Berhanu Mengistu, Ph.D., and George Maihafer, Ph.D.. I am truly appreciative of the time and effort they expended on my behalf. Thanks are extended to Jack Robinson, Ed.D., for his kind statistical assistance. Noel Wharton is recognized for her diligence in data entry and statistical analysis.

Gratitude is expressed to Donald Haupt, Paramedic Chief, Norfolk Fire and Paramedical Services for his generous assistance. I appreciate the phone consults to obtain clarification of EMS job duties and responsibilities with Fred Burt, Risk Manager, Norfolk Fire and Paramedical Services. Gratitude is also expressed to Michael Berg, Regional EMS Education Coordinator for his support.
The author is indebted to Shirley Query for her conscientious typing of a section of the instrument and to Cpt. John Forbes for aiding me with formatting text on the computer.

Deep thanks is extended to Frank M. Yeiser, Jr., M.D. for supporting the study by assisting me with systems entree to the various operational medical directors and EMS providers in the TEMS region. His letter of endorsement accompanying the cover letter lent additional credibility to the study that I would have otherwise not had.

The author wishes to acknowledge the support of friends; Carolyn and Jane for gently prodding me on to finish, and Linda and Lemlem for encouraging me to hurry up and finish so we can do something entrepreneurial together.

Recognition must be given to those most dear to me for they, above all others, truly deserve to be acknowledged. To my family (Ron, Eric, Chrystal, and Kish) whom I cherish, thanks for helping me achieve a life-long dream. I need to express a special thanks to Chrys for helping me master computer graphics. Together we did it! The mainstay of utmost importance to the success of this achievement has been Ron. I needed you and you were there. Now it's your turn!!
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Chapter 1
INTRODUCTION

There is an epidemic of violence on our streets which has deadly consequences not only for the perpetrators of crime and their victims but for the prehospital emergency medical care providers who respond to these violent incidents. As these emergency providers respond to homicides, assaults, abuse or other acts of violence being committed on individuals within their communities they fearlessly expose themselves to virulent organisms which can produce adverse health effects. With each call the risk is ever present. "With each exposure, infection occurs or does not occur" (Department of Labor, 1991, p. 64023).

The environment in which prehospital care is rendered is often hostile and uncontrolled. Weapons and drug paraphernalia, violent and uncooperative clients and antagonistic bystanders add to the potential risk. Motor vehicle accidents pose yet another risk to emergency responders as they toil to extricate victims through the broken glass and jagged metal edges of the vehicles involved. Personal safety is further jeopardized as passing motorists fail to slow down or attend to driving
requirements. Inclement weather may further complicate the situation making the performance of lifesaving tasks more hazardous (Department of Labor, 1991, pp. 64096-97). There is inherent danger when working under any of these conditions.

The prehospital environment poses tremendous challenges to emergency medical care providers, but one threat is particularly menacing. The unseen peril to emergency medical providers comes from their significant potential for occupational exposure to pathogens capable of causing serious illness and death. Pathogens which are transmitted through the blood and body fluids of persons infected with either the hepatitis B (HBV) and/or human immunodeficiency (HIV) viruses. Dienstag and Ryan (1982) asserted that frequency of blood contact is a highly significant risk factor for infection (Dienstag & Ryan, 1982, p.35).

Despite the ever present threat, studies have reported that few prehospital emergency medical care providers consistently use universal precautions recommended by the Centers for Disease Control and Prevention in 1987 (CDC, 1987; Cydulka, 1991; Eastham, 1991; Hochreiter, 1988; Klontz, 1991; Smyser, 1990; Valenzuela, 1985). Most of the research on emergency medical professionals occupational exposure to bloodborne pathogens has focused on injuries and precautionary behaviors. Research conducted on prehospital emergency medical care providers has reported that most
respondents are knowledgeable in bloodborne pathogens disease transmission and infection control practices (Smyser, 1990). While the trend has been to investigate universal precautions practices in terms of health care providers knowledge of disease transmission and attitudes, there are no studies that investigate factors internal to the individual that may contribute to this persistent inconsistent use of universal precautions practice. This is of great concern when the infectious disease experts from around the world acknowledge that efforts to prevent the spread of bloodborne pathogens (specifically AIDS and HBV) are not working.

There are reported inconsistencies in infection control practices, risk-taking behaviors and the fears expressed by EMS professionals (Smyser, 1990). Some prehospital emergency medical care providers may believe that exposure to bloodborne pathogens is uncontrollable despite their consistent practice of universal precautions and infection is contingent upon fate or luck. There may be internal psychological factors within these prehospital emergency medical care providers that influence the way they practice infection control measures/use precautionary behaviors when providing care to clients in the field setting. One such factor, as yet unexplored in this setting, is locus of control which has been widely used in organizational studies to explain differences in employees attitudes and behaviors.
Rotter (1966) purported that behaviors are quite different when perceived rewards and punishments are contingent upon personal actions rather than occurring independently of efforts or characteristics (Rotter, 1966).

Another internal factor which could account for the reported low compliance with universal precautions practices by prehospital emergency medical care providers arises out of concern for the welfare of the victim above their own personal safety. These personal safety issues may well be overridden during perilous situations involving critically ill persons in need of emergency medical care. A call for help by a person in distress may well force the prehospital emergency medical care provider to subjugate their fears in order to aid the victim. They may place the needs of others before their own. They are acting as they have been trained to do; to immediately respond to the emergency situation and to place the welfare of the client above all else. They are risk-takers acting somewhat fearlessly to save strangers from certain death. They do not spend time deliberating on whether or not they should act; they just act. The medical care providers paramount concern is for the client’s life rather than his/her own. This is called altruistic behavior.

Studies examining the relationship of locus of control and altruism to prehospital emergency medical care providers universal precautions practices to prevent occupational
exposure to bloodborne pathogens are non-existent. Although much information is available on prehospital medical care providers' knowledge of disease transmission, attitudes and prevalence of exposure, a study assessing the influence of locus of control and altruism on infection control practices in this population is lacking.

For the aforementioned reasons, the significance of conducting research investigating locus of control and altruism's influence on infection control practices among prehospital emergency medical care providers seems appropriate and timely. OSHA's Standard on Occupational Exposure to Bloodborne Pathogens influence on prehospital emergency medical care providers practice of universal precautions was recognized as the major precipitating factor in looking at this area of infection control more closely. As a first step towards understanding this complex phenomena this study was undertaken to investigate the relationship of locus of control and altruism to infection control behaviors among prehospital emergency medical care providers. The intent is to explore and understand what other factors may account for prehospital emergency medical care providers' resistance to strict practice of universal precautions espoused by OSHA so that measures can be taken to reduce occupationally related exposures to bloodborne pathogens.  

Statement of the Problems

This research study was concerned with investigating
the relationship of prehospital emergency medical care
providers locus of control and altruism to their practice of
universal precautions. The first purpose of this study was
to investigate the extent to which prehospital emergency
medical care providers perceive contingency relationships
between their practice of universal precautions and their
occupational exposure to bloodborne pathogens, using self-
report. The second purpose of this study was to identify
the extent to which prehospital emergency medical care
providers perceived a relationship between personal
protective equipment use and situation specific risk to the
safety of their client or coworkers (altruistic behavior).
The third purpose of this study was to identify what
personal attributes and/or factors predict personal
protective equipment use among prehospital emergency medical
care providers. Lastly, the study examined the effects of
OSHA’s Occupational Exposure to Bloodborne Pathogens: Final
Rule on reducing prehospital medical care providers
occupational exposure to bloodborne pathogens.

Purpose

The relation of locus of control and altruism to the
degree of compliance with universal precaution use by
prehospital emergency medical care providers has not been
reported in the literature. These are complex phenomena
that may be closely related to aspects of helping and risk-
taking behaviors. In view of the fact that exposure to
bloodborne pathogens in prehospital emergency medical care providers is probably higher than reported, reasons for inconsistent use of universal precautions are seen as worthy of investigation.

Justification for the Study

The increasing demand for emergency medical services with the accompanying potential risk of bloodborne disease exposure to prehospital emergency medical care providers necessitated that a study such as this be undertaken. Research findings that demonstrated relationships between the aforementioned variables and exposure potential could be used to develop worksite risk reduction strategies. Reduction of occupational risk potential within prehospital emergency medical care providers should result in fewer work days lost due to clinical illness resulting from exposure to bloodborne pathogens as well as reduced compensation costs (medical care and lost wages). Infinitely more important, is the reduction in pain and suffering of occupationally exposed workers. In turn, risk reduction practices may well have a positive impact on the retention and recruitment of these vital health care workers.

Research findings demonstrating relationships of locus of control and altruism to exposure could prove extremely helpful to those involved in designing EMS training curriculums and risk reduction programs. Knowledge gained from this study can be used to reevaluate the effectiveness
of existing training programs by identifying what currently exists in the area of infection control practices.

Characteristics of prehospital emergency medical care providers which not only influence their consistent practice of universal precautions but also influence their willingness to render help also merits study. Emergency medical services administrators need their employees to convey a professional, caring attitude even under the most unpleasant of circumstances. This is especially critical as agencies become more responsive to the needs of the people for whom they provide care. By identifying characteristics associated with helping behaviors agencies can assist providers in functioning more effectively in their health care systems. This in turn may lead to job satisfaction and avert job shortages from ill-prepared job applicants.

Assumptions

The following statements will be assumed to be true by this investigator:

1. That Rotter’s I-E Control Scale (1966), can be used by prehospital emergency medical care providers to measure perceived locus of control.

2. That The Values Scale - Altruism Subscale (VS, Super & Nevill, 1985) can be used by prehospital emergency medical care providers to measure perceived altruistic behaviors.

3. That by using modified versions of Smyser’s (1988)
Occupational Risk Scale and Klontz's (1991) Needlestick Exposure Scale prehospital emergency medical care providers will be able to identify perceived occupationally related risks.

4. That CDC's recommended universal precautions practices (1987) can be used to measure perceived universal precautions practices of prehospital emergency medical care providers.

5. That there is a direct relationship between how the respondent practices universal precautions in the prehospital care environment and what he/she says on the questionnaire.

6. That the respondent understands the questionnaire items and the meaning he/she gives to them is the same as other respondents who take the test (Rotter, 1973, p. 257).

7. That prehospital emergency medical care providers functions and duties may vary, but expectations of universal precautions practice will be comparable in all prehospital care environments.

8. That respondents will be frank and answer the items truthfully.

Delimitations

The investigator has imposed the following delimitations on this study:

1. The sample population was taken from government/municipal, volunteer and non-profit agencies from
a single region. Therefore, generalizations cannot be applied to specific setting such as hospitals or other medical centers, but can only be made about EMS agencies in the Tidewater area.

2. Prehospital emergency medical care supervisors were not included in this study. Individuals employed in supervisory positions have been reported as more internal on locus of control scores than non-supervisors (Kapalka & Lachenmeyer, 1988, p. 417, 422).

Limitations

The following limitations apply to this study:

1. Self-reported perceptions of locus of control were based upon Rotter's (1966) scale which was designed to measure perceptions of contingencies between reward and outcome of adult students.

2. Self-reported perceptions of altruism were based on Super and Nevill's (1985) Values Scale - Altruism subscale which was designed to measure five (5) intrinsic and extrinsic values for high school, university and adult samples.

3. Generalizability of the results is limited to prehospital emergency medical care providers employed or volunteering in EMS agencies throughout the Tidewater area.

4. Perceptions of universal precautions practices may vary with the length of time spent in providing prehospital emergency medical care.
Definition of Terms


1A. First responder - trained to provide initial first aid and basic life support to ill or injured persons.

1B. Emergency Medical Technician A - trained to provide basic life support, employ special techniques for persons in life threatening situations. Certified to work on an ambulance.

1C. Emergency Medical Technician Shock Trauma - trained to provide fluid replacement therapy, and administer some medications that do not require cardiac monitoring under the direction of a physician.

1D. Emergency Medical Technician Cardiac - Technician trained to recognize and treat life threatening cardiac conditions under discretionary and/or direct medical control.

1E. Paramedic - trained to provide all of the aforementioned techniques plus insert central venous lines. Higher level assessment skills. Provides more in-depth evaluation. Permitted greater freedom in
medical decision making and utilizing professional judgment.

2. Occupational Exposure - exposure to potentially harmful chemical, physical or biological agent that occurs as the result of one's occupation (Department of Labor, 1991, p. 64004).

3. Perception - a process by which a person extracts meaningful information from one's personal surroundings to facilitate understanding of the environment. With increased age, these perceptions become more efficient, more selective, and more accurate (Mussen, Conger & Kagan, 1974, p. 258-286).

4. Universal Precautions - infection control measures whereby all human blood and certain human body fluids are treated as if known to be infectious for HBV, HIV and other pathogens (Centers for Disease Control, 1987, p. 5s-6s).

5. Bloodborne Pathogens - pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, HBV and HIV (Department of Labor, 1991, p. 64175).

6. Personal Protective Equipment - refers to specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes are not considered to be PPE (Department of Labor, 1991, p. 64175).

7. Locus of Control - perceptions of reinforcement or reward contingent upon personal behavior or outside personal
control (Rotter, 1966, p.1).


Summary

There are several reasons for looking closely at existing infection control practices among prehospital medical care providers in an effort to draw upon what is known about existing behaviors to make them more effective. The emergency medical care system needs to strengthen infection control training programs to reduce occupational exposure and improve prehospital emergency medical care delivery. The existing patterns of increased demand on emergency medical care services necessitates that prehospital emergency medical care providers practice universal precautions on all calls. The ability of an EMS provider to reduce occupational exposure to bloodborne pathogens becomes a significant factor in future emergency medical care planning and service delivery.
The review of the literature, found in Chapter 2, focuses on the historical development of the emergency medical services (EMS) in the United States and current trends. Research examining locus of control propounded by Rotter (1966) and others is described. The basis for the development of the I-E Control Scale is examined. This chapter also discusses the concept of altruism and altruistic behaviors as found in the review of the literature. Occupational exposure to bloodborne pathogens of prehospital care providers and OSHA's Standard on infection control practices are presented. A detailed description of the research design, methodology and procedures to be used in the study will be described in Chapter 3. Analysis of the data including demographic characteristics of the respondents and results of hypotheses testing will be reported in Chapter 4. Chapter 5 summarizes the findings of the study. The implications for emergency medical technician's education, service and policy development are discussed. Suggestions and recommendations for future studies are presented.
Chapter 2

REVIEW OF LITERATURE

Introduction

The purpose of this chapter was to review the literature as it relates to this study. This review included literature related to the development of the Emergency Medical Services with particular emphasis on the Commonwealth of Virginia. Occupational exposure to bloodborne pathogens in prehospital care providers and infection control practices and theories related to altruism and locus of control was presented.

Development of Prehospital Emergency Medical Services

The concept of providing prehospital emergency medical care originated with the military as the need to provide care for battlefield casualties was identified. Early documentation describes systems that were used to transport wounded soldiers away from the frontlines of battle so they could receive needed medical attention. This medical care of their wounds however, did not begin until they reached a physician at an aid station or combat hospital (Grant, et al. 1986, pp 2-3).

During various wars many improvements have originated in the care of wounded soldiers. The advancements in taking care of injured persons has been generated over many years.
The International Red Cross formed in Switzerland in 1863, was instrumental in training persons to care for the ill and injured. Later it was an American nurse, Clara Barton, who during the Civil War headed the drive to bring the Red Cross to the United States in 1905. Since that time, the American Red Cross has participated in the training of hundreds of thousands of Americans in first aid and emergency care measures (Hafen & Karren, 1983, pp. 1-2).

The efficient transporting of clients to emergency medical care services took time to develop. At the turn of this century, some parts of America had transport systems for the sick and injured, and very little else in the way of prehospital care. Ambulance systems did not really begin to develop nationwide until after World War II, when fire departments became more involved in giving emergency care (Hafen & Karren, 1983, p. 2).

Emergency Medical Services (EMS) as we now know them started in the 1950s when the older "load and go" methods began to be replaced with professional-level care at the scene. This included care while transporting the ill and injured to a hospital (Hafen & Karren, 1983, pp. 1-13).

In the mid-1960s, only three or four states were offering courses designed for the training of ambulance personnel (Grant & Murray, 1986, p. ix). The National Highway Safety Act of 1966 charged the Department of Transportation (DOT) with developing Emergency Medical
Services (EMS) and upgrading prehospital emergency medical care. Out of this development finally emerged the emergency medical technician course (Hafen & Karren, 1983, p. 2). Today virtually all states have established a statewide emergency medical care system.

In the mid-60s, the American Heart Association produced training programs for cardiopulmonary resuscitation (CPR) and began to teach CPR and basic life support to health care professionals and the general public. During this time, the National Academy of Sciences Research Council also became involved in studying prehospital emergency medical care and stressed the professional training for those responsible for administering prehospital emergency care to the sick and injured (Hafen & Karren, 1983, p. 2; Grant, et al., 1986, p. 3).

The National Registry of Emergency Medical Technicians, was established in 1970 to develop professional standards for EMT's and to assist local agencies with EMT training programs (Grant, et al., 1986, pp. 3-4). The National Registry is the national accrediting agency for emergency medical technicians. It has established standards that serve as prerequisites for all seeking examination and subsequent national registration. It also assists in the development and evaluation of EMT training programs (American Academy of Orthopedic Surgeons, 1977, p. 7).

Advances in EMS services and equipment, and training of
emergency medical technicians has continued. Present-day emergency medical services and EMT programs are an extension of the professional arm of the hospital emergency room physicians out into the community. This needed, worthwhile service has saved countless lives where otherwise lives would most probably be lost (Hafen & Karren, 1983, p. 2).

The current EMS system in Virginia was authorized under Section 32.1 of the Code of Virginia in 1982. Up until that time, localities provided emergency medical services to their populace on an individual basis. Issues of medical control and quality were in need of improvement. The state system focused on formal training programs and sought to develop appropriate mechanisms to address the identified areas of need. The overall goal of the state EMS system is to strengthen the prehospital phase of emergency medical care (Mayer, et al., 1990, pp. 49-56).

States have various ways of designating advanced EMT levels. In the State of Virginia, training for EMS providers begins at the emergency medical technician (EMT) level, proceeds on to the shock trauma technician, then to the cardiac technician level and culminates with the highest level of certification, the Paramedic (Mayer, et al., 1990, p. 52). First-responders, a part of the EMS system, are firefighters and others trained to attend to immediate emergency care needs until an ambulance arrives (Hafen & Karren, 1983, p. 3).
Prehospital emergency medical care providers duties and responsibilities are specified in medical protocols written by each community's respective operational medical director (OMD). Each EMS agency has a designated OMD, often a physician whose specialty is emergency medicine, under whose license the emergency medical technicians work. Prehospital emergency medical care providers can administer emergency medical care under their designated State certification level as specified in their protocols. Additional care can be provided as specifically directed by a physician (Hafen & Karren, 1983, p. 5).

Prehospital emergency medical care providers are required to determine the nature and extent of illness or injury. They are expected to triage multiple accident victims to determine who is most in need of immediate emergency medical treatment. They render first aid, such as controlling bleeding, treating shock, immobilizing fractures, managing mentally disturbed victims, assisting in childbirth and providing initial care of burn victims (Hafen & Karren, 1983, p. 5). While performing these duties prehospital emergency medical care providers are frequently exposed to potentially dangerous substances which can have adverse effects on their health. All clients in an emergency setting should be considered potentially infected according to The American College of Emergency Physicians (1988). They recommend that universal precautions be

Occupational Safety and Health Administration Standard

According to the Occupational Safety and Health Administration (OSHA) exposure to bloodborne pathogens poses a significant health risk for all employees (Department of Labor, 56, 235, 1991, p. 64004). Within the medical arena, health care workers have a higher risk potential than other areas of the population. The more frequent the exposure a health care worker has to blood and other potentially infectious materials as a result of carrying out their duties, the greater the risk (Dienstag & Ryan, 1982, p. 35).

OSHA having determined that a significant risk existed to persons coming in contact with Hepatitis B virus (HBV) and the human immunodeficiency virus (HIV) as a result of carrying out their occupationally related duties promulgated a standard under section 6 (b) of the Occupational Safety and Health Act of 1970 (the Act), 29 U.S.C. 655, to eliminate or minimize occupational exposure to HBV, HIV, and other bloodborne pathogens (Department of Labor, 1991, p. 64004).

Employers with employees in designated job classifications (those tasks or procedures that place them at risk for occupational exposure to bloodborne pathogens) were required under the aforementioned ruling to initiate an exposure control work plan by May, 1992. The exposure
control work plan was to include the following elements: identification of job classifications with exposure potential; post-exposure determination and evaluation procedures; methods of universal precautions compliance; engineering and work practice controls (handwashing facilities, laundries, puncture resistant containers; personal protective equipment (gloves, gowns/aprons, masks, face shields); housekeeping measures; pre-exposure vaccination availability; and training and information on bloodborne pathogens, OSHA's regulations regarding this standard and the employer's work control plan (Department of Labor, 1991, pp. 64175-64182).

Testimony provided during the Occupational Safety and Health Administration's hearing on the proposed bloodborne pathogen standard suggested that fire and emergency medical service personnel are at increased risk for HBV and HIV infections because of the uncontrolled environment they are often forced to work in. CDC (1987) openly advocated that universal precautions should most especially be used in emergency-care settings in which the risk of blood exposure is increased and the infection status of the client is usually unknown (CDC, 1987, p. 5s). The nature of the client's condition and the working environment often precludes strict adherence to the use of infection control practices (Baraff, et al., 1989, p. 654). The Centers for Disease Control and Prevention estimated that 37% of the
exposures to HIV infected blood through percutaneous and mucocutaneous routes might have been prevented if recommended infection control precautions had been followed (Department of Labor, 1991, p. 64033). Despite the recommendations from the CDC and OSHA, studies have shown that universal precautions are generally not used by health care workers (CDC, 1987; Cydulka, 1991; Eastman, 1991; Hochreiter, 1988; Klontz, 1991; Smyser, 1988).

**Occupationally Related Exposures**

Baraff, et al. (1989) sought to determine the extent to which emergency medical care providers adhered to the recommendations on universal precautions issued by the Center for Disease Control in 1987. For purposes of the investigation, hospital infection control policies were rewritten and disseminated to all emergency department personnel and other health care workers participating in the care of such clients. Compliance of health care workers to these newly adopted policies, was measured using an observational method of data collection by a research assistant during client encounters obtained through a convenience sample. Health care workers were observed performing care on 97 critical and non-critical clients seeking care through one university hospital's emergency department. Observations on use of gloves, gown, mask and protective eyewear for resuscitation clients and gloves for IV catheter placement or phlebotomy for non-critical clients.
was noted and recorded. Type of health care worker and demographic information on the client were also noted. Investigators reported that they had to stop the study after two months because of the poor compliance with the barrier precautions policy (Baraff, 1989, pp. 655).

Results revealed that when caring for non-critical clients requiring procedures such as drawing blood, attempting IV catheter placement, or both, only 52.5% of health care workers wore gloves. Seventy-five percent of health care workers wore gloves when caring for critical trauma clients as compared to 70% worn by workers caring for cardiac arrest clients. Gowns were worn by 27% of health care workers performing care to critical trauma clients, masks by two percent, and protective eyewear by 19%. For cardiac arrest clients gowns were worn by 30% of health care workers performing care, no-one wore masks (0%), and protective eyewear was worn by 15%. Interestingly, Baraff and his associates (1989) found that of all health care workers, emergency medical technicians most frequently used appropriate infection control practices.

Investigators concluded that the unacceptable rate of compliance to universal precautions practices was due in part to a lack of appreciation of the risk of transmission of bloodborne pathogens to health care workers. Additionally, compliance was limited due to an impression held by many health care workers that personal protective
equipment is ineffective and/or unavailable/inaccessible (Baraff, et al., 1989, pp. 654-657).

Smyser, et al. (1990) studied AIDS-related knowledge, attitudes, and precautionary behaviors among Emergency Medical Professionals in Michigan. The sample consisted of 997 licensed EMS providers. Survey results revealed that only 36.7% of EMS professionals reportedly used precautionary measures (such as gloves) when treating bleeding clients. The majority of respondents (69.2%) acknowledged unprotected contact with a client’s blood. An even more alarming finding was that 88.1% of EMS providers reported recapping needles after use on clients. Despite the fact that 56% of the respondents perceived their risk of EMS-related exposure to HIV infection to be high, only one in five respondents (21.9%) reported following CDC’s recommended procedure of not recapping needles. Over 12% of this sample acknowledged used needlestick injuries during client care (Smyser, 1990, pp. 496-504).

Klontz, et al. (1991) reported on a study in which these investigators sought to determine the incidence of needlestick injuries among paramedics working in Florida in 1987. Three hundred paramedics responded to a questionnaire which explored not only the number of needlestick injuries sustained during 1987 but the circumstances of needlestick injuries and hepatitis vaccination. Twenty-three percent (n = 69) of respondents reported a total of 110 needlestick
injuries in 1987. Over 60% of these injuries could have been prevented had the paramedics practiced universal precautions and disposed of used needles properly. Seventy percent (n = 48) of the reported needlestick injuries occurred in the ambulance. A moving ambulance accounted for 25 of these 48 incidents. Needle recapping was the activity reported most commonly by paramedics who sustained a needlestick while traveling in an ambulance (Klontz, et al., 1991, pp. 1310-1313).

A prospective study of 938 health care workers exposed to body fluids of clients with AIDS or AIDS-related illnesses initiated in 1983 by the Centers for Disease Control reported that 40% (n = 373) of the exposures could probably have been prevented had workers followed the recommended universal precautions. Recapping used needles was reported by 152 workers as the most frequent circumstance of exposure (McCray, 1986, pp. 1127-1132).

Only one study attributed the risk of Hepatitis B infection to the emergency medical providers duration of service/employment. Valenzuela, et al., (1985) reported on 59 Seattle paramedics risk for occupational exposure to Hepatitis B. While this research supported that paramedics are at increased risk for bloodborne pathogen infection more importantly it reported that the greatest risk appears to be in the first few months of employment. The investigators relate this to lack of technical proficiency which may

Hockreiter and Barton (1988) support the aforementioned finding that especially in the first year of employment, potential exposure of paramedics via needlestick occurs frequently. In a study conducted on 43 members of the St. Louis Emergency Medical Service during 1985, 44 accidental needlestick injuries were investigated. Paramedics (ALS providers) reported more needlestick injuries than compared to basic life support providers. This finding was attributed to the activities associated with advanced life support such as starting intravenous therapies and intubating victims. New employees, individuals employed for less than one year, reported 43% (n = 19) of the needlestick injuries although they represented only 21% of the sample. Where the circumstances of injury were known, 45% (n = 14/31) reported the exposure occurred in the client compartment of the ambulance. Forty-six percent of these exposure incidents were potentially avoidable had the emergency medical providers adhered to universal precautions (Hockreiter & Barton, 1988, pp. 9-12).

Health care workers who work in emergency settings are among those at highest risk of hepatitis B infection (Baraff, et al., 1989, p. 656). The prevalence of hepatitis B serologic markers in emergency prehospital care personnel is 18% (Kunches, 1983, p. 269). Percutaneous and
mucocutaneous exposure incidents have resulted in 5,100 (through 1991) cases of health care workers with occupationally infected hepatitis B virus (Alder, 1993, personal interview; CDC, March, 1993, p. 2; Martin, NIOSH, 1993, personal interview). Employment in emergency medical services increases the risk of hepatitis B virus infection three-to five-fold over that of the population in general (Kunches, et al., 1983, pp. 269-272).

The hepatitis B virus (HBV) is a virulent organism and can survive one week or more dried at room temperature on environmental surfaces. One milliliter (1 ml.) of HBsAg positive blood may contain 100 million infectious doses of virus. The most efficient mode of disease transmission for health care workers in the workplace is via percutaneous exposure, i.e. direct inoculation through the skin from needlestick puncture injuries or sharp instruments. Needlesticks from HBsAg clients will infect 7% - 30% of susceptible health care workers. Infectious sera can also be introduced through more subtle ways via the mucocutaneous route, i.e. splashes and spatters of blood and blood-derived body fluids into the health care workers eyes, mouth or open skin lesions (Department of Labor, 1991, pp. 64010, 64012-13, 64106).

The odds of becoming infected from HBV are decreasing with the advent of pre-exposure prophylaxis. Despite the fact that a safe, effective HBV vaccine became effective in
1982, we are still experiencing significant morbidity and mortality from this disease. In 1985, the Hepatitis Branch of the Centers for Disease Control (CDC) estimated there were approximately 12,000 HBV infections in health care workers with occupational exposure to bloodborne pathogens. In 1988, CDC’s estimate dropped to approximately 8,700 HBV infections in these workers with occupational exposure. In 1991, the number is closer to 5,100 HBV infected workers due to occupational exposure. Health care worker deaths from this disease still number more than 100 each year (Alder, CDC, 1993, personal interview; Department of Labor, 1991, pp. 64009, 64154). These declining exposure statistics reflect some success attributable to vaccine-induced protection, but are not a sufficient long-term response to the hazards presented by bloodborne pathogens.

For all classifications of health care workers who lack immunity to HBV, OSHA estimates a 3-5 per 1000 risk of developing infection following exposure to a case of clinical hepatitis. Of this population who have been immunized, there is a percentage (5% - 20%) of those that have non-response, i.e. inadequate antibody development. The higher percentage of non-response has generally occurred in those persons over the age of 34, male, overweight and smokers (Alder, CDC, 1993, personal interview). These individuals may believe themselves to be adequately protected when in fact they are at as great a risk as the
unimmunized worker. Perhaps they are at even more risk, considering that they believe themselves to be somewhat protected when in fact they are not.

In August, 1983 Eugene McCray, M.D., of The Cooperative Needlestick Surveillance Group at the Centers for Disease Control initiated a nationwide prospective surveillance of health care workers with documented parenteral or mucous-membrane exposures to blood or other body fluids of clients with the acquired immunodeficiency syndrome or AIDS-related illnesses. The purpose of this study was to begin to quantify the extent of documented transmission of HIV/AIDS due to occupational exposure. The intent of this study was to quantitate prospectively the risk of HIV/AIDS among exposed health care workers (McCray, 1986, pp. 1127-1132). In an 1984 article published in the Journal of the American Medical Association, Steven L. Solomon, M.D., from the Centers For Disease Control reported there were no known cases of AIDS in medical care workers that could be definitely attributed to specific occupational exposures (Slive, 1984, p. 397). By December, 1985, McCray’s Needlestick Surveillance Group was following 938 health care workers, 76% (n = 713) of which reported occupational exposures to needlestick injuries and cuts with sharp instruments. Two persons in that group with reported parenteral exposure tested positive for the HIV/AIDS antibody. McCray’s Group concluded that the risk of
HIV/AIDS infection to health care workers exposed to clients with HIV/AIDS appeared extremely low.

CDC (1987) documented that as of July 10, 1987, out of 32,395 adults with AIDS a total of 1,875 (5.8%) reported being employed in a health-care or clinical laboratory setting. Although 95% (n = 1,781) of these infected health-care workers reported an identified risk behavior, the remaining 5% (n = 94) did not belong to an identified risk group, i.e. means of HIV infection was undetermined (CDC, 1987, p. 4s).

By July, 1988, 1,613 health care workers with blood exposures to the HIV were enrolled in CDC’s Needlestick Surveillance Group. Of the 1,613 exposures, 1,201 agreed to participate in a followup study reported by Marcus (1988). Sixty-three percent of the exposures to contaminated needles occurred during the manipulation of an intravenous, phlebotomy or arterial needle, during the performance of an invasive procedure, or during other procedures. Seventeen percent occurred while recapping used needles by hand, 14% due to improper disposal of used needles or sharp objects, and six percent from contamination of an open wound. Three of the 860 (0.35%) workers with needlestick injuries had sero-converted six months post-exposure (Marcus, 1988, pp. 1118-1123).

The number of health care workers reported with AIDS grew in number to 5,425 as of June 30, 1992. Ninety-four
percent were found to have non-occupational risk behaviors for HIV infection. Over five percent (304) of health care workers with AIDS were in the undetermined risk category. Of those workers having an undetermined risk for HIV infection, no one cited percutaneous, mucocutaneous or cutaneous exposure to blood or fluids known to be infected with HIV (Chamberland, 1991, pp. 3459-3462).

Although the human immunodeficiency virus (HIV) is less efficient in transmitting disease than HBV the consequences of HIV infection are more bleak, usually leading to the infected individual's death. Whereas prior exposure or vaccination can produce an immune state in individuals exposed to the HBV, this is not the case with HIV. There is no known immunity to HIV. There is no vaccine and no cure for AIDS. The virulence of the virus depends on the particular strain involved and the size of the inoculum. The dose necessary to result in disease is as yet unknown, although it is thought to be very small. The organism is infectious up to 48 hours after it leaves the body. Occupational exposures to this organism have reportedly occurred through parenteral exposures (needlestick injuries) and skin or mucous membrane contacts via blood spatters (Department of Labor, 1991, pp. 64016-17). Several studies report seroconversion rates of 0.42% - 0.47% following HIV exposure (Marcus, 1988, p. 1118; Department of Labor, 1991, p. 64020).
Since the initial report by the Needlestick Surveillance Group, the federal Centers for Disease Control and Prevention in Atlanta have documented 36 (through March, 1993) cases of health care workers with occupationally infected human immunodeficiency virus (HIV). Additionally, there are 69 health care workers with suspected occupational exposure to HIV. The uncertainty of the total number of occupationally exposed health care worker cases has been attributed to the lack of baseline bloodwork or initial report of incident, refusal to be interviewed or death.

In the Commonwealth of Virginia, the State Health Department reported that of the 4300 persons with HIV infection who have subsequently developed AIDS, 124 are health care workers whose infection apparently resulted from an occupationally related exposure. Six of these 124 reported cases are listed as emergency medical technicians (EMT's). (Cumulative data from 1982 to May, 1993). The Virginia State Health Department (VSHD) also reported that out of 4657 persons infected with HIV, 153 are health care workers with suspected occupationally related exposures. What differs from the State Health Department's information when compared to CDC's information is that the State's data does not exclude any other behavioral risks and/or may not include baseline blood work (Villaneuva, VSHD, AIDS Office, 1993, personal interview). According to CDC's data, approximately 92-95% of health care workers with reported
occupational exposure to HIV will have other identifiable risk behaviors (Ciesielski, CDC, 1993, personal interview). Applying this percentage to the total number of health care workers to date in the Commonwealth of Virginia who have developed AIDS from occupational exposure exclusively, the number would be six (6.2 - 8.0). OSHA estimates that individuals have a 3-4 per 1000 risk of developing an HIV infection following needlestick exposure to blood from an HIV person (Department of Labor, 1991, p. 64036). The risk remains for HIV infection until a vaccine can be developed.

The numbers of health care workers reported to surveillance systems probably does not adequately represent the extent of exposure incidents that occur daily. It has been suggested that some workers get exposed to potentially infectious sera so frequently that they do not bother to initiate a post-exposure form (Department of Labor, 1991, p. 64011). Klontz, et al., (1991) conducted research on needlestick exposures in paramedics and although the study did not explore why paramedics did not report their injury to anyone, data revealed that paramedics who did not report their needlestick injuries tended to be older and have more years of work experience compared with paramedics who did report injuries. Klontz and his associates further reported that the probability of reporting the injury was not related to gender or status of hepatitis B vaccination (Klontz, et al., 1991, p. 1313).
Perhaps there are disincentives to reporting occupational exposures to potentially infectious bloodborne pathogens. Mallon, et al., (1992) suggested that breaches of confidentiality with the potential for discrimination, the lack of time and an inefficient reporting procedure may contribute to underreporting of needlestick injuries (Mallon, et al., 1992, pp. 592-595).

Steele (1990) suggested that if the emergency responder's injury is a minor one it may be unreported due to the additional paperwork. Then again, the incident report form may not accurately reflect the severity of the exposure thus making it more difficult to determine contact and injury (Steele, 1990, p. 465). Fear of disciplinary action following non-adherence to standard infectious disease protocols may also be a factor in workers not reporting exposure incidents.

A study conducted by Tandberg, et al. (1991) investigated the under-reporting of occupationally related exposures to bloodborne pathogens among emergency health care workers. Two hundred fifty-nine emergency physicians (n = 46), emergency nurses (n = 88) and emergency medical technicians (n = 125) were surveyed to determine factors and attitudes associated with failure to formally report occupationally related needlestick and other sharp object injuries.

Over six hundred percutaneous exposures were recalled
by subjects, but only 228 (35%) were formally reported. Of the three health care groups sampled, EMTs recalled the least number of needlestick injuries, 55% as compared to 72% of nurses, and 80% of physicians. During the last five years EMTs recalled an average of 1.8 contaminated exposures, whereas nurses recalled an average of 2.8 and physicians recalled an average of 3.8 exposures.

The excessive amount of time to complete an incident report form and increased years in occupation were strongly associated with a low incident reporting rate. Some of this behavior was attributed to the being unable to leave the work area during the shift and, heightened responsiveness of new employees to agency rules. Other subjects indicated they had been criticized by their employer for repeated occupationally related exposures and feared reprisals (Tandberg, et al., 1991, pp. 66-70).

Results indicated that the subject's own perception of risk was the most powerful predictor of low reporting rate. Respondents seriously underestimated the real incidence of occupational transmission of infectious agents. National efforts to reassure health care workers that the actual risk of occupational exposure to bloodborne pathogens is small might actually lead to less reporting and further underappraisal of true occupational risk (Tandberg, et al., 1991, pp. 66-70). It appears that the reasons for adhering to universal precautions are being weakened by the mixed
messages of the industry's watchdogs.

Smyser (1990) found that the perceived fears (high risk levels) were inverse to the low rates of precautionary behaviors reported by EMS personnel (Smyser, 1990, pp. 496-504). This converse relationship could be explained by the prehospital emergency medical care providers extremely fast or impulsive actions when responding to calls for assistance or help. They rush into action so quickly and with such urgency that they forget to take precautionary measures by donning their personal protective equipment.

Helping others over self seems antithetical to the fundamental drive of self-preservation (Hunt, 1990, p. 12). Despite the protectionary instinct, findings support the notion that there are individuals who assist those in distress or in need of aid primarily for moral reasons without thought to the consequences of their acts (external rewards or punishments) (Carlo, et al., 1991, p. 450). This overriding concern for helping others over self has been referred to as altruism.

Altruism

Altruism, a term coined by Auguste Comte in the mid-1800s, implies a devotion to the welfare of others, based in selflessness. Behaving with regard for others has generally been accepted as a virtue (Rushton, et al., 1981, p. 9). Altruistic behaviors such as compassion and caring have long been viewed as desirable role socialized behaviors. Health
care providers are often socialized to incorporate these behaviors into their professional roles. Accordingly, altruistic attributes have been developed in students entering the health related professions within their learning environments (Ben-Shem & Avi-Itzhak, 1991, pp. 369-379).

There are various approaches to the study of altruism. Two broad approaches are behavior-oriented and motivational models. Behavioralists have identified altruistic behavior as a conscious, intentional, willingness to act even though it may be disadvantageous to the helper (Hunt, 1990, p. 47). Losco (1986) referred to these as overt behaviors. Motivationalists focus on the how and why the helping behavior is performed (Bar-Tal, 1985/86, pp. 3-14). Motivation models also look at what reinforces helping behaviors (Losco, 1986, p. 336).

Altruistic acts are both cognitive and affectual requiring that the helper must first become aware of the situation and then relate to others' personal distress (Hunt, 1990, p. 164). The helper takes on the role of the other person; shares the feelings of others' distress; sees things from the perspective of others' and is so moved as to consider helping (Hunt, 1990, pp. 167, 169). Losco (1986) supported this view and posits that there are four interactive elements as well. These altruistic elements are arousal, perception, assessment and action (Losco, 1986, pp.
Schwartz and Howard (1982) have conceptualized helping behavior in somewhat similar ways but have suggested a more complex relationship between the helper and the recipient of help which they have formulated into "the normative model of helping" (Schwartz & Howard, 1982, p. 327).

According to Schwartz and Howard (1982), altruistic acts are self-administered, situation specific behavioral expectations generated from one's own personalized morals and internalized values. The process is activated by the perception of other's distress or need which in turn generates feelings of moral obligation to help or refrain from helping. Those who can identify emotionally with others are more likely to demonstrate altruistic behavior than those who do not demonstrate empathy (Hunt, 1990, p. 124). The helper's personal morals act to mediate the pros and cons of helping as does the helper's capability to act. This in turn generates the decision to help (Schwartz & Howard, 1982, pp. 327-353). According to Losco (1986, p. 340) those helpers with special competence will be more likely to respond actively to perceived need.

Staub (1991) defined altruism as behavior with the purpose of increasing another's welfare and refers to it as prosocial behavior. Personal norms such as concern for people's welfare and valuing others can be sources of motivation to engage in altruistic behaviors. Furthermore,
people who demonstrate helping behaviors can feel good about their accomplishments (Staub, 1991, pp. 150-153). This later posture reflects a change in Staub's earlier beliefs wherein his definition of altruistic behavior was more restrictive, not allowing for any benefit to accrue to the helper only to the recipient (Staub, 1978, p. 6).

Motivationalists have generally defined altruism as helping behavior which is voluntary, intentional, benefits others and without expectation of external rewards in return (Rushton, 1976; Bar-Tal, 1985/86; Batson, 1986). Simmons (1991) posed the difficulty in separating the expectation of subtle self-rewards from a "pure" concern for the victim and insists that altruism should not be disclaimed even if it is not "pure" (Steblay, 1991, pp. 10, 15).

To insist on such a sharp separation of motives ignores that helping another is one of the most important acts an individual can perform and trivializes the meaning of these acts (Simmons, 1991, pp. 1-22).

Research into the phenomenon of altruism has generated ideas in support of a number of variables that relate to helping behavior. Staub (1991) found that happy people (those in a positive mood) are more helpful than unhappy people (those in a negative mood). Persons whose social orientation was positive towards other people, and included a sense of responsibility and concern for the welfare of others were more likely to respond to calls for help. People are inclined to be helpful to those who hold similar
beliefs than towards persons who are markedly different (Hunt, 1990, pp. 124, 125, 145).

Batson, et al. (1986) studied several personality characteristics reported in the literature as being associated with increased helping. Sixty female undergraduate students participated in this study. Subjects were first asked to complete questionnaires that measured four personality variables: self-esteem, social responsibility, ascription of responsibility, and dispositional empathy. Under the guise of another unrelated experiment these same subjects were then faced with a situation in which they were given an opportunity to help a person in distress. The helping opportunity was structured to create both an easy escape condition and a difficult escape condition. Each subject was given the opportunity to decide how they would respond to the distress call. The study demonstrated that the motivation for helping was to avoid shame and guilt for not helping rather than helping the other as an end in itself. The investigators found no evidence that any of the four personality variables, generally associated with altruism, was related to altruistic motivation (Batson, et al., 1986, pp. 212-220).

One study investigated the relationship between personality variables, altruism and compensation. Romer, et al. (1986) initially constructed a questionnaire based upon a helping-orientation model and then conducted a study using
94 undergraduate students to test the validity of this model. The helping-orientation model consisted of four helping orientations: altruistic, receptive-giving, inner-sustaining and selfish. Romer, et al. hypothesized that the strength of two interpersonal motives, nurturance and succorance, define these four helping orientations toward giving and receiving help. To test this hypothesis, students were asked to respond to situations posed on the Helping-Orientation Questionnaire (HOQ) in which the responses were framed corresponding to one of the four helping orientations. Respondents were then assigned to one of the four helping-orientation types based upon their responses. The investigators found that altruistic and receptive-giving people were nurturant toward others and were more predisposed to help others when compensation was expected. Selfish and inner-sustaining people were not nurturant and were inclined to accept help more than give it.

A second study was designed to test the relation between these helping orientations, actual helping behavior and compensation. Sixty-five undergraduate students participated by first completing the HOQ. Once their helping orientation was determined they were then assigned to the compensation/no compensation conditions. The investigators found that when no compensation was offered, subjects identified on the HOQ as altruists tended to be more likely to give help and volunteer time than other groups. The
report suggested that altruists help others less when they are compensated because they interpret the ability to compensate as a sign that the needy person has less need than if the needy person cannot compensate the helper (Romer, et al., 1986, pp. 1001-1012).

Although the capacity to act altruistically differs little by gender, there has been support demonstrating differences in the relationship between the kinds of altruistic behavior males and females engage in and the types of situations in which they will offer help. Hunt (1990) reports that men have been shown to offer help more in risky or physically strenuous situations whereas women will offer emotional help more in nurturing, caring situations (Hunt, 1990. p. 116). Kerber's (1984) study suggested gender may influence helping indirectly as a reflection of the helper's perception of the rewards and costs associated in the social situation (Kerber, 1984, pp. 177-187). Eisenberg, et al (1989) found no significant differences between genders when studying the relations of personality variables to helping (Eisenberg, et al., 1989, pp. 41-67).

The effects of age on helping behaviors have been studied by several investigators. Rushton (1976, 1986) reported that altruistic behaviors increased with age. Rai, et al. (1989) investigated the relationship between age and altruism by sampling 90 male students aged 16-26. A thirty-
item Altruism Scale in Hindi developed by Rai and Singh, 1988, was used to measure altruism. Results indicated that as age increases so does altruism. The investigators further deduced that as one encounters more situations that call for help, the helper's degree of altruism will increase (Rai, et al., 1989, pp. 121-128).

A common belief that urban dwellers are less helpful than rural people has generated considerable research. Evidence both for and against this relationship has been documented in the literature. Some studies have shown greater helping rates in rural dwellers (Rushton, 1978) while others have shown just the opposite (Weiner, 1976). Studies have also reported no differences in helping behaviors of people in either urban or rural settings.

Steblay (1987) conducted a meta-analytic review of research investigating the rural-urban effect on helping behavior. The sample consisted of 32 published reports, two convention papers, and one unpublished report, representing 65 hypotheses and 14,221 subjects. Results indicated a greater helping response in the rural communities. The overall pattern of the relationship between community size and helping behavior however, was not in the manner initially assumed. Steblay found that helping rates in large urban communities (population more than 300,000) and small rural communities (population less than 5,000) were similarly low. Whereas, a positive relationship between
helping behaviors and population sizes over 5,000 and under 300,000 was demonstrated (Steblay, 1987, pp. 346-356).

Weiner (1976) investigated whether residents of urban vs. rural areas differed in helping behaviors. One hundred twenty-six undergraduate students, representing a cross-section of the major regions of the United States, participated in the study. A staged emergency situation was presented to evoke helping behaviors among the subjects. A six-point scale was developed to quantify the magnitude and type of helping response. The victim recorded each subject's response to the incident. Results of this experiment found that a lower rate of helping behavior was provided by the rural group of subjects than the urban groups. Weiner also tested for the effects of gender and race on helping responses of the subjects and reported that neither gender nor ethnic origin affected the frequency of helping responses. Weiner sought to explain the findings by attributing the differences in helping to subjects viewing the victim as a stranger or outsider rather than kin or insider (Weiner, 1976, pp. 112-124).

Ben-Shem and Avi-Itzhak (1991) reported a study investigating the relations between work values and vocation decisions in students aspiring to careers in helping and other professions. The Work Values Inventory Scale developed by Super (1970) was distributed to 486 freshman students enrolled in higher education in Israel.
Investigators found that the direct care for the well being of others was more important for aspirants with careers in helping professions than to their counterparts in other professions. Those entering the helping professions tended to be more caring, compassionate and empathetic (Ben-Shem & Avi-Itzhak, 1991, p. 376).

Other factors could account for the reportedly low compliance to universal precautions practices. A personality dimension that may directly influence the performance of universal precautions practices and helping behaviors is locus of control.

Locus of Control

The concept of internal and external control of reinforcement or locus of control, evolved from social learning theory. The basic concepts of social learning theory were originally developed for the clinical psychologist to use in understanding how choices are made by persons from the variety of potential behaviors available to them. The premise was that learning and performance in specific situations differs when persons perceive that they control the contingency between behavior and reinforcement than when they perceive that they lack such control. Thus, the interplay of learned needs and reinforcers, expectancies for success, generalized problem-solving expectancies and the nature of the event/situation all influence one's locus of control (Phares, 1976, pp. 13, 17, 25, 68).
Phares was the first to attempt to measure belief in locus of control as a personality dimension in 1955. He constructed a Likert-type scale, comprised of 13 items stated as external attitudes and 13 items stated as internal attitudes to measure chance and skill effects on expectancies for reinforcement of behaviors. Persons who perceive a causal relationship between their behavior (skill, ability) and the occurrence of rewards or anticipated achievement of desired goals are referred to as internals. Persons who regard the occurrence of rewards as beyond their control (fate, luck) are referred to as externals. Phares found some evidence that he could predict the behavior of individuals within a task situation based upon their locus of control (Phares, 1976, pp. 1, 3, 38-39).

Other investigators followed up on Phares’ original work of 1955 and sought to revise and improve upon Phares’ instrument. In the early 1960s Rotter, Liverant and Seeman sought to develop the locus of control scale along multiple dimensions. A 100-item forced choice questionnaire was designed. Each item on the scale consisted of a pair of statements. One of the statements in an item related to an external belief and the other statement dealt with an internal belief. When this 100-item scale was subjected to factor analysis it was reduced down to 60 items. Further improvements resulted in the final version of the scale that
became known as the Rotter Internal-External (I-E) Control Scale. This scale has 23 I-E items and 6 filler items (Phares, 1976, pp. 39-41; Rotter, 1966, pp. 4-5). Researchers have suggested that Internals are more active, inquisitive/information seekers, alert, or directive in attempting to gain control over their life events and manipulate their environments than are Externals. Kalpaka and Lachenmeyer (1988) suggest that individuals with I-E Control Scale scores reflecting stronger generalized beliefs regarding control over outcomes (internally locused) possess more competence, confidence, and initiative than their counterparts (Kalpaka & Lachenmeyer, 1988, p. 418). Furthermore, a higher level of coping and activity would be anticipated from Internals. Externals seem to be more conforming, less confident, more susceptible to influence and persuasion and more sensitive to social demands (Phares, 1976, pp. 60-63, 65, 89).

Research conducted by Liverant and Scodel (1960) studied the effect of locus of control on risk-taking behaviors. Using a dice throwing task, subjects' bet placing preferences were examined. The investigators found that Internals were more cautious in their control efforts, i.e. less willing to take risks while Externals were more willing to engage in riskier behavior (Liverant & Scodel, 1960, pp. 1-7).

Bierhoff, et al. (1991) tested the concept of an
altruistic personality and locus of control with proven first-aiders (n = 43) who intervened after a traffic accident. It was hypothesized that high internal locus of control should increase helping because it implies the belief that it is possible to influence events in the environment. The sample of known first-aiders were compared to a group of non-helpers matched on sex, age and social status. First-aiders were found to be more socially responsible, empathetic and Internal (i.e. where performance and results are systematically related) (Bierhoff, et al., 1991, pp. 263-280).

Prehospital emergency medical care providers are often placed in highly stressful field situations in which they must rely on their problem-solving, decision-making skills in managing the crisis at hand. Anderson (1977) conducted a study that examined the relationship between the coping behaviors, decision behaviors of managers in a stress setting and locus of control. Ninety small business owners participated in the study, conducted in a Pennsylvania community following the flooding associated with Hurricane Agnes. Two data collection phases were scheduled over a three and one-half year period. Interviews were conducted to obtain subjects perceptions of the threatening situation (Subjective Stress Scale), coping behaviors and measure of locus of control (I-E Control Scale). Coping behaviors were categorized according to the Kahn, Wolfe, Quinn, Snoek, and
Osenthal classification scheme. Results indicated that externals perceived higher stress than internals and demonstrated less task-oriented coping behavior than internals. This same relationship was demonstrated over time (Anderson, 1977, pp. 446-451).

The relationship of locus of control to decision-making skills was also studied by Neaves (1989). The sample consisted of 93 senior nursing students enrolled in a 3-year diploma program and a university-based baccalaureate program. Rotter’s I-E Control Scale (1966) and a two-part decision-making questionnaire (Medication Administration Questionnaire) were administered to the two groups of students during class time. The investigator’s hypothesis that an internal locus of control was positively related to independent decision-making in nursing students was supported. It was suggested that an external locus of control may hinder the incorporation and implementation of the principles and conduct of accountable professional practice (Neaves, 1989, pp. 12-17).

Bishop and Solomon (1989) conducted an investigation examining the relationship between gender differences, locus of control and career commitment. They hypothesized that gender influences both locus of control and career commitment. Approximately 300 graduate students enrolled in an MBA program at a large urban university participated in the study. Rotter’s (1966) I-E Control Scale and a modified
organization commitment questionnaire developed by Porter, Steers, Mowday, and Boulian (1974) were used to collect data. Results supported the first hypothesis that suggested as men age, they become more internal; as women age, they become more external. A change in locus may be due to women's feeling of helplessness in overcoming obstacles to career establishment and advancement. A second hypothesis related to career commitment and gender was not significant. Similar levels of career commitment were reported regardless of gender (Bishop & Solomon, 1989, pp. 107-114).

Gender orientation, locus of control and occupational status were studied by Kapalka and Lachenmeyer (1988). They proposed that supervisors would exhibit more internal locus of control scores and androgyny scores than a control group of non-supervisors. Thirty-two males and 37 females participated in the study by completing Rotter's (1966) I-E Control Scale and the Bem Sex-Role Inventory. Results confirmed that supervisors were more internal than non-supervisors. Moreover more women supervisors were internally locused than women in non-supervisory positions (Kapalka & Lachenmeyer, 1988, pp. 417-427).

An attempt to explain urban-nonurban differences in social behavior occurred when Witt (1988) hypothesized that nonurban residents may possess a more Internal orientation in locus of control than urban residents. Witt reasoned that nonurban residents may see a more direct relationship
between personal effort and outcomes than urban residents who are more likely to be influenced by external forces. Using Rotter's I-E Control Scale and the Just World Scale, 130 undergraduate students were asked to participate in a study addressing the relationship between hometown residence (urban, rural) and social cognition. Results suggested that the residential experience affects the manner in which a person processes information about the social environment. Students who came from nonurban areas demonstrated a more Internal orientation in locus of control and held a stronger belief in a just world than those students who indicated they came from urban environments (Witt, 1988, pp. 715-717).

Summary

The review of the literature included historical as well as current research on the subject of prehospital emergency medical care providers, their exposure to bloodborne pathogens and infection control practices. Very little is known about why prehospital emergency medical care providers do not consistently use universal precautions to prevent occupationally related exposure to bloodborne pathogens. In order to gain a fuller understanding of this phenomenon several theoretical frameworks were explored for use in this setting. The review of the literature has indicated that locus of control and altruistic behaviors have been attributed to helping acts. Although locus of
control has not been studied with this population, it has been shown to have merit in that conceptually it can be applied to study the attitudes and behaviors of prehospital emergency medical care providers to gain a better understanding of their resistance to universal precautions practices.

The literature further suggests that some people may be innately predisposed to learn to respond to calls for assistance (protectionary instinct), while others believe altruism to be learned behaviors reinforced by social norms. The educational process serves to develop these primary altruistic behaviors through various learning experiences. This study supports the thesis that humankind has a certain tendency towards altruism and that these behaviors can be reinforced and refined in the educational setting.

There is a need to study universal precautions practices in the working environment as they relate to prehospital emergency medical care providers in an attempt to describe adherence to OSHA's employee protection standard which became effective March, 1992. This standard required employers to develop bloodborne pathogens safety and health standards for employees with "reasonably anticipated"... contact with blood or other potentially infectious materials in the course of performing their jobs (Department of Labor, 1991, p. 64175). Evidence suggests that occupational exposure to bloodborne pathogens continues to pose a
significant risk at present and in the future to prehospital emergency medical care providers. There needs to be a point at which the seriousness of this event becomes a reality to the providers. Perhaps the data derived from a study such as this can be a turning point in prehospital emergency medical care providers's universal precautions practices to improve compliance thereby decreasing the hazards to them and the costs to their employers and ultimately to the health care system.

Prehospital emergency medical care providers have undertaken their work deliberately and with benevolence aforethought. Their actions to aid others in distress often transcend their concern for self and result in extreme personal sacrifice. Attributions of altruistic motives should readily be made to helpers who suffer as a result of their helping behaviors (Swap, 1991, pp. 49-64).
CHAPTER 3
METHODOLOGY

Introduction
This section explains the design of the study, sampling procedures, the method of data gathering and the statistical procedures used in data analysis. The instrument used to gather data is discussed in this chapter.

The research design used in this study was descriptive. Descriptive research is non-experimental, describes conditions as they exist and attempts to discover relationships between existing non-manipulated variables (Best, 1981: 25). The survey method was employed to accomplish the purposes of this study.

Research Questions

The following research questions were posed to determine the relationship between locus of control and altruism on the universal precautions practices of prehospital emergency medical care providers.

1. Was there a relationship between locus of control and prehospital emergency medical care providers universal precautions practices?

2. Was there a relationship between altruism and prehospital emergency medical care providers universal precautions practices?
3. Was there a relationship between locus of control and altruism among prehospital emergency medical care providers?

4. Was there a relationship between the extent of occupational risk and prehospital emergency medical care providers universal precautions practices?

5. What personal attributes and/or factors would predict universal precautions practices among prehospital emergency medical care providers?

6. What effect would OSHA’s Occupational Exposure to Bloodborne Pathogens: Final Rule have on universal precautions practices among prehospital emergency medical care providers?

Hypotheses

Hypothesis Number One.

1A. There would be a relationship between locus of control and the frequency of universal precautions practice by a prehospital emergency medical care provider.

1B. Locus of control would have a greater significant impact on the universal precautions practices of a prehospital emergency medical care provider than other variables (altruism, occupational risk, personal factors)

Hypothesis Number Two.

2. There would be a relationship between the Values Scale - Altruism scale score, and the frequency of universal precautions practice by a prehospital emergency medical
care provider.

**Hypothesis Number Three.**

3. There would be a relationship between the I-E Control Scale (Rotter, 1966) score and the Values Scale - Altruism Scale (Super & Nevill, 1985) score among prehospital emergency medical care providers.

**Hypothesis Number Four.**

4. There would be a relationship between occupational risk and the frequency of universal precautions practice by a prehospital emergency medical care provider.

**Hypothesis Number Five.**

5. There would be a relationship between the frequency of universal precautions practice and the prehospital emergency medical care provider's EMS training program, infection control training, level of certification, employment status, years of formal education, marital status, age, years of related experience, size of community served, Hepatitis B vaccine status, and number of reported exposure incidents.

**Hypothesis Number Six.**

6. There would be a difference in prehospital emergency medical care providers reported frequency of universal precautions practices following implementation of OSHA's Occupational Exposure to Bloodborne Pathogens: Final Rule in 1992 as compared to reported use prior to 1992.
Data Collection

The basic approach utilized to collect the data necessary to answer the posed questions was a questionnaire. Discrete, nominal data were collected to include the personal characteristics of the respondents (Treece and Treece, 1977, p. 144). These included the prehospital emergency medical care providers age in years, gender, marital status, level of formal education, race, certification level, total years of experience, present employment status and size of community served, type of certification training program, length of time in present position, reported occupational exposure incidents, and Hepatitis vaccination status. The SPSS-X computer program was used to analyze the data (SPSS, 1987).

All subjects agreeing to participate in this study were asked to complete a personal data sheet as well as Rotter's I-E Control Scale (1966), The Values Scale - Altruism Scale (Super & Nevill, 1985), an occupational risk exposure indicator and a universal precautions practices pre and post OSHA scale. The personal data sheet provided information on the variables to predict compliance to universal precautions.

Sampling Procedures

A listing of all provider agencies in the Tidewater Emergency Medical Services Region was obtained from the Tidewater Emergency Medical Services Council (TEMS). A
letter was sent to the EMS Director or agency contact person within each agency requesting their participation in this study (refer to listing contained in see Appendix C). A meeting was requested with those departments agreeing to participate in this study. The purpose of the meeting was to determine the best way to distribute the questionnaires to the emergency medical care providers and to ensure their timely return.

Many of these agencies have both career and volunteer EMS providers on their rosters. Some EMS agencies are staffed with all career providers, while some other agencies provide prehospital emergency medical care with an entirely volunteer staff. Career providers are those who receive monetary compensation for their services. They are considered employees of the agency. Volunteer providers are those who donate their professional services to the agency, without monetary compensation. There are prehospital emergency medical care providers who are paid employees for one EMS agency and who volunteer in another EMS agency in the TEMS region.

To reduce sampling bias (increase representativeness) a probability sampling method was used. Stratified random sampling was used to select the potential participants for use in the study. This procedure involved dividing the population into two subgroups; BLS providers and ALS providers. Level of certification being the stratifying
variable. In the Tidewater Emergency Medical Services Region as of July, 1992 there were 5,145 certified BLS providers and 564 certified ALS providers (population size). To guarantee appropriate representation of both groups in proportion to their size in the population of EMS providers all career (paid, full-time and part-time) and volunteer (without monetary compensation) ALS providers in the participating agencies were sampled. BLS providers were selected randomly from the participating agencies employee rosters. The BLS sample included both career (full-time and part-time) employees as well as volunteers (Polit & Hungler, 1991. pp. 262-263).

Rosters of EMS providers employed by each agency were used in selecting the sample. A random numbers table was used to draw a sample of the desired size.

There was no prior research on the strength of the relationship between the independent and criterion variables. There were two extraneous variables: race/ethnicity and gender, that were controlled for during the statistical analysis. A table for determining needed sample size of a randomly chosen sample from a given finite population was used. Based upon this table the sample size would need to include 361 useable questionnaires (Krejcie & Morgan, 1970, p. 607-610). Approximately 1,200 subjects or 21% of the total population were sampled, acknowledging a return rate of 30-50% for questionnaires. The number of
questionnaires distributed was based upon the following rationale. EMS providers are certified every two - four years therefore, many in the population may not be currently employed or volunteering at the time of data collection. Furthermore, an EMS volunteer may be on the inactive role duty status, thus not be scheduled to pull duty time during data collection.

A cover letter was prepared, informing each prospective participant of the name of the investigator, the purpose of the investigation, how the data will be used and the procedure for the return of the questionnaire. Participants were informed that the purpose of the research was to investigate ways to reduce potential occupational exposure to bloodborne pathogens by examining what behaviors place them at risk, both internal factors as well as occupationally related, and what infection control measures are practiced. The cover letter was attached to the personal data sheet, the I-E Control Scale, The Values Scale - Altruism Scale, occupational risk behavior index and universal precautions practice scale.

Each prospective participant was guaranteed anonymity. Names were neither requested on the questionnaire nor on the personal data sheet. Confidentiality of each subject was safeguarded by reporting research information in the aggregate only.
Data Gathering Instruments

The instrument selected to measure self-reported perceptions of locus of control was a tool originally developed by Phares (1957) and later revised by Rotter (1966). The Rotter Internal-External (I-E) Control Scale is a tool designed to measure a person's perceptions of contingency relationships between their own behavior and events which follow that behavior, i.e. perceptions of the degree to which a person feels their rewards are contingent upon their behavior. The I-E Scale consists of a 23-item, forced-choice test with 6 filler items intended to obscure the purpose of the test. Each item consists of a pair of alternative statements lettered a or b. Respondents were asked to select the one statement of each pair that more strongly reflected their personal beliefs. Scores could range from zero (0) to 23.

The individuals score reflected the total number of external choices (Rotter, 1966, p. 10).

Locus of Control scores were operationalized along a single internality-externality continuum. Lower scores reflected stronger generalized beliefs regarding control over outcomes (Internality). Weaker generalized beliefs regarding control over outcomes (the influence of luck, chance) are reflected in higher scores (Externality). The copyright on this instrument expired and the scale is in the realm of public domain.
An internal consistency coefficient (Kuder-Richardson) of .70 was obtained from a sample of 400 college students. Test-retest reliability for a one month period using 30 college students was reported as $r = .60$ (Rotter, 1966, p. 13). Anderson (1977, p. 447) reported a split-half coefficient of .76 for the I-E Scale when used in his study.

The instrument was reported as having construct validity, "that potentially will predict moderately well across a number of situations" (Phares, 1976, p. 42).

The instrument selected to measure the concept of altruism was The Values Scale, developed by the Work Importance Study an international consortium of vocational psychologists led by Donald Super, Ph.D.. Dr. Super and Dorothy Nevill, Ph.D. co-authored the American version of this scale. The Values Scale (1985) in its entirety contains 106 items measuring 21 values, one of which is altruism. The altruism scale consists of five items, at least two of which relate to work values and at least two of which relate to values in general. Respondents were asked to rate each item according to the following 4-point scale: 1 for little or no importance, 2 for some importance, 3 for important, and 4 for very important. The score was the sum of the weights given by the respondent to each item scored for each value. Scores could range from 5 to 20 (Nevill & Super, 1986, pp. 7-10, 20-26.). Permission to use this scale was obtained from Consulting Psychologists Press, Inc.
A copy of the permission agreement can be found in Appendix A.

Two measures of reliability were reported for the altruism five-item scale: internal consistency (alpha coefficient) for high school, university and adult samples and stability (test-retest over a two- to four-week interval) for the university sample. Alpha coefficient for the adult sample (N = 323) was reported as .84. Test-retest correlations for the university sample were reported as .71 (N = 83) and .76 (N = 140). The instrument was reported as having face and content validity.

To measure potential occupational exposures to bloodborne pathogens and the use of protective devices by prehospital emergency medical care providers questions were adapted from a 1988 survey conducted by the Special Office on AIDS Prevention, Center for Health Promotion, Michigan Department of Public Health with the primary author’s permission (Smyser, et al., 1990). Three major activities are assessed: needlestick exposure and recapping; blood exposure of unprotected skin and protective barrier use; and resuscitation efforts and protective equipment use. This instrument used a combination of multiple choice items and agree - disagree statements. A series of skip - questions were also employed in the design of the tool. For each statement respondents were instructed to circle the letter that best applied to them. Scores could range from 12 - 35.
Lower scores conveyed lower occupationally related exposure risk. Higher scores conveyed higher occupationally related exposure risk. The letter of permission to adapt this survey for the research purposes of this investigator can be found in Appendix A.

Questions to measure potential exposures to bloodborne pathogens and the practice of infection control measures were also adapted from a 1991 survey conducted by the Division of Field Services, Centers for Disease Control, Atlanta, Georgia and the Epidemiology Program and Office of Emergency Medical Services, Florida Department of Health and Rehabilitative Services, Tallahassee. Permission to adapt this survey to the needs of this study was obtained from the primary investigator, Karl C. Klontz. A letter of permission from Dr. Klontz is located in Appendix A. There are no published reports of reliability or validity for either of these two instruments.

Adherence to OSHA’s Final Rule was measured using performance criteria identified in the Occupational Safety and Health Act Section 1910.1030. This ruling went into effect in 1992. The instrument consisted of 12 universal precautions practices items identified in OSHA’s Exposure Control Plan (Department of Labor, 1991, pp. 64175 - 64181). The instrument was designed in such a way that respondents could indicate compliance with each universal precaution practice item during the period of time just prior to the
Final Rule going into effect (prior to May, 1992) and after the rule went into effect (after May, 1992). The row identified the infection control behavior. The columns specified the time period; prior to May, 1992, and after May, 1992. The dependent variable was the providers' responses to frequency of universal precautions practices for the column marked after May, 1992. A Likert-type scale, consisting of 5-points, ranging from always to never, including a fifth category for don't know/remember was used. Respondents were instructed to indicate their compliance with universal precautions practices by circling the number that indicates the frequency of the practice. Scores could range from 12 - 48. Lower scores reflected higher frequency of universal precautions practice. Higher scores reflected lower frequency of universal precautions practice. Workplace evaluations using these criteria are to be conducted by the Assistant Secretary of Labor for Occupational Safety and Health or designated representative (Department of Labor, 1991, p. 64173). There are no published reports of said evaluations to date.

**Statistical Treatment**

In testing the hypotheses to determine the relationship of locus of control, altruism and occupational risk to universal precautions practices correlation coefficients were performed. Pearson Product Moment Correlation Coefficients were computed to describe the degree and
magnitude of the relationships between and among the variables. Data were examined across two groups; BLS providers and ALS providers. Analysis of variance was used to analyze significance of differences between these two groups results on measures of universal precautions practices. Multiple linear regression analyses were performed to quantify relationships and predictive power of significant variables (locus of control, altruism, occupational risk, personal characteristics of respondents) associated with universal precautions practices. Variables were entered into the equation according to their contribution in explaining the variance in the dependent variable. If they failed to meet the criteria for inclusion they were excluded from the equation (Streiner, 1986, pp.59-61).

For this study a statistical significance level of p = .05 was the point at which the likelihood of obtaining an observed difference did not occur by chance alone. Therefore, it was concluded that the independent variable(s) had some effect on the outcome (Streiner, 1986, p. 37).

Descriptive statistics were used to describe the data obtained in the section of this study related to exposure incidents. Frequency counts and percentages for the values of individual sub-scales by level of certification were produced. A description of respondents (prehospital emergency medical care providers) potential for occupational
exposure and reported incidents, by level of certification were reported. Measures of central tendency and dispersion were provided in describing and analyzing the data in a meaningful way.

There were several attribute variables of prehospital emergency medical care providers that could have had an influence on the results of this study. Therefore, a multiple regression analysis was performed to determine if any of these variables were significant predictors of the practice of universal precautions. The results of the stepwise multiple regression were interpreted using the multiple R statistic, R squared, and beta values. Multiple R represented the correlation between the dependent variable and all independent variables which entered into the equation. The square of the multiple correlation represented the proportion of variance explained by the independent variables which entered into the equation. The beta weights represented the change in the dependent variable by the unit of change in the independent variable when both were measured in terms of standard deviation units (Streiner, 1986, pp.57-61). Two extraneous variables: race/ethnicity and gender, were controlled for in the statistical analysis.

Dependent t-Tests were utilized to examine if there were significance differences between the frequency of universal precautions practices pre-OSHA to post-OSHA. The
t-Test was used to test the hypotheses that the two populations means were equal.

An ANOVA was performed to determine significant differences between BLS and ALS providers universal precautions practices pre-OSHA to post-OSHA. The explained variation was the difference between each group mean and the overall mean of the dependent variable. The F-ratio represented the variability between groups compared to the variability within groups (Streiner, 1986, pp. 48-50).

**Summary**

This chapter reported the methodology used to determine the relationships between locus of control, altruism, occupational risk and identified personal characteristics of prehospital emergency medical care providers to their universal precautions practices. Qualitative data was used to describe the selected demographic characteristics of the prehospital emergency medical care providers. Quantitative data was analyzed using inferential statistics.
Chapter 4
ANALYSIS OF DATA

Introduction

This chapter presents the findings of the study. Demographic data of the participants are presented, as well as analysis of the hypotheses. Relationships between locus of control, altruism and occupational risk to prehospital emergency medical care providers universal precautions practices are described. The effects of OSHA's Final Rule on providers universal precautions practices are presented.

Description of the Sample

Of the 1,189 questionnaires distributed to EMS agencies within the TEMS region, 361 (30%) were returned prior to the deadline. Three hundred fifty-nine were used in this study. Two questionnaires were discarded for inclusion due to incomplete data.

Information for this study was obtained from basic life support (BLS) and advanced life support (ALS) prehospital emergency medical care providers employed or volunteering in municipal and private emergency medical services agencies throughout the Tidewater Emergency Medical Services area (Appendix A).

Basic Life Support Providers. Of the 139 participating basic life support providers (those who indicated level of
certification as Basic EMT or not certified/first-responder), the modal age range was 21 - 30 years of age (n = 62), with ages ranging from less than 20 years to 61+ years. Figure 1 presents the distribution of the sample of basic life support providers (BLS) across the age ranges. Fifty-eight percent (n = 81) of the BLS providers were male, 41% (n = 57) were female. This item was left blank on one questionnaire.

One hundred twenty-five (90%) respondents were classified as Caucasian, seven (5%) identified themselves as African-American, one (.7%) reported Hispanic with three questionnaires (2%) indicating "other". Three questionnaires had this data missing.

Thirty-five percent (n = 48) of the respondents indicated they were single, 57% (n = 79) reported they were married, eight percent (n = 11) indicated "other" marital status and one questionnaire had missing data in this category.

The highest level of education completed by 61 (44%) BLS providers was "some college". Forty-six (33%) respondents remained at the secondary level of education (high school graduate), 26 (19%) reported completing a four year degree program, and six (4%) reported graduate degrees.

Thirty-three percent (n = 46) of BLS providers reported they had completed EMS training through a community college. Seventy-one percent (n = 99) of the respondents had
Distribution of BLS Providers by Age Ranges

Figure 1

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completed their EMS training through a vocational/technical program. Thirteen percent (n = 18) reported receiving their training through the US military and 40% (n = 55) reported attending "other" EMS training programs, such as hospital based or individual agency based programs. Figure 2 presents the distribution of the BLS providers according to the type of EMS training programs completed.

Approximately 95% (n = 130) of the BLS providers indicated they had received infection control training in their last EMS course content. Six percent (n = 8) indicated they had not received infection control training in their last EMS course content.

One hundred-three (74%) of the BLS providers indicated they were presently serving as EMS volunteers, and 22 (16%) were EMS paid. Twenty-eight (20%) indicated that they were presently volunteer firefighters, and eight (6%) were paid firefighters. Some respondents checked more than one category, suggesting that they are both career and volunteer providers. Figure 3 presents the distribution of the sample according to their present employment status.

Fifty-six percent (n = 78) of the BLS respondents indicated that they had between one to five years as a volunteer EMS provider. Over 13% (n = 19) indicated between six to ten years of experience as a EMS volunteer. Fourteen percent (n = 19) indicated they had between one and five years as a paid EMS provider. Two percent (n = 3) indicated
Figure 2

Type of EMS Training Program
For BLS Providers

Comm-College 29% 46
Vo-Tech 25% 40
US Military 11% 18
Other 35% 55

N = 139
Figure 3

Distribution Of BLS Providers
According to Present Employment Status

Absolute Frequency

Vol. EMS  |  Pd. EMS  |  Vol. FF  |  Pd. FF
0          |  20       |  40       |  60

n = 139
between six to ten years as a paid EMS provider. The years of experience as a paid EMS provider ranged from newly employed to 20 years, with a mean employment period of 14 months.

Fifteen (11%) respondents indicated some past experience as a paid firefighter. Seven (5%) had one year or less experience as a paid firefighter. One hundred twenty-four (89%) reported no previous experience as a paid firefighter. Ninety-eight (70%) of the BLS providers had no volunteer firefighter experience. Forty-one (29%) of the respondents indicated some past experience as a volunteer firefighter. The number of years spent as a volunteer ranged from one year to 20+ years, with a mean of 20 months.

Sixty-one (44%) of the BLS respondents worked in an urban area and 61 (44%) indicated they worked in a suburban area. Fifty-three (38%) of the BLS providers reported working in a rural area. Some of the respondents indicated working in more than one geographical area in their career and volunteer positions.

The number of prehospital emergency medical care providers at the BLS level of certification reporting exposure incidents (direct body contact without personal protective equipment) in the last 12 months varied from zero exposure (n = 105) to greater than five exposures, (n = 3). Figure 4 presents the distribution of the number of exposure incidents reported by the respondents.
Figure 4

Number of Exposure Incidents
Reported by BLS Providers

<table>
<thead>
<tr>
<th>Number of Exposures</th>
<th>Absolute Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>110</td>
</tr>
<tr>
<td>1-5</td>
<td>20</td>
</tr>
<tr>
<td>+5</td>
<td>0</td>
</tr>
</tbody>
</table>

N = 139
One hundred-fifteen (83%) respondents reported receiving the hepatitis B vaccine. Eighty-four (60%) indicated they had received all three doses. Four (3%) indicated receiving one dose, 16 (12%) received two doses, three (2%) indicated receiving four doses, one indicated five doses and one had six doses. Twenty-four BLS providers (17%) indicated they had not received any doses of the hepatitis B vaccine. The space to enter in the exact number of HBV doses received was left blank on six questionnaires. Figure 5 presents the distribution of BLS providers receiving the hepatitis B vaccine.

**Advanced Life Support Providers.** Advanced life support certification was held by 214 (60%) of respondents. To be classified as an advanced life support provider in Virginia, the technician must be certified as a shock trauma technician, cardiac technician or paramedic (Mayer, et al., 1990, p. 52).

The modal age range for ALS prehospital emergency medical care providers was 21 - 30 years (n = 87), with a range of 20 years or less to 61+ years. Figure 6 presents the distribution of the sample of ALS providers across the age ranges. One hundred sixty-one (75%) ALS providers were male and 52 (24%) providers were female. One respondent left this item blank.

One hundred ninety-eight (92%) respondents were classified as Caucasian, seven (3%) ALS providers identified
Hepatitis B Vaccine Immunization Status
For BLS Providers

Figure 5

Absolute Frequency

<table>
<thead>
<tr>
<th>Class</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
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<tr>
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<tr>
<td>2</td>
<td>2</td>
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<td>3</td>
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<td>1</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

N = 138
themselves as African-Americans, one (.5%) as Hispanic and five respondents indicated "other". Three questionnaires had data missing in this item. Twenty-nine percent (n = 62) of the ALS providers were single, 65% (n = 140) were married and four percent (n = 10) indicated "other". Two respondents omitted this data.

The highest level of educational preparation reported by 5% (n = 10) of the ALS providers was a graduate degree. Twenty-five (12%) remained at the secondary level of education (high school graduate). One hundred forty (65%) had completed some college and 38 (18%) had completed a four year degree program. One respondent omitted this item.

One hundred thirty-six (63%) ALS providers reported they had completed their EMS training through a community college. Thirty-nine (18%) respondents had completed EMS training through a vocational/technical program. Five (2%) reported receiving their training through the US military and 47 (22%) reported "other" EMS training programs, such as hospitals and EMS agencies. Figure 7 presents the distribution of the sample by type of EMS training programs completed.

One hundred eighty-three (n = 85) ALS providers indicated they had received infection control training in their last EMS course content. Twenty-nine (13%) indicated they had not received infection control training in their last EMS course content. Two questionnaires had this data
Figure 7

Type of EMS Training Program
For ALS Providers

Comm-College 60% 136
Vo-Tech 17% 39
Other 21% 47
US Military 2% 5

N = 214
Providers were asked to report their present employment status. One hundred fourteen ALS providers (53%) were currently working as volunteers in an EMS agency while 121 (57%) indicated they were currently paid EMS agency employees. Thirty-seven (17%) ALS providers were currently working as volunteers in a fire department compared to 81 (38%) who were paid fire department employees. Data suggests that some respondents may be paid employees in one agency (fire department) and volunteers in another (rescue squad). Figure 8 presents the distribution of ALS providers according to their present employment status.

Another question on the personal data sheet explored the years of experience as a firefighter and/or EMS provider. One hundred twenty-seven respondents (59%) indicated they had experience as a paid EMS provider. The years of experience as a paid EMS provider ranged from newly employed to 21+ years. One hundred sixty-five (77%) respondents indicated they had volunteer experience as a EMS provider.

Eighty-nine (42%) ALS providers indicated they had anywhere from one to 21+ years as a paid firefighter. One hundred twenty-five (58%) had no paid firefighter experience. Seventy-one (33%) ALS providers indicated they had worked as a volunteer firefighter, as compared to 143 (67%) who had not worked in this capacity.
Figure 8

Distribution of ALS Providers
According to Present Employment Status

<table>
<thead>
<tr>
<th></th>
<th>Vol. Ems</th>
<th>Pd. Ems</th>
<th>Vol. FF</th>
<th>Pd. FF</th>
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</thead>
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<tr>
<td>Absolute Frequency</td>
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<td></td>
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</tbody>
</table>

n = 214

Series 1
Of the 214 ALS providers responding to this questionnaire, 118 (55%) indicated they worked in an urban area. Eighty-three (38%) indicated they worked in a suburban area and 74 (34%) worked in a rural area.

The number of ALS providers reporting exposure incidents (direct body contact without personal protective equipment) in the last 12 months varied from zero exposure to greater than five exposures. One hundred thirty-six (63%) ALS providers reported no exposures. One to five exposures was indicated by 75 (35%) providers. Two respondents (.9%) indicated being exposed more than five times. One questionnaire had missing data. Figure 9 presents the distribution of the ALS respondents by number of exposure incidents.

Ninety-three percent (191) of the ALS respondents reported receiving the hepatitis B vaccine. Seventy-nine percent (n = 169) indicated they had received all three doses. Less than one percent (n = 2) indicated receiving one dose, and two percent (n = 5) indicated receiving four doses. One person (.5%) received six doses. Seven percent (n = 14) of the ALS providers indicated they had not received the hepatitis B vaccine. The space to enter in the exact number of HBV doses was left blank on seven questionnaires. The distribution of ALS providers according to their hepatitis B vaccine immunization status is presented in Figure 10.
Figure 9

Number of Exposure Incidents

Reported by ALS Providers

![Graph showing number of exposures]

Absolute Frequency

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Number of Exposures

N = 214
Analysis of the Hypotheses

Hypothesis Number One

Hypothesis 1.A.

There would be a relationship between locus of control and the frequency of universal precautions practices by a prehospital emergency medical care provider.

This hypothesis was rejected (p > 0.05).

The universal precautions practice scale consisted of 12 items adapted from the Department of Labor’s Occupational Health and Safety Administration Occupational Exposure to Bloodborne Pathogens; Final Rule, 29 CFR Part 1910.1030 (Department of Labor, 1991, pp. 64175-64182). Respondents were asked to report frequency of identified infection control practices after the Final Rule went into effect, (May, 1992). For each individual prehospital emergency medical care providers universal precautions practice scale, a mean item rating was computed. The instrument ranged from 1 = always engages in this behavior, to 4 = never engages in this behavior. A response of 5 was equated to "Don't know". Total scale scores could range from a low of 12 to a high of 60. The lower the total score the more frequently the provider practiced universal precautions. An overall mean item rating of 22.2288 and a standard deviation of 5.9560 were computed.

For each individual prehospital emergency medical care provider’s I-E Control Scale (Rotter, 1966) a mean item rating was computed. The instrument ranged from 0 (no belief
Figure 10
Hepatitis B Vaccine Immunization Status
For ALS Providers

Absolute Frequency

N = 214
or truth in this statement) to 23 (believes this statement to be true). The scale was recoded to give numerical values of 0 = 1 to items two, six, seven, nine, 16, 17, 18, 20, 21, 23, 25, and 29. An overall mean item rating of 9.4596 and a standard deviation of 4.2496 were computed. The Pearson Product Moment Correlation coefficient showed \( r = .0745, p > 0.05 \). The data are presented in Appendix F.

An overall mean item rating of 9.770 and a standard deviation of .369 were computed for total I-E Control Scale scores on the BLS providers. An overall mean item rating of 9.238 and a standard deviation of .287 were computed for total I-E Control Scale scores on ALS providers. A two-way analysis of variance was performed to determine if there were any differences among the prehospital emergency medical care providers universal precautions practices by level of certification (BLS and ALS) and locus of control. The analysis of variance showed \( F (20, 296) = 1.185, p > 0.05 \). The two groups of providers locus of control scores were normally distributed. The data are presented in Appendix G.

Hypothesis 1.B.

Locus of control would have a greater significant impact on the reported frequency of universal precautions practices by a prehospital emergency medical care provider than other variables (altruism, occupational risk, personal factors).

This hypothesis was rejected \( (p > 0.05) \).

Multiple linear regression analysis of the aforementioned survey items with stepwise selection of variables revealed
that locus of control was not related to universal precautions practices. Altruism was the only variable that significantly contributed to the variance of universal precautions practices among the providers. The data is presented in Appendix H.

**Hypothesis Number 2.**

There would be a relationship between altruism and the reported frequency of universal precautions practices by a prehospital emergency medical care provider.

This hypothesis was accepted, \( r = -0.1275, p<0.05 \).

For each individual prehospital emergency medical care provider's Values Scale - Altruism scale score, \( \text{(Super & Nevill, 1985)} \) an overall mean item rating was computed. The instrument contained five items that ranged from 1 (value of little or no importance) to 4 (value very important). Total scale scores could range from 5 (weakly altruistic), to 20 (strongly altruistic). Mean item ratings were reported for all respondents. An overall mean item rating of 16.6156 and a standard deviation of 2.8671 were computed for all respondents regarding Values Scale - Altruism scale score.

A Pearson Product Moment correlation coefficient was performed to determine if prehospital emergency medical care providers universal precautions practices were related to their Values Scale - Altruism scale score. A negative correlation was computed. Table 1 presents the data.

An overall mean item rating of 17.000 and a standard deviation of 2.700 were computed for BLS providers Values
<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Altruism</td>
<td>16.6156</td>
<td>2.8671</td>
<td>-2.1700</td>
<td>-.1275*</td>
</tr>
<tr>
<td>UPP</td>
<td>22.2288</td>
<td>5.9560</td>
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<td></td>
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</tbody>
</table>

*Signif. LE .05

UPP n = 354; Altruism n = 359
Scale - Altruism scale scores. An overall mean item rating of 16.379 and a standard deviation of 2.962 were computed for ALS providers Values Scale - Altruism scale scores. A two-way analysis of variance was also computed to determine if the prehospital emergency medical care providers universal precautions practices were significantly different according to their level of certification (BLS and ALS) and Values Scale - Altruism scale score. The analysis of variance showed \( F(1, 316) = 1.797, p < .05 \). The data are presented in Table 2.

**Hypothesis Number 3.**

There would be a relationship between reported I-E Control Scale (Rotter, 1966) scores and Values Scale - Altruism Scale (Super & Nevill, 1985) scores of prehospital emergency medical care providers.

The hypothesis was accepted at \( r = -0.1464, p < 0.01 \).

An overall mean item rating of I-E Control Scale (Rotter, 1966) scores of 9.4596 and a standard deviation of 4.2496 were computed. An overall mean item rating of Values Scale - Altruism Scale (Super & Nevill, 1985) scores of 16.6156 and a standard deviation of 2.8671 were computed. The Pearson Product Moment correlation coefficient used to test the hypothesis is presented in Table 3.

**Hypothesis Number 4.**

There would be a relationship between occupational risk and the reported frequency a prehospital emergency medical care provider would practice universal precautions.

The hypothesis was rejected at \( p > 0.05 \).
# Universal Precautions Practices of Providers

According to Level of Certification and Altruism

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Sqr.</th>
<th>D. of F.</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
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</thead>
<tbody>
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<td>Main effects</td>
<td>717.3611</td>
<td>13</td>
<td>55.182</td>
<td>1.828</td>
<td>0.038</td>
</tr>
<tr>
<td>2-way interaction</td>
<td>475.709</td>
<td>9</td>
<td>52.857</td>
<td>1.751</td>
<td>0.077</td>
</tr>
<tr>
<td>Explained</td>
<td>1193.070</td>
<td>22</td>
<td>54.2308</td>
<td>1.797</td>
<td>0.016</td>
</tr>
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<td>Residual</td>
<td>9537.974</td>
<td>316</td>
<td>30.183</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10731.040</td>
<td>338</td>
<td>31.749</td>
<td></td>
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</table>

n = 338
<table>
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Locus of Control</td>
<td>9.4596</td>
<td>4.2496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altruism</td>
<td>16.6156</td>
<td>2.8671</td>
<td>-1.7837</td>
<td>-0.1464</td>
</tr>
</tbody>
</table>

LOC n = 359; Altruism n = 359
For each individual prehospital emergency medical care provider's Occupational Risk Scale (ORS), an overall mean item rating was computed. Total scale scores could range from 12 (low occupational risk) to 35 (high occupational risk). Items in the scale were recoded to give numerical values of 1 = zero times, 2 = five times or less, 3 = six to ten times, 4 = more than ten times to ORS questions one, four, five and 11. ORS questions two, three, six, seven, and twelve were recoded to give numerical values of 1 = no, 2 = yes. Lastly, items in the scale were recoded to give numerical values of 1 = always, 2 = sometimes, and 3 = never to ORS questions, eight, nine, and ten.

An overall mean item rating of 22.2368 and a standard deviation of 4.8013 were computed for the occupational risk scale scores. An overall mean item rating of 22.2288 and a standard deviation of 5.9560 were computed for universal precautions practices. The Pearson Product Moment Correlation coefficient revealed no significant relationship. The data can be found in Appendix I.

Basic life support providers overall mean item rating on the occupational risk scale was 18.683 with a standard deviation of 4.911. The overall mean item rating on the same scale for ALS providers was 24.692 with a standard deviation of 2.321. A two-way analysis of variance was performed to determine if there was any interaction between occupational risk and level of certification on prehospital
emergency medical care providers universal precautions practices. Results revealed \( F (1, 301) = 1.865, p < .003 \), and are presented in Table 4.

The occupational risk scale assessed three major activities: needlestick exposure and recapping; blood exposure on unprotected skin and protective barrier use; and resuscitation efforts and protective equipment use. These three subscales were analyzed to determine if differences existed between the two groups (BLS and ALS). The first subscale consisted of the following three items. Sixty-five percent \((n = 90)\) of the BLS providers compared to .5% \((n = 1)\) of the ALS providers reported they did not use needles (inserting or removing I.V.'s administering injection, or performing veni-punctures) when treating a client. Of the 35% \((n = 48)\) BLS providers that reported using needles during client care, 6% \((n = 8)\) reported that they had received needlestick injuries. Ninety-nine percent \((n = 212)\) of the ALS providers used needles in client care and 8% \((n = 17)\) reported that they had received needlesticks. Seventeen percent \((n = 23)\) of the BLS providers indicated they recap used needles while sixty-nine percent \((n = 148)\) of the ALS providers recap used needles.

The next seven items on the occupational risk subscale relate to potential occupational bloodborne pathogen exposure. Five (4%) BLS and 12 (6%) ALS providers recorded
### Table 4
Universal Precautions Practices of Providers
According to Level of Certification and Occupational Risk

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Sqrs.</th>
<th>D. of F.</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
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<tr>
<td>Main effects</td>
<td>1569.692</td>
<td>22</td>
<td>71.3508</td>
<td>2.456</td>
<td>0.000</td>
</tr>
<tr>
<td>2-way interaction</td>
<td>380.292</td>
<td>14</td>
<td>27.164</td>
<td>0.936</td>
<td>0.521</td>
</tr>
<tr>
<td>Explained</td>
<td>1949.983</td>
<td>36</td>
<td>54.1668</td>
<td>1.865</td>
<td>0.003</td>
</tr>
<tr>
<td>Residual</td>
<td>8744.312</td>
<td>301</td>
<td>29.051</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10694.300</td>
<td>337</td>
<td>31.734</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ n = 337 \]
suffering a contaminated sharps cut, (percutaneous exposure). One hundred thirty-two (95%) of the BLS and 214 (100%) of the ALS providers treated bleeding clients in the line of duty. Forty-four (32%) of the BLS providers responded they had unprotected skin contact (cutaneous exposure) with client’s blood while 134 (63%) of the ALS providers report blood exposure to unprotected skin. Mucocutaneous exposure (splashes or splatters into eyes or mouth) to client’s blood was reported by four (3%) BLS and 14 (7%) ALS providers. Figures 11 (a) presents distribution of occupational exposure by type of risk activity for BLS providers and (b) for ALS providers.

Protective gloves were always worn by 100 (72%) of the BLS providers and 167 (78%) of the ALS providers when treating bleeding clients. Twenty-nine (21%) of BLS and 45 (21%) ALS providers responded they sometimes wear gloves when treating bleeding clients. A protective gown was never worn by 101 (73%) of the BLS group and 164 (77%) of the ALS group of respondents. Three (2%) BLS providers and one ALS (.5%) provider indicated they always wore a gown. Those who recorded wearing a protective gown sometimes totaled 25 (18%) BLS and 47 (22%) ALS. Special protective eyewear (other than regular eyeglasses) was reported as never worn by 92 (66%) of the BLS and 119 (56%) of the ALS providers. Three (2%) BLS and 4 (2%) ALS providers indicated they always wore protective eyewear when treating bleeding
Figure 11a

BLS Providers Potential Occupational Exposure
By Type of Risk

Absolute Frequency

N.S. Needlestick; S.Cut Sharps Cut; Recap. Recapping Needle; + 10 times needle use
N=139
Figure 11b

ALS Providers Potential Occupational Exposure
By Type of Risk

Absolute Frequency

N.S. Needlestick; S.Cut Sharps Cut; Recap. Recapping Needle; + 10 times needle use
N = 214
clients. Thirty-four (25%) BLS and 88 (41%) ALS providers responded wearing protective eyewear sometimes under the aforementioned conditions. Figures 12 (a) presents the distribution of type of personal protective equipment used by BLS providers and (b) by ALS providers.

The last two questions on the occupational risk subscale addressed resuscitation efforts and protective devices. Since May, 1992, cardiopulmonary resuscitation was performed by 76% (n = 106) of the BLS and 95% (n = 204) of the ALS providers. Fourteen (10%) of the BLS and 14 (7%) of the ALS providers performed mouth-to-mouth resuscitation without protective devices.

A two-way analysis of variance was performed to determine if the prehospital emergency medical care providers universal precautions practices were significantly different according to level of certification and the specific type of occupational risk: needlestick exposure, blood exposure, or resuscitation exposure. For needlestick exposure results showed [F (5, 325) = 1.016, p > .05]. For blood exposure results revealed [F (7, 317) = 1.981, p < .008], Table 5. For resuscitation exposure, results demonstrated [F (4, 326) = 1.571, p > .05].

For each individual prehospital emergency medical care provider’s knowledge of treating a client known or suspected of HIV/HBV infection score, an overall mean item rating was computed. The item ranged from 1 = zero times to 4 = ten
Figure 12a
BLS Provider Personal Protective Equipment Use
Type of Equipment Used

Absolute Frequency

Gloves; Gowns; Eyewear
N = 139

Always wear

Always 100
Always 3
ALS Provider Personal Protective Equipment Use

Type of Equipment Used

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Always 167</th>
<th>Always</th>
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<tbody>
<tr>
<td>Gloves</td>
<td>167</td>
<td>45</td>
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<tr>
<td>Gowns</td>
<td>164</td>
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<tr>
<td>Eyewear</td>
<td>119</td>
<td>88</td>
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N = 214
Table 5
Universal Precautions Practices of Providers
According to Level of Certification and Blood Exposure

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<th>Source of Variation</th>
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<td>79.138</td>
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<td>2-way interaction</td>
<td>159.105</td>
<td>7</td>
<td>22.729</td>
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<td>Explained</td>
<td>1187.896</td>
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<td>59.3958</td>
<td>1.981</td>
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<td>Residual</td>
<td>9506.400</td>
<td>317</td>
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n = 337
times or more. An overall item mean rating of 2.3116 and a standard deviation of .9853 were computed. A Pearson Product Moment Correlation coefficient was performed to compare universal precautions practices to knowledge of potential exposure to HIV/HBV. No significant differences in universal precautions practices were found that could be attributed to this knowledge. This data are presented in Appendix J.

Hypothesis Number 5.

There would be a relationship between the practice of universal precautions and the prehospital emergency medical care providers EMS training program, infection control training, employment status, level of certification, years of formal education, marital status, age, years of related experience, Hepatitis B vaccine status, and the number of exposure incidents.

A stepwise multiple regression analysis was performed. Three variables met the criteria for inclusion. OSHA’s Final Rule, (p< .000), r = .10463. Agency infection control policy, (p< .022), r = .14702. EMS training program, (p< .001), r = .13343. No other independent variables entered into the equation. Table 6 presents the data.

Hypothesis Number 6.

There would be a difference in prehospital emergency medical care providers reported use of universal precautions practices following implementation of OSHA’s Occupational Exposure to Bloodborne Pathogens: Final Rule in 1992 as compared to reported use prior to 1992. This hypothesis was accepted at p< .001.

There were twelve items in the universal precautions practice scale. Respondents were asked to report frequency
### Table 6
Stepwise Multiple Regression Analysis
Predicting Providers Universal Precautions Practices

<table>
<thead>
<tr>
<th>Variable</th>
<th>R Square</th>
<th>Multiple R</th>
<th>R Sq. Change</th>
<th>F Change</th>
<th>Sig. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA's Final Rule</td>
<td>0.10463</td>
<td>0.32346</td>
<td>0.10463</td>
<td>38.91205</td>
<td>0.000</td>
</tr>
<tr>
<td>U.S. Mil EMS Trng.</td>
<td>0.13343</td>
<td>0.36528</td>
<td>0.02880</td>
<td>11.03567</td>
<td>0.001</td>
</tr>
<tr>
<td>Agency Infect. Control Policy</td>
<td>0.14702</td>
<td>0.38343</td>
<td>0.01359</td>
<td>5.27295</td>
<td>0.022</td>
</tr>
</tbody>
</table>

N = 334  D.F. = 333
of infection control practices prior to May, 1992 before the Final Rule took effect and after May, 1992 when agencies were to begin implementing the standards. All findings related to the frequency with which the respondents reported universal precautions practices will be addressed by item according to their certification level.

Dependent t-Tests were used to determine difference in reported use of universal precautions pre and post OSHA ruling. For each of the individual twelve items an overall mean item rating was computed. The instrument ranged from 1 (always engages in this behavior) to 4 (never engages in this behavior). A response of 5 indicated Don’t Know. The testing yielded the following results.

The findings for item one suggest there is a significant difference \[ t (338) = 3.47, p< .001 \] in EMS providers practices of covering pre-existing lesions, areas of abraded, lacerated, chapped, irritated or otherwise damaged skin with an adhesive dressing prior to putting on gloves from May, 1992 as compared to practices before May, 1992. An overall mean of 2.8702 was reported pre-OSHA (before May, 1992) and a mean item rating of 2.7080 post-OSHA (after May, 1992) was computed. Pre-OSHA 14% \( (n = 20) \) of BLS providers and 13% \( (n = 28) \) of ALS providers always covered lesions before gloving. The frequency of this behavior increased post-OSHA to 27% \( (n = 37) \) of BLS and 22% \( (n = 47) \) of ALS providers always covered lesions before
Lesions Covered Before Applying Gloves

Effect of OSHA's Final Rule

Table 7

t - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.8702</td>
<td>1.182</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2.7080</td>
<td>1.273</td>
<td>0.757</td>
<td>3.47</td>
<td>.001*</td>
</tr>
</tbody>
</table>

N = 339  D.F. = 338

* at .001 level of significance
gloving. The data are presented in Table 7.

A significant difference \( t (340) = 5.54, p < .000 \) was found in hand washing practices pre to post OSHA. An overall mean item rating of 1.3578 prior to OSHA’s Final Rule and a mean item rating of 1.1584 post-OSHA’s Final Rule suggests that hands are washed more frequently with soap and water as soon as feasible after removing gloves. Sixty-nine percent \( (n=96) \) of the BLS and 77% \( (n = 165) \) of the ALS providers indicated a pre-OSHA practice of always washing hands after glove removal. The frequency increased post-OSHA to now include 78% \( (n = 109) \) BLS and 91% \( (n= 194) \) ALS providers that indicated a post-OSHA practice of always washing after removing gloves. Table 8 presents the data.

Prehospital emergency medical care providers were asked whether gloves, goggles, mask or face shields were worn when handling or decontaminating items or surfaces that may be contaminated with blood or other potentially infectious materials. An overall mean item rating of 2.2404 was computed for practices prior to May, 1992 and a mean of 1.7537 for after May, 1992. Results showed \( t (336) = 10.39, p < .000 \). Forty percent \( (n = 56) \) of the BLS and 27% \( (n = 57) \) of the ALS respondents indicated they always wore personal protective equipment when decontaminating items for the pre-OSHA time period whereas the reported frequencies increased post-OSHA to 58% \( (n = 80) \) and 47% \( (n = 104) \), respectively. Table 9 presents this data.
### Table 8

**Hands Washed After Removing Gloves**

Effect of OSHA’s Final Rule

**t - Test For Related Samples**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1.3578</td>
<td>0.783</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.1584</td>
<td>0.501</td>
<td>0.537</td>
<td>5.54</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 341  D.F. = 340

*at .000 level of significance
### Table 9

**Personal Protective Equipment Use When Handling or Decontaminating Items**

**Effect of OSHA’s Final Rule**

**t - Test For Related Samples**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.2404</td>
<td>1.197</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.7537</td>
<td>1.024</td>
<td>0.711</td>
<td>10.39</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 337  D.F. = 336

* at .000 level of significance
A significant difference \[ t (337) = 5.30, p < .000 \] was found in the practice of not touching writing instruments, equipment boxes or radios with wet or soiled gloves prior to May, 1992 as compared to after May, 1992. Overall mean item ratings of 2.3580 pre-OSHA and 2.1331 post-OSHA were computed. Twenty-two percent (n = 30) of the BLS providers reported that pre-OSHA they always practiced not touching items with wet gloves as compared to 32% (n = 44) post-OSHA. Data reported by the ALS respondents reflect 19% (n = 40) pre-OSHA and 29% (n = 61) post-OSHA. The data are presented in Table 10.

A significant difference \[ t (334) = 9.46, p < .000 \] was obtained when looking at the practice of wearing goggles and a mask when suctioning airways or dealing with an arterial bleed. Prior to May, 1992, prehospital emergency medical care providers report less frequently wearing goggles and masks; 19% (n = 27) of BLS always wore, 6% (n = 12) ALS always wore. An overall mean item rating computed at 2.9761. After May, 1992, the reported frequency increased to 32% (n = 44) BLS always wore and 14% (n = 29) ALS always wore. An overall mean item rating of 2.5373 was computed which suggests a significant change in behavior. Table 11 presents this data.

A significant difference \[ t (332) = 4.25, p < .000 \] in the recapping of contaminated needles between the two time periods under study was computed. The number of respondents
### Table 10

**Objects Not Touched With Soiled Gloves**

Effect of OSHA’s Final Rule

$t$ - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>$t$ value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.3580</td>
<td>1.039</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2.1331</td>
<td>1.003</td>
<td>0.709</td>
<td>5.30</td>
<td>.000*</td>
</tr>
</tbody>
</table>

$N = 338$  
D.F. = 337  
*at .000 level of significance
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.9761</td>
<td>1.145</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2.5373</td>
<td>1.175</td>
<td>0.733</td>
<td>9.46</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 335  D.F. = 334
* at .000 level of significance
indicating they always did not recap needles went from 20% of both BLS (n = 28) and ALS (n = 42) providers pre-OSHA, to 37% (n = 52) BLS and 29% (n = 63) ALS, post-OSHA. An overall mean of 2.5495 was calculated for prior to May, 1992 and an overall mean item rating of 2.3213 for after May, 1992. Table 12 presents this data.

There were significant differences \[t (332) = 7.24, p< .000\] in the prehospital emergency medical care providers practice of immediately placing contaminated needles in a puncture resistant, leak-proof, color-coded container. A pre-OSHA overall mean item rating of 1.6006 was computed. An after OSHA overall mean item rating of 1.2312 was reported. Sixty-seven percent (n = 93) of the BLS providers always used puncture resistant containers for contaminated needles pre-OSHA in relation to 56% (n = 119) of the ALS providers and this practice increased to include 86% (n = 119) of the BLS and 79% (n = 168) of the ALS respondents post-OSHA, (Table 13).

The ready availability of personal protective equipment at the worksite demonstrated a significant difference \[t (338) = 9.39, p< .000\]. An overall mean of 1.8289 was computed for prior to May, 1992 and a mean of 1.3274 was computed for after May, 1992. Pre-OSHA 58% (n = 80) of the BLS providers indicated that equipment was always available at the worksite as compared with 43% of the ALS providers who recorded the same response. Post-OSHA the number of
### Table 12

Contaminated Needles Not Recapped  
Effect of OSHA's Final Rule  
t - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.5495</td>
<td>1.188</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2.3213</td>
<td>1.201</td>
<td>0.664</td>
<td>4.25</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 333  D.F. = 332  
*at .000 level of significance
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1.6006</td>
<td>1.009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.2312</td>
<td>0.614</td>
<td>0.427</td>
<td>7.24</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 333  D.F. = 332
*at .000 level of significance
respondents indicating increased availability of personal protective equipment at the worksite rose to include 78% (n = 108) of the BLS and 75% (n = 161) of the ALS providers. Table 14 presents this data.

Findings suggest that there were significant differences [t (336) = 6.94, p< .000] between the practices of removing garments contaminated by blood or other body fluids as soon as possible pre to post OSHA. An overall mean of 1.5994 was computed for the period prior to OSHA’s Final Rule and an overall mean of 1.2819 was computed for the period after OSHA’s Final Rule went into effect. Pre-OSHA 77% (n = 93) of the BLS providers and 54% (n = 116) of the ALS reported always removing blood contaminated garments as soon as possible. Post-OSHA 84% (n = 117) of the BLS and 73% (n = 157) of the ALS providers indicated they always followed this practice. The data are presented in Table 15.

Significant differences [t (332) = 6.94, p< .000] were found in the cleaning and laundering of soiled, reusable personal protective equipment by the agency. An overall mean of 2.9700 was computed for agency practices prior to May, 1992 and an overall mean of 2.6066 was computed for agency practices after May, 1992. Thirty-three percent (n = 46) of the BLS and 16% (n = 35) of the ALS respondents indicated that pre-OSHA the EMS agency always cleaned and laundered soiled, reusable personal protective equipment. Post-OSHA this frequency increased to include 45% (n = 62)
Table 14

Personal Protective Equipment Available at Worksite

Effect of OSHA's Final Rule

$t$ - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1.8289</td>
<td>1.063</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.3274</td>
<td>0.689</td>
<td>0.436</td>
<td>9.39</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 339  D.F. = 338
*at .000 level of significance
Table 15

Contaminated Garments Removed As Soon As Possible

Effect of OSHA's Final Rule

t - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>1.5994</td>
<td>0.946</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.2819</td>
<td>0.618</td>
<td>0.489</td>
<td>6.94</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 337 D.F. = 336

*at .000 level of significance
### Table 16

**Agency Cleans Soiled, Reusable Personal Protective Equipment**

Effect of OSHA's Final Rule

*t- Test For Related Samples*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.9700</td>
<td>1.407</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>2.6066</td>
<td>1.514</td>
<td>0.789</td>
<td>6.94</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 333 D.F. = 332

* at .000 level of significance
of the BLS and 36% (n = 77) of the ALS providers. Table 16 presents the data.

An item related to the availability of a confidential medical evaluation and followup following an occupationally related exposure to blood or other body fluids demonstrated a significance difference [t (333) = 9.07, p< .000] between the two time frames under study. An overall mean of 2.4551 was computed for prior to May, 1992 and a mean of 1.9132 was computed for after May, 1992. The availability of a confidential medical evaluation was always available pre-OSHA according to 42% (n = 59) of the BLS and 29% (n = 63) of the ALS providers as compared to 68% (n = 94) and 54% (n = 116) post-OSHA, respectively. Data are presented in Table 17.

Findings suggest that there were significant differences [t (334) = 14.19, p< .000] between the provision of annual workplace infection control training on bloodborne pathogens pre to post OSHA. An overall mean of 2.5463 was computed prior to May, 1992 and a mean of 1.4597 was computed for after May, 1992. Thirty-nine percent (n = 54) of the BLS and 22% (n = 46) of the ALS respondents indicated that pre-OSHA they always received bloodborne pathogens infection control training and information annually at their workplace, compared to 77% (n = 107) BLS and 70% (n = 150) ALS post-OSHA (Table 18).

An overall mean item rating of 26.054 and a standard
### Table 17

**Availability of Confidential Medical Evaluation**

**Effect of OSHA’s Final Rule**

**t - Test For Related Samples**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th>t value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.4551</td>
<td>1.459</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.9132</td>
<td>1.410</td>
<td>0.711</td>
<td>9.07</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 334 D.F. = 333

* at .000 level of significance
Table 18: Bloodborne Pathogen Training Provided Annually
Effect of OSHA's Final Rule
`t` - Test For Related Samples

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Corr.</th>
<th><code>t</code> value</th>
<th>2-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>2.5463</td>
<td>1.375</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>1.4597</td>
<td>0.993</td>
<td>0.333</td>
<td>14.19</td>
<td>.000*</td>
</tr>
</tbody>
</table>

N = 335 D.F. = 334
*at .000 level of significance
deviation of 9.735 was computed for BLS providers pre-OSHA infection control practice scores. An overall mean item rating of 27.095 and a standard deviation of 6.801 was computed for ALS pre-OSHA infection control practice scores. An analysis of variance was performed to determine if the prehospital emergency medical care providers' universal precautions practices were significantly different according to their level of certification (BLS and ALS) and pre-OSHA infection control practices. Results showed \[ F (1, 268) = 6.444, p < .000 \] The data are presented in Table 19.

Forty-five percent (n = 161) of the respondents reported they were somewhat familiar with OSHA's Occupational Exposure to Bloodborne Pathogens: Final Rule which took effect in May, 1992. Forty percent (n = 56) of the BLS providers indicated they were somewhat familiar as compared to 48% (n = 103) of the ALS providers.

Of the total number of respondents, 40% (n = 145) reported being very familiar with the Final Rule. This percentage held true for both BLS and ALS providers.

Forty-nine total respondents (14%) reported not being familiar with the standard, (27 BLS providers and 22 ALS providers). There were three questionnaires with data missing for this item.

Three hundred-nine (86%) respondents reported that their agency had a policy or procedure for dealing with occupationally related exposure to bloodborne pathogens.
Table 19

Universal Precautions Practices of Providers
According to Level of Certification and Pre-OSHA

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Sqrs.</th>
<th>D. of F.</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td>4464.887</td>
<td>32</td>
<td>139.528</td>
<td>8.805</td>
<td>0.000</td>
</tr>
<tr>
<td>2-way interaction</td>
<td>1457.981</td>
<td>26</td>
<td>56.076</td>
<td>3.539</td>
<td>0.000</td>
</tr>
<tr>
<td>Explained</td>
<td>5922.868</td>
<td>58</td>
<td>102.118</td>
<td>6.444</td>
<td>0.000</td>
</tr>
<tr>
<td>Residual</td>
<td>4246.716</td>
<td>268</td>
<td>15.646</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10169.580</td>
<td>326</td>
<td>31.195</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n = 326
Eighty-six percent of both BLS (n = 120) and ALS (n = 184) providers knew of their agency's infection control policy.

Three percent (n = 9) reported their agency did not have an infection control policy. Only one percent (n = 2) of the BLS providers reported no agency policy whereas, three percent (n = 7) of the ALS providers reported no policy.

Thirty-nine providers (11%) did not know whether their agency had an infection control policy or not. More BLS than ALS providers were unknowledgeable regarding the existence of an agency policy; 12% (n = 16) of BLS as compared to 10% (n = 22) of the ALS. Two questionnaires had missing data.

A Factor Analysis was performed post hoc to explain the relationship between locus of control and altruism as well as altruism to universal precautions practice in terms of some underlying factor(s). Principal components factor analysis using Kaiser normalization and Varimax rotation, produced a two-factor solution with an explained variance of 54.5% as shown in Table 20. Items loading below a level of .40 were not included in the determination of principal components. Factor 1, the strongest factor, consisted of two items conceptualized as knowledge. Pre-OSHA infection control practices loaded .81611 with Factor 1 and universal precautions practices loaded at a level of .82622. Factor 2, an intrapersonal psycho-social factor, included locus of
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>FACTOR 1</th>
<th>FACTOR 2</th>
<th>EIGENVALUE</th>
<th>PCT OF VAR</th>
<th>CUM PCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLOC</td>
<td>-0.49017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAVS</td>
<td></td>
<td>0.61982</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TORS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREOSHA</td>
<td>0.81611</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPP</td>
<td>0.82622</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACTOR 1</td>
<td></td>
<td></td>
<td>1.58298</td>
<td>31.7</td>
<td>31.7</td>
</tr>
<tr>
<td>FACTOR 2</td>
<td></td>
<td></td>
<td>1.14343</td>
<td>22.9</td>
<td>54.5</td>
</tr>
</tbody>
</table>

N = 359
control, altruism. Locus of control, loaded -.49017 with Factor 2 and altruism loaded .61982. Occupational risk-taking loaded about equally on both factors and therefore was deleted.

The frequency with which a prehospital emergency medical care provider practices universal precautions seems to be related to their knowledge of infection control measures. Whether or not the provider consistently practices universal precautions also seems to be related to an intrapersonal psycho-social component.

Summary

This study sampled the perceptions of prehospital emergency medical care providers regarding universal precautions practices according to locus of control, altruism, and occupational risk. The effects of OSHA’s Final Rule on universal precautions practices was also examined. A total of 359 participants responding to a questionnaire were included in this study. There were 139 Basic Life Support providers and 214 Advanced Life Support providers. The majority of the participants were volunteering in EMS agencies throughout the Tidewater Emergency Medical Services area.

The modal age range for BLS and ALS providers was 21 - 30 years of age: BLS (n = 62), ALS (n = 87). Thirty-three percent (n = 46) of the BLS respondents indicated completing their EMS training through a community college compared to
that of the majority of ALS (65% [n = 136]) providers.

One hundred-three (74%) BLS providers were serving as EMS volunteers, while 114 (53%) of the ALS reported volunteering. Twenty-two (16%) of the BLS respondents were employed as paid providers compared to 121 (57%) of the ALS providers.

The number of BLS providers indicating exposure incidents to a client's blood (direct body contact without personal protective equipment) in the last 12 months totaled 34 (25%), while the number of blood exposure incidents for ALS providers totaled 77 (36%).

The results of hypothesis testing revealed that there were no significant relationships between locus of control and the frequency of universal precautions practices by prehospital emergency medical care providers. Locus of control according to level of certification also did not relate to the reported frequency of universal precautions practices.

Altruism was found to inversely relate to the frequency of universal precautions practice by prehospital emergency medical care providers. Universal precautions practices were also found to differ according to level of provider certification and altruism. BLS providers were found to have higher altruism scale scores and practice universal precautions more frequently than ALS providers.

Locus of control and altruism were found to be
negatively related. The calculated significance was small and thought to be a function of the large sample size.

No significant differences were found in the universal precautions practices of prehospital emergency medical care providers and their reported occupational risk. Differences were found between the two groups according to a specific type risk behavior (blood exposure).

Significant differences were found between the practice of universal precautions and (1) OSHA's Final Rule, (2) agency infection control policy and (3) EMS training program (U.S. military). None of the other variables met the criteria for inclusion.

The results of testing Hypothesis Six revealed significant differences between pre-OSHA and post-OSHA universal precautions practices by prehospital emergency medical care providers. For each of the twelve infection control behaviors examined, results indicated that there was a significant change for the better. Prehospital emergency medical care providers were practicing universal precautions more frequently since May, 1992.

A composite presentation of the hypotheses are presented in Table 21. A matrix of correlation coefficients among the variables of interest are presented in Table 22. Two underlying factors, knowledge of infection control measures and an intrapersonal psycho-social component appear to account for the bulk of variance related to the frequency
## Table 21

**COMPOSITE PRESENTATION OF HYPOTHESES**

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>STATISTICAL PROCEDURE</th>
<th>ACCEPTED/REJECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number One</td>
<td>PPMCC</td>
<td>Rejected</td>
</tr>
<tr>
<td>Number Two</td>
<td>PPMCC</td>
<td>Accepted</td>
</tr>
<tr>
<td>Number Three</td>
<td>PPMCC</td>
<td>Accepted</td>
</tr>
<tr>
<td>Number Four</td>
<td>PPMCC</td>
<td>Rejected</td>
</tr>
<tr>
<td>Number Five</td>
<td>MRA</td>
<td>Accepted</td>
</tr>
<tr>
<td>Number Six</td>
<td>t-Test</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
### Table 22

**CORRELATION COEFFICIENTS**  
Matrix Among Variables of Interest

<table>
<thead>
<tr>
<th></th>
<th>TLOC</th>
<th>TAVS</th>
<th>TORS</th>
<th>PREOSHA</th>
<th>UPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLOC</td>
<td>---</td>
<td>-.1464**</td>
<td>0.0393</td>
<td>0.0629</td>
<td>0.0745</td>
</tr>
<tr>
<td>TAVS</td>
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<td>----</td>
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<td>-0.0799</td>
<td>-.1275*</td>
</tr>
<tr>
<td>TORS</td>
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<td>----</td>
<td>0.0505</td>
<td>-0.0607</td>
</tr>
<tr>
<td>PREOSHA</td>
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<td>----</td>
<td>.5100**</td>
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<tr>
<td>UPP</td>
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<td>-0.0607</td>
<td>.5110**</td>
<td>----</td>
</tr>
</tbody>
</table>

* - Significance Level .05 (2-tailed)  
** - Significance Level .01 (2-tailed)
a prehospital emergency medical care provider practices universal precautions.

The following chapter will discuss the implications, and conclusions derived from this study. Recommendations for further research and policy development are presented.
Chapter 5

FINDINGS AND DISCUSSION

Introduction

Discussion of the findings of this study, implications for prehospital emergency medical care providers, conclusions and recommendations are presented in this chapter. The purpose of this study was to determine if significant relationships could be identified between locus of control, altruism, occupational risk-taking behaviors, personal factors and universal precautions practices of prehospital emergency medical care providers employed or volunteering in various Emergency Medical Services (EMS) agencies within the Tidewater Emergency Medical Services (TEMS) region. This study also sought to determine if significant differences could be identified in universal precautions practices of prehospital emergency medical care providers prior to and after passage of OSHA's Final Rule. Perceptions of self-reported universal precautions practices were examined according to basic levels of certification, Basic Life Support (BLS) and Advanced Life Support (ALS).

Discussion of Findings

Locus of control, as described by Rotter (1966); altruism, as described by Super and Nevill (1985); occupational risk, as characterized by Smyser (1988) and
occupational risk, as characterized by Smyser (1988) and Klontz (1991) and universal precautions practices, adapted from the Department of Labor's Final Rule on Occupational Exposure to Bloodborne Pathogens (1991) comprised the measurement tool. One hundred thirty-nine basic life support providers and 214 advanced life support providers participated in this study. Each completed a personal data sheet, yielding demographic data about themselves, as well as a locus of control scale, an altruism scale, an occupational risk scale and a pre-OSHA and post-OSHA universal precautions practices scale. The frequency of universal precautions practices as perceived by self were identified. Universal precautions practices were also examined according to the EMS providers certification level.

Prehospital emergency medical care providers frequency of universal precautions practices according to their locus of control demonstrated no significant relationship. The mean item ratings were very close between the two groups of providers, BLS and ALS. The ANOVA between locus of control, levels of certification and the frequency of universal precautions practices by prehospital emergency medical care providers revealed no significant difference \( F (20, 296) = 1.185, p > 0.05 \).

Locus of control failed to contribute to the prediction of the frequency of universal precautions practices by prehospital emergency medical care providers. Altruism was
the only variable to enter into the regression equation. These findings are presented in tabular form (see Appendices F-H).

The frequency of universal precautions practices by prehospital emergency medical care providers according to their altruistic values demonstrated a statistical difference. The Pearson Product Moment Correlation Coefficient between the providers frequency of universal precautions practices and altruism revealed a statistical significance, $p<0.01$, $r = -0.1464$. The inverse relationship suggests that the more altruistic the provider, the more frequent universal precautions are practiced. Design characteristics may have (artificially) influenced the findings. This was a cross-sectional study, using a single method of data collection. Information on the independent and dependent variables were obtained from each respondents self-report. Each of these factors, singly or in combination with another, could have inflated the statistical results. Because of the small reported value, the findings were considered to be more a function of the large sample size than a true difference attributed to a significant relationship between the variables.

The frequency of universal precautions practices according to altruism and providers levels of certification findings demonstrated significant differences [$F (1, 316) = 1.797$, $p<.05$]. The mean item rating for BLS providers on
the altruism scale was 17.000 and for ALS providers it was computed at 16.379.

Prehospital emergency medical care providers locus of control and altruism values were found to demonstrate a significant relationship. A Pearson Product Moment Correlation Coefficient revealed $p < 0.01, r = -0.1464$. The negative correlation suggests that as one of the scale scores goes up the other scale score goes down, i.e. the higher the locus of control scale score (more externally locused) the lower the altruism scale score (less altruistic the provider).

Prehospital emergency medical care providers frequency of universal precautions practices grouped according to their occupational risk demonstrated no significant relationship. The mean item ratings were very close and correlation coefficients revealed no significant correlations (see Appendix I).

The ANOVA between occupational risk and frequency of universal precautions practices according to the providers level of certification revealed significant differences, $[F (1, 301) = 1.865, p < .003]$. One dimension on the occupational risk scale (blood exposure) demonstrated a significant relationship to the prehospital emergency medical care providers frequency of universal precautions practices. The other two dimensions, needlestick and resuscitation exposure, failed to demonstrate a
statistically significant relationship to the prehospital emergency medical care providers level of certification and universal precautions practices.

One of the prehospital emergency medical care providers personal variables helped to explain the frequency of universal precautions practice. Using a stepwise multiple regression analysis the three variables which met the criteria for inclusion were: OSHA's Final Rule; type of EMS training program (U.S. military); and agency infection control exposure plan. Type of EMS training was the only personal variable; the other two variables tested respondents knowledge. These findings are presented in tabular form (see Table 6).

All of the universal precautions variables demonstrated a statistically significant difference pre to post OSHA's Final Rule. A pre-OSHA universal precautions practice overall mean item rating of 26 was reported for BLS providers as compared to their post-OSHA mean of 21.7. A pre-OSHA universal precautions practice overall mean item rating of 27 was reported for ALS providers as compared to their post-OSHA mean of 22.2. For each item comprising the concept of universal precautions practice, a related t-Test was performed to determine any difference between past practices (prior to May, 1992) and the providers current universal precautions practice (after May, 1992). These findings are presented below and in tabular form in Tables 7.
The first item of universal precautions practice considered covering areas of chapped, abraded, pre-existing skin lesions before gloving. A pre-OSHA overall mean of 2.8702 was reported and a post-OSHA mean item rating of 2.7080 was reported. Findings suggest there a significant difference \( t (338) = 3.47, p < .001 \).

The second item related to universal precautions considered the practice of hand washing as soon as possible after removing gloves. An overall mean item rating of 1.3578 prior to OSHA’s Final Rule and a post-OSHA mean item rating of 1.1584 were reported. A significant difference \( t (340) = 5.54, p < .000 \) was demonstrated.

The third item on the universal precautions practice scale related to whether gloves, goggles, mask or face shields were worn when handling or decontaminating items or surfaces contaminated with blood or other potentially infectious materials. An overall mean item rating of 2.2404 was computed for practices prior to May, 1992 and a mean of 1.7537 was computed for practices after May, 1992. Results showed \( t (336) = 10.39, p < .000 \), a significant difference.

The practice of not touching writing instruments, equipment boxes or radios with wet or soiled gloves prior to May, 1992 as compared to after May, 1992 was the fourth item on the universal precautions practice scale. Overall mean item ratings of 2.3580 pre-OSHA and 2.1331 post-OSHA.
were computed. A significant difference \[t (337) = 5.30, p < .000\] was demonstrated.

The practice of wearing goggles and a mask when suctioning airways or dealing with an arterial bleed pre-OSHA as compared to post-OSHA was the fifth item on the universal precautions practice scale. Overall mean item ratings of 2.9761 and 2.5373 were reported for practices prior to May, 1992 and after May, 1992, respectively. A significant difference \[t (334) = 9.46, p < .000\] was found.

The sixth item on the universal precautions practice scale explored the recapping of contaminated needles. An overall mean of 2.5495 was calculated for prior to May, 1992 and an overall mean item rating of 2.3213 was calculated for after May, 1992. A significant difference \[t (337) = 5.30, p < .000\] was reported.

The seventh item on the universal precautions practice scale considered the practice of immediately placing contaminated needles and non-reusable sharps into puncture resistant, color-coded, leak proof containers. A pre-OSHA mean item rating of 1.6006 was computed and an post-OSHA mean of 1.2312 was computed. A significant difference \[t (332) = 7.24, p < .000\] was demonstrated.

The ready availability of personal protective equipment at the worksite was the eighth item on the practice scale. An overall mean of 1.8289 was computed for practices prior to May, 1992, and an overall mean of 1.3274 was computed for
practices after May, 1992. A significant difference \( t(338) = 9.39, p< .000 \) was demonstrated.

Removing garments contaminated by blood or other body fluids as soon as possible was the ninth item identified on the practice scale. An overall mean item rating of 1.5994 was computed for the period prior to OSHA's Final Rule and an overall mean item rating of 1.2819 was computed for the period after OSHA's Final Rule went into effect. A significant difference of \( t(336) = 6.94, p< .000 \) was demonstrated.

The tenth item on the practice scale referred to the EMS agency cleaning and laundering soiled, reusable personal protective equipment. An overall mean item rating of 2.9700 was computed for agency practices prior to May, 1992 and an overall mean item rating of 2.6066 was computed for agency practices after May, 1992. A significant difference \( t(332) = 6.94, p< .000 \) was reported.

The availability of a confidential medical evaluation and followup following an occupationally related exposure to blood or other body fluids was the eleventh item on the practice scale. An overall mean item rating of 2.4551 was computed for prior to May, 1992 and an overall mean item rating of 1.9132 was computed for after May, 1992. A significant difference \( t(333) = 9.07, p< .000 \) was found.

The twelfth and final item on the universal precautions practice scale entailed the provision of annual workplace
infection control training on bloodborne pathogens. An overall mean item rating of 2.5463 was computed prior to May, 1992 and an overall mean item rating of 1.4597 was computed for after May, 1992. A significant difference \( t(334) = 14.19, p< .000 \) was demonstrated.

Interpretations and Implications

Thirty-six percent \((n = 129)\) of the respondents in this study were certified BLS providers. Sixty percent \((n = 214)\) of the respondents in this study were ALS providers. Three percent \((n = 10)\) were not certified/first responders. When comparing these results by training level to the known distribution of prehospital emergency medical care providers in the TEMS region, there is an over-representation of the higher levels of training which may affect the survey results.

The results of the study indicated that there appear to be no significant relationships between locus of control and the frequency of universal precautions practices by prehospital emergency medical care providers. Locus of control did not enter into the equation to predict universal precautions practices. Level of provider certification also did not enter into the relationship. Neaves (1989, pp. 15-17) reported a study by Pettersen, (1985) that suggests the consistent lack of strength and preciseness of the relationship between locus of control to other variables may be due to the general nature of the scale. Although locus
of control did not demonstrate a significant relationship to universal precautions practice in this study, it may have been due to the number of variables under consideration. A scale designed for health care providers may improve the strength of the relationship.

There appears to be an inverse relationship between altruism and the frequency of universal precautions practices by providers. A small, statistically significant negative relationship was demonstrated. The findings indicated that as one scale score increased the other scale score decreased. Universal precautions practices may be influenced by altruistic motivations in that the highly altruistic provider will adhere more closely to infection control practices to protect the client from nosocomial infections at a time when the client may be particularly vulnerable. The extent of illness or injury is unknown as are the circumstances under which care must be initiated, therefore the more altruistic providers may take the time to prevent the client from contamination of potentially infectious organisms by adhering more strictly to universal precautions practices.

An interesting finding on the altruism scale was the difference between the two groups (BLS and ALS) of providers. The mean item rating for BLS providers altruism scale was 17.000 out of a possible score of 20 as compared to a mean item rating of 16.379 for ALS providers. Twenty-seven
percent of the BLS providers reported an altruism scale score of 20 whereas only 21% of the ALS providers reported a score of 20. This finding implies that the BLS respondents employ altruistic behaviors more frequently than the ALS respondents. Data supporting increased altruistic behaviors in BLS providers can be found in comparing volunteerism among the ranks.

Eighty-six percent (n = 119) of the BLS providers indicated they had volunteer EMS experience. The years of volunteer service ranged from one - 21 plus, with a mean of 16 months. Seventy-seven percent (n = 165) of the ALS providers reported having volunteer EMS experience. The range of years of service was the same, however the mean years of volunteer service for ALS respondents was 17 months.

Overall, the ALS respondents had more years of experience as EMS providers as compared to BLS providers. Perhaps the increased years of experience act to diminish the providers altruistic tendencies. The nature of the work at the ALS level frequently demands that providers render emergency care to the more gravely ill or most critically injured under generally adverse conditions. Emergency measures instituted to save the client’s life may be implemented under such hostile conditions that the thought of contamination from the provider’s less frequent adherence to universal precautions practices may be felt to be of
little consequence to the client’s outcome at the time.

Another interesting finding of the study indicated that there appear to be no significant relationship between the frequency of universal precautions practices and perceived occupational risk of prehospital emergency medical care providers. According to the level of certification, BLS providers had lower reported occupational risk than ALS providers. BLS respondents had a occupational risk scale mean of 18.6 (out of a possible 35 [high risk]) compared to the ALS respondents occupational risk scale mean of 24.6. Lower risk among BLS providers may be attributed to their level of certification which limits invasive procedures since they are only certified to handle minor injuries and illnesses where the client’s condition is relatively stable. Therefore, there should be less risk for incurring a used needlestick injury or contaminated sharps cut.

One of the occupational risk exposure subscales identified an overall blood exposure mean item rating of 12.8 for BLS providers and a mean item rating of 14.0 for ALS providers. The higher the number the greater the purported risk. Although the BLS respondents reported a lower overall occupational risk as well as a lower blood exposure mean, some interesting findings emerged from the data. Sixty-five percent (n =90) of the BLS respondents reported that they did not use needles when treating a client. Unless local medical protocols dictate otherwise,
BLS providers are not certified to use needles. The unexpected finding was that 35% (n = 48) of the BLS respondents did report needle use during client care and 6% (n = 8) of them indicated that they had received needlestick injuries. It may well be that some of the respondents reporting needle use were covered under local medical protocols to administer injections or initiate intravenous fluids. There may also be the occasion whereby the ALS provider hands-off a used needle to a BLS provider to recap or dispose of in the proper container resulting in a needlestick injury. Contaminated needlestick injuries may also occur when the BLS provider, not knowing that there is a "hot sharps" lying around on or near the stretcher, gets stuck while riding in the client care compartment attending to the client enroute to the hospital. Since BLS providers are for the most part not certified to use needles in the course of their work they may not have been taught what precautionary measures to take when handling used needles to prevent needlestick injuries.

A further revelation related to the respondents occupational risk also pertained to needlestick exposure. Ninety-nine percent (n = 212) of the ALS providers reported needle use in client care and 8% (n = 17) indicated needlestick injuries. What was most revealing was that providers continue to recap used needles, despite urging from the health care industry to do otherwise. Sixty-nine
percent (n = 148) of the ALS respondents reported still recapping used needles. Similarly, 17% (n = 23) of the BLS respondents reported recapping used needles as well. The number engaged in this risky practice was less post-OSHA than when compared to the pre-OSHA figures of 74% (n = 159) for ALS and 58% (n = 82) for BLS providers. Four percent (n = 5) of the BLS and 6% (n = 8) of the ALS respondents reported suffering a contaminating sharps cut other than during recapping. Altogether, 10% of the BLS respondents and 14% of the ALS respondents reported percutaneous occupationally related blood exposures. In addition to the percutaneous route, 32% of the BLS respondents reported unprotected cutaneous (skin) contact to blood while 63% of the ALS respondents reported likewise.

The lowest reported number of blood exposures occurred through the mucocutaneous routes. Three percent (n = 4) of the BLS and 7% (n = 14) of the ALS respondents reported blood contact (via splashes and splatters) into their mouth and eyes. Some of the reported blood contact with the provider's mouth and eyes could have occurred during CPR which was reported to have been performed by 76% of the BLS and 95% of the ALS over the past year. Mouth-to-mouth resuscitation was reported as being performed (without protective devices) by 10% (n = 14) of the BLS respondents and 7% (n = 14) of the ALS respondents. While ALS providers are generally responsible for monitoring the cardiac

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dysrhythmias, inserting I.V. lines, administering cardiac drugs and obtaining blood samples, BLS providers are responsible for administering chest compressions and supporting respiratory ventilations which places their face closer to client's face, often times in the direct pathway of vomitus and accumulating lung secretions in the oral-nasal pharynx. These findings would be somewhat expected considering the nature of prehospital emergency services work and the frequency with which all prehospital emergency medical care providers come in contact with blood during the course of their work (BLS - 95%; ALS - 100%). Figure 13 presents the distribution of the providers by type of blood exposure.

The degree to which both groups of providers used personal protective equipment varied little. The percentage of reported glove use (BLS - 72%; ALS - 78%) and gown use (BLS - 18%; ALS - 22%) according to the two groups was about the same. More ALS than BLS providers reported wearing protective eyewear which could be related to the fact that ALS are certified to suction, intubate and initiate arterial lines thus increasing their occupational blood exposure risk. Knowledge of whether a client they were treating had HIV/HBV infection demonstrated no relationship to the frequency of universal precautions practices by prehospital emergency medical care providers. This may be related to the fact that each client is treated as if they were infected.
Route of Occupational Exposure to Bloodborne Pathogens
Comparison: BLS to ALS Providers

Figure 13

Absolute Frequency

Type of Blood Exposure

Providers

BLS n = 139
ALS n = 214
with a bloodborne pathogen so the knowledge of infection does not appear to make a difference in infection control practices.

The disparity between the frequency of universal precautions practices by level of certification suggests differences in how recent the infection control training was presented and the extent of the information presented. Universal precautions practices are taught to most BLS providers during their EMT course content. As providers advance to the ALS level, they are required to recertify every two years. Perhaps universal precautions practices updates are not included in the content presented during recertification. This could account for the disparity between the two groups. Ninety-four percent of the BLS providers reported having received infection control training in their last course content, hence they are practicing closer to the ideal because the information is fresh in their minds, as compared to 85% of the ALS providers who may have not had an update since completing their BLS training. Emphasis needs to be placed on continuing the infection control training process for each level of certification so as to reinforce these concepts at each successive level of progression.

The type of EMS training program appeared to be an important personal variable in infection control. EMS training through the U.S. military accounted for 3% of the
variance in predicting the frequency of universal precautions practices by prehospital emergency medical care providers. Some of this could be attributed to the indoctrination in the military which focuses on strict interpretation of policies, standardization of operational procedures and uniformity, and a highly controlled working environment. The availability of hospital clinical experiences to learn and practice infection control techniques most likely influences compliance with universal precautions practices in EMS providers trained by the military.

There was evidence that OSHA's final rule made a difference in the frequency of universal precautions practices by prehospital emergency medical care providers. A greater frequency in all of the identified universal precautions practices by prehospital emergency medical care providers was demonstrated for the pre-OSHA to post-OSHA time periods. ALS providers still fail to cover pre-existing lesions on their hands before gloving as often as BLS providers but this could be a reflection of new practices the BLS providers have learned in infection control updates which the ALS providers have not been exposed to as yet. ALS providers wash more but bandage their chapped, abraded hands less before gloving. The practice of wearing gloves when decontaminating equipment increased by 18%-20% for both groups. The practice of not touching
equipment with contaminated gloves increased about the same for both groups. Wearing goggles and mask while suctioning and caring for clients with an arterial bleed almost doubled for both groups. A 20% increase in both groups for using sharps boxes was noted. Providers perceived that agencies were stocking more personal protective equipment pre-to post OSHA. More providers removed clothing contaminated by blood and other body fluids more frequently than before. Providers perceived their EMS agency as being more responsive to cleaning and laundering reusable personal protective equipment following implementation of OSHA’s Final Rule. Perceptions of an increase in the availability of a confidential medical evaluation was reported by both groups following implementation of OSHA’s Final Rule. Finally, there was a reported increase in annual workplace training on infection control practices since implementation of OSHA’s Final Rule.

OSHA’s Final Rule in conjunction with EMS agencies infection control policies would appear to be related to improved infection control practices. Since its inception the EMS program has been aligned with federal mandates. Originally the EMT program was developed through government rulings sponsored by the Department of Transportation. Therefore, EMS agencies have based much of their training programs on government rules and regulations. Thus, the Department of Labor’s 1991 ruling was generally not regarded
as intrusive. However, perhaps the fines attached for violations of occupational health and safety practices act as negative incentives which serve to increase the likelihood of agencies abiding by the rules. Furthermore, other federal funds granted to the agency may be in jeopardy should it be determined that the agency is not meeting OSHA guidelines, all of which acts as additional incentives.

There were providers who were occupationally exposed to bloodborne pathogens that were not being evaluated for possible infection. There were 224 various types of occupational exposures recorded by the 359 prehospital emergency medical care providers participating in this study. One hundred-eleven respondents indicated that they reported their exposure incident to their supervisor. Underreporting of injuries has been identified in other studies (Klontz, et al., 1991; Mallon, et al., 1992). An issue more pressing than the actual report, is that some of these EMS providers who have not been properly evaluated following an exposure incident may be harboring an infectious disease which they could unwittingly transmit to vulnerable clients under their care. Any misconceptions that these providers may have about reporting occupationally related injuries should be cleared up as quickly as possible so as to protect the provider, the EMS agency, and most especially the recipient of care.
Conclusions

This study of the relationship of locus of control and altruism to the frequency of universal precautions practices by prehospital emergency medical care providers indicated no significant relationship for locus of control and a small, inverse relationship for altruism. While the data does not support the anticipated strong relationship between locus of control, altruism, occupational risk, and universal precautions practices it does reveal that there may be some support for altruistic providers exhibiting greater universal precautions practices than less altruistic providers. Providers' universal precautions practices were found to differ significantly between levels of certification for specific variables.

Prehospital emergency medical care providers responses to the questions asked in this study indicate that a significant number are engaging in job related activities that place them at extremely high risk for exposure to bloodborne pathogens. Of the 359 respondents, 25 (7%) reported receiving a needlestick injury, 17 (5%) indicated that they had suffered a sharps cut, 178 (50%) revealed that they had direct skin exposure to a client’s blood, 18 (5%) divulged that a client’s blood had splattered or splashed directly into their eyes or mouth, and 28 (8%) had performed mouth-to-mouth resuscitation without protective devices since May, 1992.
Well over half of the participants in this study reported unprotected occupationally related exposure to potentially infectious bloodborne pathogens. This is comparable to the 69.2% exposure risk of EMS professionals reported by Smyser (1990). Jui, et al (1990) purports that compliance to universal precautions by health care workers has been intermittent, variable, and at times poor. This is supported by findings in this study which reveal that several universal precautions practices still continue to pose a problem to prehospital emergency medical care providers.

Providers are reluctant to take the time to routinely cover any damaged skin with an adhesive dressing prior to putting on gloves. Should the glove tear while providing emergency care any open lesions are particularly vulnerable to invasion by infectious organisms. The touching of clean surfaces, with wet or soiled gloves continues. This is quite disturbing considering the fact that 89% had indicated that they had received infection control training at their worksites since May, 1992. A large percentage of providers (48%) continue to recap needles, a behavior which has been directly linked to the transmission of bloodborne diseases. These risky behaviors could be demonstrating support for educational programs/training targeting certain identified areas of concern.

A number of persons participating in this study
requested feedback on the outcome of this research, which leads the investigator to believe prehospital emergency medical care providers at various levels in the EMS system are interested in the study of prehospital infection control. Furthermore, they want to know what factors may account for providers resistance to strict practice of universal precautions. It is hoped that the findings of this study can serve to enhance worksite risk reduction programs for all prehospital emergency medical care providers, most especially to increase the providers awareness thereby decreasing their risk-taking behaviors. Based on the data it is likely that frequent infection control training can contribute to reducing the prehospital emergency medical care providers risk of occupational exposures to bloodborne pathogens.

**Recommendations**

Based on the findings and implications of this study, several recommendations can be made. Suggestions for further research and public policy development in the area of reducing prehospital emergency medical care providers occupational exposure to bloodborne pathogens through the frequent use of universal precautions are presented.

1. Design characteristics may have influenced the findings of this study therefore, the degree to which the selection of responses on paper is consistent with actual behavior needs to be established through further research.
An observational or interview methodology, using a longitudinal design should be considered.

2. A replication study utilizing larger samples of basic life support providers should be done. This could involve larger sampling within the four types of EMS training programs as well (community college, vocational technical, U.S. military and other agencies).

3. A study in the clinical area could be done to determine the effect needleless syringes would have on reducing used needlestick injuries in the prehospital setting.

4. A study could be conducted that evaluates the effectiveness of more user friendly personal protective equipment, such as longer mid-arm length gloves to prevent or reduce cutaneous exposures.

5. A study could be conducted using modified versions of the I-E Control Scale and Values Scale - Altruism Scale that would include items which pertain more directly to health care providers.

6. A study could be conducted to include the perceptions of the providers' supervisor as well as self-reported perceptions of the frequency of universal precautions practices. It may well be that prehospital emergency medical care providers engage in universal precautions differently when interacting with their superiors.
7. Evaluation of organizational variables that facilitate and/or inhibit the practice of exposure incident reporting would provide more complete data regarding the effectiveness of incident reporting as a strategy for reducing bloodborne pathogen infection. As an initial step, EMS agencies could develop an awareness campaign that encourages the identification and evaluation of occupationally related exposure incidents.

8. Given the fact that altruism would seem to be a plausible factor that may contribute to increased frequency of universal precautions practice, EMS training programs that would strengthen these behaviors should be considered.

9. Inservice training for all prehospital emergency medical providers on a regular basis, incorporating the newest developments in infection control needs to be provided by each EMS agency. Special attention needs to be given to ALS providers, who have been identified as being at greater risk for bloodborne pathogen exposure yet practice universal precautions less frequently than BLS providers.
REFERENCES


APPENDIX A

CORRESPONDENCE
August 09, 1993

Inside Address
Name
Street Address
City, State, Zip

Dear (Agency Contact Person's Name):

On July 14, I requested the opportunity to meet with Tidewater Emergency Medical Services Council, Inc., Mobile Intensive Care Committee to obtain support for my proposed research study. Committee members were most helpful by suggesting improvements in the wording of the questionnaire and various ways to distribute the survey to the target population. Because of the diversity of EMS providers in the Tidewater region it was decided that the best way to distribute the questionnaires was to develop a procedure agency by agency. As a result of this decision following this meeting, Mr. Michael D. Berg provided me a listing of agencies within the TEMS region and the contact person for each.

I would like to set up a meeting with you as soon as possible for the purpose of obtaining your support for this study and for determining the best way to distribute the questionnaires to EMS providers employed or volunteering in your agency. I can be reached at my home phone 587-7079, or by pager, 677-0708.

Thank you for your time and attention to this request. I am looking forward to meeting with you.

Sincerely Yours,

(Mrs.) Joanne L. Wakeham, RN., MSN
TO: ALL OPERATIONAL MEDICAL DIRECTORS TEMS REGION

FROM: FRANK M. YEISER, JR., M.D., FACEP

DATE: AUGUST 13, 1993

SUBJECT: OLD DOMINION UNIVERSITY GRADUATE SCHOOL SURVEY REGARDING PRACTICE OF UNIVERSAL PRECAUTIONS IN THE PRE-HOSPITAL EMS COMMUNITY.

Attached is a copy of a survey which is being conducted by a graduate student from Old Dominion University which will evaluate current attitudes and practices of current UNIVERSAL PRECAUTIONS by pre-hospital care providers. As you can see by the attached correspondence it is going to look at this issue from the perspectives of locus of control and altruism. I think that this study is interesting and certainly it would behoove us to cooperate fully with this study. I have attached copy of a memorandum which I will direct to the pre-hospital providers that serve under my medical direction and would ask the support of all of the area OMDs to promote this study. Please feel free to use my memo and make whatever substitutions that your feel necessary. If you have questions regarding this please give me a call. May pager number is 677-9778 and my home phone is 725-5864. Thanks again for your cooperation in advance.

Sincerely Yours,

Frank M. Yeiser, Jr., M.D.,
Medical Director, City of Norfolk Fire and Paramedical Rescue Services

Attachment
TO: EMS PROVIDERS

FROM: FRANK M. YEISER, JR., M.D., FACEP

DATE: AUGUST 13, 1993

SUBJECT: OLD DOMINION UNIVERSITY GRADUATE SCHOOL SURVEY REGARDING PRACTICE OF UNIVERSAL PRECAUTIONS IN THE PRE-HOSPITAL EMS COMMUNITY.

The attached survey which is being conducted by a graduate student from Old Dominion University is designed to give us a better understanding with regards to attitudes and current UNIVERSAL PRECAUTIONS practices of pre-hospital care providers. I would ask that each and every one of you complete this survey as rapidly and as honestly as possible. Note that some of the questions may seem unusual to you, but do not try to read anything into them, just go ahead and answer with your honest first impression. Please be extremely accurate with regard to the demographic information which is requested at the end of the survey. Individual results will be held confidential. Upon completion of the study the final analysis will be publicized. I appreciate your support of this project and will look forward to the completion of this study.

Sincerely Yours,

Frank M. Yeiser, Jr., M.D.
Medical Director, City of Norfolk Fire and Paramedical Rescue Services

Attachment
Dear Prehospital Emergency Medical Care Provider:

Exposure to bloodborne pathogens (HBV, HIV) poses a significant risk for all healthcare providers but more so for prehospital emergency medical care workers who must perform procedures under adverse field conditions or while transporting victims of injury or illness to hospital emergency rooms. Studies have reported that as high as 70% of all prehospital emergency medical care providers have been exposed to potential bloodborne pathogens when caring for ill and injured persons.

As an EMS provider your services are indispensable to the health care system in this region. Furthermore, the increasing demand for services with the accompanying associated increased risk of exposure necessitates that we look at ways to reduce your potential occupational risk. In support of ways to reduce potential occupational exposure to bloodborne pathogens your agency has agreed to participate in this research study. Your name has been randomly selected from among first-responders and certified emergency medical services providers to participate in this important research effort. A questionnaire which surveys whether locus of control and altruism are related to the practice of universal precautions in prehospital emergency medical care providers is enclosed with this letter. Please answer all questions from the perspective of your role as an EMS provider. Complete the questionnaire as soon as possible and return it at your earliest convenience using the attached self-addressed, stamped envelope. In the event you have already completed this questionnaire for another agency you work for, please do not participate in this survey again. Please return this packet to the contact person for your agency so another person can be asked to participate.

All respondents will remain anonymous. Names will not be identified by the data you submit. The descriptions you give will not be shared with anyone in your agency. Only aggregate data will be reported. Self-addressed, stamped envelopes are provided to ensure confidentiality of the return.

I believe we, as medical care providers, need to focus on infection control practices and risk behaviors that may bring us into contact with potentially infective organisms. I am requesting your support in completing this questionnaire. I greatly appreciate your assistance with this undertaking.

If you have any questions about this project please don't hesitate to contact (Mrs.) Joanne L. Wakeham, 804-587-7079 or Gregory Frazer, Ph.D., Associate Professor, Graduate Program Director, Old Dominion University, 804-683-4409. The importance of your participation in this study can not be understated. Thank you for your time and effort in completing this survey.

Sincerely,
(Mrs.) Joanne L. Wakeham, RN, MSN

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September 02, 1993

Inside Address
Agency Name
Street Address
City, Virginia 23zip

Dear Proper Name with title;

Just a brief note to thank you for all your kind assistance in facilitating the distribution of the survey instruments to the EMS personnel within your agency. I am also indebted to all those who have participated in this project by taking the time to complete a questionnaire.

I am planning to start data analysis September 17, 1993. I need 361 useable questionnaires for a 95 percent level of confidence with this study. Surveys however, are not being returned in the numbers I was hoping for. I would appreciate it if you could include a brief reminder to EMS providers to complete and return the surveys as soon as possible in any written materials sent out to the stations in the next week or so.

I anticipate the data should be ready by November, 1993 if all goes as scheduled and the forces of nature in the form of hurricanes don’t decide to return to our area any time soon. A summary of the results will be sent to each participating agency.

Thanks again for all your cooperation and support. Please let me know if there is anything further I need to do to increase the return rate of these questionnaires.

Sincerely Yours,

(Mrs.) Joanne L. Wakeham, RN, MSN
I need to call on you once again for help. Unfortunately, not enough questionnaires have been returned to start data analysis. The returns are far below the expected number needed to make the study assessing EMS providers occupational risk to bloodborne pathogens and universal precautions practices representative of the EMS population.

In an attempt to encourage the participation of all EMS providers surveyed, I have prepared a flyer. I would appreciate it if you could see that one of these flyers is distributed to each of your stations and posted in a central location for EMS providers to read.

I remain optimistic that all EMS providers given a questionnaire will take the time to complete and return it soon. I feel that the information gained from this study will prove to be most helpful in meeting your needs and the needs of prehospital emergency medical care providers in reducing and addressing occupational risk to bloodborne pathogens.

Please let me know if there is anything further I need to do to increase the return rate of these questionnaires.

Sincerely Yours,

(Mrs.) Joanne L. Wakeham, RN, MSN

enc.
WANTED - EMS PROVIDERS QUESTIONNAIRES

YOUR PARTICIPATION IN THE UNIVERSAL PRECAUTIONS SURVEY IS URGENTLY NEEDED.

AS AN EMS PROFESSIONAL YOUR SERVICES ARE INDISPENSABLE TO THE HEALTH CARE SYSTEM. FOR THIS REASON IT IS MOST IMPORTANT THAT YOUR RESPONSES BE INCLUDED IN THIS SURVEY.

IF YOU HAVE NOT COMPLETED THE QUESTIONNAIRE YET, I URGE YOU TO DO SO AS SOON AS POSSIBLE. IF YOU NEED ANOTHER COPY PLEASE LET ME KNOW. I CAN BE REACHED AT 587-7079.

THANK YOU FOR YOUR HELP AND SUPPORT. JOANNE WAKEHAM
In response to your request of July 26, 1993, upon concurrent receipt by Consulting Psychologists Press, Inc., of this signed Permission Agreement and payment of the Permission Fee, permission is hereby granted to you to modify the Values Scale instrument by retyping the five items which comprise the Altruism Scale and reproducing these items as one section in a five-part instrument to be used in conjunction with your dissertation research entitled "The Relationship Between Locus of Control and Altruism and Prehospital Emergency Medical Care Providers Universal Precautions Practices". Research will be conducted from August 1, 1993 to September 30, 1993 or upon violation of this Permission Agreement including, but not limited to, failure to pay the Permission Fee of: 1000 copies x $.05 = $50.00 + an Administrative Processing Fee of $25.00 for a total of $75.00 or by failure to sign and return this Permission Agreement within 45 days from August 11, 1993.

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May 25, 1993

Joanne L. Wakeham, RN, MSN
7613 Leafwood Drive
Norfolk, Virginia 23518

Dear Ms. Wakeham:

Enclosed is the instrument used in the 1988 survey of AIDS-related knowledge, attitudes, and precautionary behaviors in Michigan emergency medical professionals.

You have my permission to adapt this survey for your research purposes. I only ask that you mention that your instrument or portions of your instrument were adapted from a 1988 survey conducted by the Special Office on AIDS Prevention, Center for Health Promotion, Michigan Department of Public Health with the primary author's permission. The formal reference is: Smyser, MS, Bryce, J, Joseph, JG: AIDS-Related Knowledge, Attitudes, and Precautionary Behaviors Among Emergency Medical Professionals. Public Health Rep 105: 496-504, September-October, 1990.

In our experience with this instrument we found the series of questions relating to HIV/AIDS related information sources (question numbers 12 - 20) to be difficult to interpret. It was not sure whether respondents were rating these sources according to actual experience or according to their perception of usefulness, since most respondents suprisingly answered that they had used just about all of the listed sources. Evaluation of the AIDS hotline through the State Medical Society was particularly problematic, since most respondents reported they had used this hotline, yet very few EMS personnel were logged in previous years by hotline personnel.

One approach that might help you improve your response rate would be to include post cards to be sent back separately from the anonymous survey responses. The postcards would be numbered according to addressee and return of the postcard would allow you to send second or even thrid mailings to only those who had not responded.

I would be very interested to know the results of your survey and would appreciate a copy of your survey findings. If I can be of further assistance, please feel free to write or call me at (206) 464-5459.

Sincerely,

Michael Smyser, MPH
Acting Office Director

enclosures
Joanne,

Sorry about the marks over the questionnaire—it was the only copy I could find.

My only suggestion is to set up a very strong, constructive relationship with the EMS system administrator you'll be working with. Your response rate, I think, is largely dependent on that interaction.

Good luck!

— Karl C. Klatzky
APPENDIX B

DATA COLLECTION INSTRUMENT
DIRECTIONS: This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you’re concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief; obviously there are no right or wrong answers.

Your answers to the items on this inventory are to be recorded directly on this booklet. Circle the letter of the item which you choose as the statement more true. Please answer these items carefully but do not spend too much time on any one item. Be sure to find an answer for every choice.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you’re concerned. Also try to respond to each item independently when making your choice; do not be influenced by your previous choices.

Circle the letter which best represents your views.

1.a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.

2.a. Many of the unhappy things in people’s lives are partly due to bad luck.
   b. People’s misfortunes result from the mistakes they make.

3.a. One of the major reasons why we have wars is because people don’t take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4.a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individual’s worth often passes unrecognized no matter how hard he tries.

5.a. The idea that teachers are unfair to students is nonsense.
   b. Most students don’t realize the extent to which their grades are influenced by accidental happenings.

6.a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.
Circle the letter which best represents your views.

7.a. No matter how hard you try some people just don’t like you.
    b. People who can’t get others to like them don’t understand how to get along with others.

8.a. Heredity plays the major role in determining one’s personality.
    b. It is one’s experiences in life which determine what they’re like.

9.a. I have often found that what is going to happen will happen.
    b. Trusting to fate has never turned out.

10.a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
     b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11.a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
       b. Getting a good job depends mainly on being in the right place at the right time.

12.a. The average citizen can have an influence in government decisions.
       b. This world is run by the few people in power, and there is not much the little guy can do about it.

13.a. When I make plans, I am almost certain that I can make them work.
       b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14.a. There are certain people who are just no good.
       b. There is some good in everybody.

15.a. In my case getting what I want has little or nothing to do with luck.
       b. Many times we might just as well decide what to do by flipping a coin.

16.a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
       b. Getting people to do the right thing depends on ability, luck has little or nothing to do with it.

17.a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, or control.
       b. By taking an active part in political and social affairs the people can control world events.
Circle the letter which best represents your views.

18. a. Most people don’t realize the extent to which their lives are controlled by accidental happenings.
   b. There really is no such thing as "luck".

19. a. One should always be willing to admit mistakes.
   b. It is usually best to cover up one’s mistakes.

20. a. It is hard to know whether or not a person really likes you.
   b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
   b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
   b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can’t understand how teachers arrive at the grades they give.
   b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.
   b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
   b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don’t try to be friendly.
   b. There’s not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
   b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
   b. Sometimes I feel that I don’t have enough control over the direction my life is taking.

29. a. Most of the time I can’t understand why politicians behave the way they do.
   b. In the long run the people are responsible for bad government on a national as well as on a local level.
How important to you is the value listed below? Please read each statement, then use the following scale to show how important that value is to you:

1 means of little or no importance
2 means of some importance
3 means important
4 means very important

DIRECTIONS: Please respond to all questions in this section by circling the number next to each item that shows how important the value is to you.

It is now or will in the future be important for me to...

1. help people with problems 1 2 3 4
2. be involved in work in which the goal is helping people 1 2 3 4
3. work in a way that makes the world a better place 1 2 3 4
4. improve the welfare and peace of the world 1 2 3 4
5. do work which improves things for other people 1 2 3 4

DIRECTIONS: Please complete the following survey which addresses your own experience as a prehospital emergency medical care provider. Answer each question as accurately as possible by circling one letter under each statement as instructed.

Since May, 1992 approximately how many times have you:

1. Used needles (inserting or removing I,V,’s, administering injections, or performing veni-punctures) when treating a client?
   a. zero times
   b. five times or less (not zero)
   c. six to ten times
   d. more than ten times

If you answered zero times to question 1 please skip questions 2 and 3 and continue with question 4.
Circle the letter that best applies to you.

When you used needles during this time frame did you ever:

2. Stick yourself accidentally with a needle which had already been used on a client?
   a. yes
   b. no

3. Put the plastic needle cover back on the needle after it had been used on a client?
   a. yes
   b. no

Since May, 1992, approximately how many times have you:

4. Cut yourself with a sharp object that was soiled with someone else’s blood?
   a. zero times
   b. five times or less (not zero)
   c. six to ten times
   d. ten times or more

5. Treated clients who were bleeding?
   a. zero times
   b. five times or less (not zero)
   c. six to ten times
   d. more than ten times

If you answered zero times to question 5 please skip questions 6 - 10 and continue with question 11.

When you treated these clients who were bleeding this year did you ever:

6. Have unprotected skin contact with the blood of one of these clients?
   a. yes
   b. no

7. Have the client’s blood come in contact with your mouth or eyes?
   a. yes
   b. no
Circle the letter that best applies to you.

When you treated these clients who were bleeding during this time frame, how often did you wear:

8. Protective gloves (latex, vinyl, or rubber)?
   a. always
   b. sometimes
   c. never

9. A protective gown?
   a. always
   b. sometimes
   c. never

10. Special protective eyewear (other than regular eyeglasses)?
    a. always
    b. sometimes
    c. never

Since May, 1992, approximately how many times have you:

11. Attempted to resuscitate a client?
    a. zero times
    b. five times or less (not zero)
    c. six to ten times
    d. ten times or more

If you answered zero times to question 11, please skip question 12 and continue with question 13.

When you attempted the resuscitation this past year, did you ever:

12. Perform mouth-to-mouth-resuscitation without any protective device?
    a. yes
    b. no

Since May, 1992, approximately how many times have you:

13. Treated a client which you knew or suspected of being infected with a bloodborne pathogen (HBV or HIV)?
    a. zero times
    b. five times or less (not zero)
    c. six to ten times
    d. ten times or more
DIRECTIONS: Please answer the following questions which address your own compliance with universal precautions as an EMS professional. Each question will address your practices during the period of time just prior to OSHA's Final Rule, (before May, 1992) and after the rule went into effect (after May, 1992).

Using the following scale for each of the statements, please indicate your answer by circling the most appropriate number.

1 Always  2 Sometimes  3 Rarely  4 Never  5 Don't Know

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Prior to May 1992</th>
<th>After May 1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-existing lesions, areas of abraded, lacerated, chapped, irritated or otherwise damaged skin are covered with an adhesive dressing prior to putting on gloves.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Hands are washed with soap and water as soon as feasible after removing gloves.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Gloves, goggles, mask or face shields are worn when handling or decontaminating items or surfaces that may be contaminated with blood or other potentially infectious materials.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Once gloves become wet or soiled, other objects such as writing instruments or radio equipment are not touched.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>ISSUES</td>
<td>Prior to May 1992</td>
<td>After May 1992</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>5. Goggles and a mask are worn when suctioning airways or dealing with an arterial bleed.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Contaminated needles are not recapped.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Contaminated needles and non-reusable sharps are immediately placed in puncture resistant, color-coded, leak proof containers.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Personal protective equipment (gloves, masks, goggles, gown/aprons, mouth pieces, etc.) is readily available at the worksite.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Garments contaminated by blood or other body fluids are removed as soon as possible.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. Soiled, reusable personal protective equipment (turn-out gear, boots, air tank) is cleaned and laundered by the agency.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11. Following an occupationally related exposure to blood or other body fluids, a confidential medical evaluation and followup is made available.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
### ISSUES

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Prior to May 1992</th>
<th>After May 1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Bloodborne pathogens infection control training and information is provided by the workplace annually.</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

13. How familiar are you with OSHA's Occupational Exposure to Bloodborne Pathogens: Final Rule which took effect in 1992?
   a. Very familiar
   b. Somewhat familiar
   c. Not familiar

14. Does your agency have a policy or procedure for dealing with occupationally related exposure to bloodborne pathogens?
   a. Yes
   b. No
   c. Unknown

**DIRECTIONS:** Please complete the following questions about your background as an prehospital emergency medical care provider by checking one box per question or by filling in the blanks where appropriate.

1. Your age: _______
2. Your gender: Male _____ Female _____
3. Your race: Caucasian _____ African-American _____ Hispanic _____ Other _____
4. Marital status: Single _____ Married _____ Other _____
5. Highest level of education: High school diploma or G.E.D. _______
   Some college _______
   Undergraduate 4 year degree _______
   Graduate degree _______
6. Most recent EMS training program: Vocational/Technical _______
   Community college _______
   U.S. Military _______
   Other _______
7. Was infection control training provided in your last EMS course content?
   a. Yes
   b. No
8. Level of current EMS certification:  
   Basic EMT_____  
   Shock Trauma Tech_____  
   Cardiac Tech_____  
   Paramedic_________  
   Not certified/first responder_____  

9. Total years of experience:  
   Firefighter Vol____ yrs.  Paid____ yrs.  
   EMS Vol____ yrs.  Paid____ yrs.  

10. Present employment status:  
   Firefighter Vol.____  Paid____  
   EMS Vol.____  Paid____  

11. Type of area served: Urban_____  Suburban_____  Rural_____  

12. How many blood and body fluid exposure incidents (direct body contact without personal protective equipment) did you report to your supervisor/agency in the last 12 months?
   a. zero  
   b. one - five  
   c. more than five  

13. Have you ever received the Hepatitis B vaccine?
   a. yes  
   b. no  
   c. unsure  
   d. declined  

If yes to question 13, give number of doses received:_______  

Thank you for participating in this important project!
APPENDIX C

AGENCY LISTINGS
## APPENDIX C

### TIDewater EMERGENCY MEDICAL SERVICES COUNCIL, INC.

**AGENCY LISTING**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Contact Person</th>
<th>Operational Medical Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bennett's Creek VRS</td>
<td>Scott Gartner</td>
<td>P. D. Cash, MD</td>
</tr>
<tr>
<td>Boykins VFD &amp; RS</td>
<td>Ronnie Griffith</td>
<td>S. R. Bhandari, MD</td>
</tr>
<tr>
<td>Chesapeake EMS</td>
<td>Kenneth Murphy</td>
<td>R. L. Manolio, MD</td>
</tr>
<tr>
<td>Courtland VRS</td>
<td>Pam Moore</td>
<td>S. R. Bhandari, MD</td>
</tr>
<tr>
<td>Eastern Shore</td>
<td>Holley Bailey</td>
<td>G. Gubb, MD</td>
</tr>
<tr>
<td>Franklin Fire &amp; Rescue</td>
<td>Jim Wagenbach</td>
<td>S. R. Bhandari, MD</td>
</tr>
<tr>
<td>Isle of Wight VRS</td>
<td>John Treier</td>
<td>J. Garrison, MD</td>
</tr>
<tr>
<td>Ivor VRS</td>
<td>Carl Gardner</td>
<td>A. Chambers, MD</td>
</tr>
<tr>
<td>Medical Transport</td>
<td>Rob Braithwaite</td>
<td>S. Skrip, MD</td>
</tr>
<tr>
<td>(Sentara)</td>
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<td>A. Chambers, MD</td>
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APPENDIX D

SAMPLING SCHEDULE
### APPENDIX D

#### SAMPLING SCHEDULE

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APPENDIX E

PILOT STUDY RESULTS
DESCRIPTION OF THE SAMPLE

Fifty questionnaires were distributed to prehospital emergency medical care providers participating in the pilot study. Sixty-eight percent or 34 were returned prior to the deadline. One respondent identified their current level of EMS certification at the basic EMT; 12 were shock trauma certified; 5 were certified as cardiac technicians and 13 were paramedics. A total of 41.1 percent (N=13) prehospital emergency medical care providers were classified as BLS providers and 52.9 percent (N=18) were classified as ALS providers. Two respondents failed to report certification level. Figure 1 presents the distribution of the sample of prehospital emergency medical care providers across the four certification levels.

Of the 34 participating prehospital emergency medical care providers, the age range was 24-48 years of age, the mode was 25 years of age. Two questionnaires had missing age data. Figure 2 presents the distribution of the sample of prehospital emergency medical care providers across the 15 age ranges. Twenty-six males responded to the questionnaire and six females.

Twenty-eight respondents classified their race as Caucasian, three reported themselves as African-American and three questionnaires had missing data in this block. Thirteen respondents indicated they were single, 14 reported they were married, three indicated "other" marital status and 4 questionnaires had missing data in this category.

The highest level of education completed by the majority of
prehospital emergency medical care providers was "some college" (N=17). Nine remained at the secondary level of education (high school graduates), five had completed a four year degree program, and two reported graduate degrees. One questionnaire had data missing.

Forty seven percent (N=16) of prehospital emergency medical care providers reported they had completed EMS training through a community college. Seven respondents had completed EMS training through a vocational/technical program. Three reported receiving their training through the US Military and six reported "other" training programs. Two questionnaires had this data missing. Figure 3 presents the EMS training of the respondents.

One question on the personal data sheet explored whether infection control training was provided in their last EMS course content. Approximately seventy-four percent (N=25) of the prehospital emergency medical care providers indicated they had received infection control training in their last EMS course content. Over twenty percent (N=7) indicated they had not received infection control training in their last EMS course content. Two questionnaires had this data missing.

Another question explored the length of firefighter and EMS experience. The number of years spent as a paid firefighter ranged from one to 15, with a mean of 5 years 4 months. Twenty-six percent (N=9) reported one year or less experience as a paid firefighter. Over fourteen percent (N=5) indicated a total of two years of experience as a paid EMS provider. The range of years of
experience as a paid EMS provider ranged from newly employed to 21 years, with a mean employment of 6 years 8 months. All respondents were employed full-time in a municipal agency in an urban area.

The number of prehospital emergency medical care providers reporting exposure incidents (direct body contact without personal protective equipment) in the last 12 months varied from zero exposures (N=20) to greater than five exposures (N=2). Approximately thirty-five percent (N= 12) reported from one to five exposures in this time period. Figure 4 presents the exposure incidents of respondents.

All 34 respondents reported receiving the Hepatitis B vaccine. Seventy-seven percent (N=26) indicated they had received all three doses. One provider indicated receiving one dose, and another indicated receiving four doses. The space to enter in the exact number of HBV doses was left blank on six questionnaires.
### Reliability Analysis - Scale (Retest)

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#### Reliability Coefficients

- Correlation Between Forms = -.2499
- Guttmann Split-Half = -.6656
- Alpha for Part 1 = .7319
- Alpha for Part 2 = .7033

23 Items in Part 1

23 Items in Part 2
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- Equal Length Spearman-Brown = .4699
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5 Items in Part 2
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- Guttman Split-Half: .2590
- Unequal-Length Spearman-Brown: .2603
- Alpha for Part 1: .6774
- Alpha for Part 2: .5954

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<td>Standard Error</td>
<td>.165</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-tail t Value</td>
<td>1.49</td>
<td></td>
<td>3.04</td>
</tr>
<tr>
<td></td>
<td>Degrees of Freedom</td>
<td>31</td>
<td></td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>2-tail Prob.</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix E-6

--- t-tests for paired samples ---

<table>
<thead>
<tr>
<th>Variable Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Error</th>
</tr>
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<tbody>
<tr>
<td>OSHA7 BEFORE OSHA FINAL RULE QUESTION # 4</td>
<td>2.2188</td>
<td>.870</td>
<td>.154</td>
</tr>
<tr>
<td>OSHA7 AFTER OSHA FINAL RULE QUESTION # 4</td>
<td>2.1250</td>
<td>.907</td>
<td>.160</td>
</tr>
</tbody>
</table>

(Difference) Mean Deviation Standard Error 2-tail t Degrees of 2-tail Prob.

| .0938 | .466 | .082 | .864 | .000 | 1.14 | 31 | .263 |

<table>
<thead>
<tr>
<th>Variable Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA9 BEFORE OSHA FINAL RULE QUESTION # 5</td>
<td>3.0000</td>
<td>.983</td>
<td>.179</td>
</tr>
<tr>
<td>OSHA9 AFTER OSHA FINAL RULE QUESTION # 5</td>
<td>2.5000</td>
<td>1.137</td>
<td>.208</td>
</tr>
</tbody>
</table>

(Difference) Mean Deviation Standard Error 2-tail t Degrees of 2-tail Prob.

| .5000 | .900 | .164 | .648 | .000 | 3.04 | 29 | .995 |

<table>
<thead>
<tr>
<th>Variable Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA11 BEFORE OSHA FINAL RULE QUESTION # 6</td>
<td>2.4483</td>
<td>1.055</td>
<td>.196</td>
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<tr>
<td>OSHA11 AFTER OSHA FINAL RULE QUESTION # 6</td>
<td>2.4828</td>
<td>1.153</td>
<td>.214</td>
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</tbody>
</table>

(Difference) Mean Deviation Standard Error 2-tail t Degrees of 2-tail Prob.

| -.0345 | .778 | .145 | .755 | .000 | -.24 | 28 | .813 |
### t-tests for paired samples

<table>
<thead>
<tr>
<th>Variable Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA13 BEFORE OSHA FINAL RULE QUESTION # 7</td>
<td>30</td>
<td>1.4000</td>
<td>.621</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.2667</td>
<td>.521</td>
</tr>
<tr>
<td>OSHA14 AFTER OSHA FINAL RULE QUESTION # 7</td>
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<td></td>
<td></td>
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<tr>
<td>(Difference) Standard Mean Deviation</td>
<td>.1333</td>
<td>.434</td>
<td>.079</td>
</tr>
<tr>
<td></td>
<td>l</td>
<td>.724</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>t</td>
<td>1.68</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Degrees of Freedom</td>
<td>2-tail Prob.</td>
<td>.103</td>
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<tr>
<td></td>
<td></td>
<td>2-tail 1 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degrees of Freedom</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-tail Prob.</td>
<td></td>
</tr>
<tr>
<td>OSHA15 BEFORE OSHA FINAL RULE QUESTION # 8</td>
<td>30</td>
<td>1.9000</td>
<td>.803</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.5000</td>
<td>.630</td>
</tr>
<tr>
<td>OSHA16 AFTER OSHA FINAL RULE QUESTION # 8</td>
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<td></td>
</tr>
<tr>
<td>(Difference) Standard Mean Deviation</td>
<td>.4000</td>
<td>.770</td>
<td>.141</td>
</tr>
<tr>
<td></td>
<td>l</td>
<td>.443</td>
<td>.014</td>
</tr>
<tr>
<td></td>
<td>t</td>
<td>2.84</td>
<td>29</td>
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<td></td>
<td>Degrees of Freedom</td>
<td>2-tail Prob.</td>
<td>.008</td>
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<td>2-tail 1 t</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degrees of Freedom</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-tail Prob.</td>
<td></td>
</tr>
<tr>
<td>OSHA17 BEFORE OSHA FINAL RULE QUESTION # 9</td>
<td>30</td>
<td>1.9000</td>
<td>.845</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>1.7333</td>
<td>.868</td>
</tr>
<tr>
<td>OSHA18 AFTER OSHA FINAL RULE QUESTION # 9</td>
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<tr>
<td>(Difference) Standard Mean Deviation</td>
<td>.1667</td>
<td>.379</td>
<td>.069</td>
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<td></td>
<td>l</td>
<td>.902</td>
<td>.000</td>
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<td></td>
<td>t</td>
<td>2.41</td>
<td>29</td>
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<tr>
<td></td>
<td>Degrees of Freedom</td>
<td>2-tail Prob.</td>
<td>.023</td>
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<td></td>
<td></td>
<td>2-tail 1 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Degrees of Freedom</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-tail Prob.</td>
<td></td>
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</tbody>
</table>
### Appendix E - 3

--- t-tests for paired samples ---

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA19</td>
<td>30</td>
<td>3.7333</td>
<td>.785</td>
<td>.143</td>
</tr>
<tr>
<td>OSHA20</td>
<td>30</td>
<td>3.6667</td>
<td>.959</td>
<td>.175</td>
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</tbody>
</table>

### (Difference) Standard Mean Deviation Error 2-tail t Degrees of 2-tail

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA19</td>
<td>.0667</td>
<td>.450</td>
<td>.082</td>
<td>.886</td>
<td>.000</td>
<td>.81</td>
<td>.423</td>
</tr>
<tr>
<td>OSHA21</td>
<td>.3333</td>
<td>.802</td>
<td>.146</td>
<td>.832</td>
<td>.000</td>
<td>2.28</td>
<td>.030</td>
</tr>
<tr>
<td>OSHA23</td>
<td>.4375</td>
<td>1.366</td>
<td>.242</td>
<td>.468</td>
<td>.007</td>
<td>1.81</td>
<td>.080</td>
</tr>
</tbody>
</table>

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APPENDIX F

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT
FOR PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES
ACCORDING TO LOCUS OF CONTROL
## Pearson Product Moment Correlation Coefficient

For Providers Universal Precautions Practices According to Locus of Control

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Locus of Control</td>
<td>9.4596</td>
<td>4.2496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPP</td>
<td>22.2288</td>
<td>5.9560</td>
<td>1.88130</td>
<td>0.0745</td>
</tr>
</tbody>
</table>

Upp n = 354; LOC n = 359
APPENDIX G

ANALYSIS OF VARIANCE
FOR PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES
ACCORDING TO LOCUS OF CONTROL AND LEVEL OF CERTIFICATION
### Appendix G

**Universal Precautions Practices of Providers**

According to Level of Certification and Locus of Control

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Sqr.</th>
<th>D. of F.</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main effects</td>
<td>830.747</td>
<td>22</td>
<td>37.761</td>
<td>1.217</td>
<td>0.232</td>
</tr>
<tr>
<td>2-way interaction</td>
<td>713.696</td>
<td>20</td>
<td>35.685</td>
<td>1.150</td>
<td>0.298</td>
</tr>
<tr>
<td>Explained</td>
<td>1,544.443</td>
<td>42</td>
<td>36.772</td>
<td>1.185</td>
<td>0.212</td>
</tr>
<tr>
<td>Residual</td>
<td>9,186.601</td>
<td>296</td>
<td>31.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10,731.040</td>
<td>338</td>
<td>31.749</td>
<td></td>
<td></td>
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</table>

\( n = 338 \)
APPENDIX H

MULTIPLE REGRESSION ANALYSIS
FOR PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES
ACCORDING TO SUBSCALES
### Appendix H

**Stepwise Multiple Regression Analysis**

Predicting Providers Universal Precautions Practices Among Subscales

<table>
<thead>
<tr>
<th>Variable</th>
<th>R Square</th>
<th>Multiple R</th>
<th>R Sq. Change</th>
<th>F Change</th>
<th>Sig. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altruism</td>
<td>0.01245</td>
<td>0.11157</td>
<td>0.01245</td>
<td>4.29854</td>
<td>.0389*</td>
</tr>
</tbody>
</table>

D.F. 1, 341
Signif. LE .05*
APPENDIX I

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT
FOR PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES
ACCORDING TO OCCUPATIONAL RISK
### Appendix I

**Pearson Product Moment Correlation Coefficient**

For Providers Universal Precautions Practices According to Occupational Risk

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupa. Risk</td>
<td>22.2368</td>
<td>4.8013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPP</td>
<td>22.2288</td>
<td>5.9560</td>
<td>-1.6984</td>
<td>-0.0607</td>
</tr>
</tbody>
</table>

Upp $n = 354$; ORS $n = 359$
APPENDIX J

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT
FOR PROVIDERS UNIVERSAL PRECAUTIONS PRACTICES
ACCORDING TO HIV/HBV CLIENT
### Pearson Product Moment Correlation Coefficient

For Providers Universal Precautions Practices According to HIV/HBV Client

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/HBV Client</td>
<td>2.3116</td>
<td>0.9853</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPP</td>
<td>22.2288</td>
<td>5.9560</td>
<td>-.3430</td>
<td>-0.0583</td>
</tr>
</tbody>
</table>

Upp n = 354; HIV/HBV n = 353
AUTOBIOGRAPHICAL STATEMENT

Joanne Louise Wakeham was born in Buffalo, NY, on March 27, 1946. Mrs. Wakeham received a diploma in nursing from Edward J. Meyer Memorial School of Nursing, Buffalo, NY; a bachelor of science degree in nursing from Old Dominion University, Norfolk, Virginia, in 1978 and a master of science degree in nursing from Hampton University, Hampton, Virginia, in 1985.

Mrs. Wakeham has held positions as staff nurse at Virginia Beach General Hospital, Virginia Beach, Va.; At Home Care, Tidewater Health Care Services, Virginia Beach, Va.; and at Norfolk Public Health Department, Norfolk, Va.; supervisor of nursing at Norfolk Public Health Department and Chesapeake Public Health Department, Chesapeake, Va.; and nurse manager at Chesapeake Health Department. She served as clinical instructor at Old Dominion University, School of Nursing, Norfolk, Va. and assistant professor of nursing at Hampton University, School of Nursing, Hampton, Va. She is a Captain in the United States Army Reserve, Army Nurse Corps assigned to the 18th Field Hospital, Norfolk, Va.; faculty member for the United States Armed Forces School, 91C30 Program, Wilmington, Delaware; Officer in Charge of Curriculum and Testing, USARF, 91C30 Program, Wilmington, De. She is a peer review panel member for the Eastern Region AIDS Resource and Consultation Center, Norfolk, Va.

Mrs. Wakeham is a member of Sigma Theta Tau, and the
Virginia Public Health Association. She served on the board of
directors for the Virginia Home Health Association; and was a
member of the Mayor’s Task Force on Poverty, Chesapeake, Va.

Mrs. Wakeham’s has co-authored an article entitled: "The
Grant Development Process: A Nursing Solution for A Community