

**COMPLIANCE WITH UNIVERSAL PRECAUTIONS  
AMONG OPERATING ROOM REGISTERED NURSES**

by

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## ABSTRACT

Title of Thesis: COMPLIANCE WITH UNIVERSAL PRECAUTIONS  
AMONG OPERATING ROOM REGISTERED NURSES

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The purpose of this study was to collect data regarding the knowledge of and compliance with Universal Precautions (UP) among operating room registered nurses (OR RN's) who circulate, to determine if they are knowledgeable of their risk for exposure to Hepatitis B Virus (HBV) and the Human Immune Deficiency Virus (HIV) and if they practice universal precautions according to OSHA standards. The study population was OR RN's from four rural hospitals. A convenience sample of 36 such OR RN's were observed over a 60-day period, for performance of UP behaviors during a variety of surgical procedures.

A descriptive observational research design was used for this investigation. Demographic data and data on universal precautions (UP) practices were collected using a survey and a Universal Precautions Assessment Tool (UPAT), revised from a tool developed by Gauthier, Turner, Langley, Neil and Rush (1991). Demographic data showed that the study sample was representative of an OR RN population with respect to gender. A Spearman's Rho correlation coefficient showed that the more knowledgeable of UP the OR RN was, the less likely he/she was to wear gloves when applying tape to the surgical dressing ( $r = -.4438, p=.034$ ). The two sample T-test revealed that OR RNs who had attended a UP inservice within 6 months of being observed were more likely to wash their hands after contamination ( $\bar{X}=22.33, SD=40.45$ ). Wearing gloves when moving a patient ( $t=3.75, p=.001$ ) and washing hands

after removal of gloves ( $t = -4.03$ ,  $p = .000$ ) were found to be significantly different when the nurse had received the Hepatitis B vaccine.

Further investigation with a larger sample and a control group is needed to ascertain which factors contribute to the problem of poor compliance with glove use and handwashing behavior.

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## LIST OF ABBREVIATIONS

- AHA-American Hospital Association
- AIDS-Auto Immune Deficiency Syndrome
- AORN-Association of Operating Room Nurses
- B/BF-Blood and Body Fluid
- CDC-Center for Disease Control
- DOL-Department of Labor
- HBM-Health Belief Model
- HBV-Hepatitis B Virus
- HCP-Health Care Personnel
- HIV-Human Immune deficiency Virus
- HW-handwashing
- OR-operating Room
- OR RN-Operating Room Registered Nurse
- OSHA-Occupational Safety and Health Administration
- PPE-Personal protective equipment
- UP-Universal Precautions
- UPAT-Universal Precautions Assessment Tool

## CHAPTER I

### Introduction to the Problem

The potential for occupational exposure to bloodborne diseases is an alarming and real threat for all health care personnel (HCP). As the number of persons infected with bloodborne diseases increases, it has become critical that all health care personnel (HCP) exhibit unfailing compliance with a strategy for isolation precautions, known as Universal Precautions (UP). Due to the fact that all blood and body fluids (B/BF) are potentially contaminated with infectious diseases, it is therefore presumed that all hospital patients, regardless of their blood-borne infection status, represent a potential source of infection (Department of Labor, 1987). The obligatory behaviors incorporated with the practice of UP must be observed by all HCP whose work practices involve contact with patients' body fluids (i.e. blood, semen, saliva, tears, urine, vaginal secretions, cerebrospinal fluid, breast milk, as well as amniotic fluid).

A document issued by the Center for Disease Control (CDC), in 1987, recommended all health care employers throughout the United States, develop, teach and monitor practice procedures that would protect all HCP, as well as patients, from communicable diseases. The recommended practice of using "all standard precautions," to prevent the risk of exposure is to be carried out for all patients (CDC, 1987, 1988). In 1991, the Occupational Safety and Health Administration (OSHA) recognized the concerns about infectious diseases, particularly those spread by bloodborne pathogens, and developed a standard for dealing with these risks. This standard, identified as the Universal Precautions Standard, was mandated by OSHA, to be practiced by all HCP.

In 1993, the Association of Operating Room Nurses (AORN) Journal published the recommended practices of Universal Precautions as they pertain to, and should be

implemented in the operating room setting. Identified in these standards were behaviors that the operating room nurse could employ to protect the patient and the nurse from exposure to bloodborne pathogens. Included in these UP practices were the availability and use of protective barriers referred to as personal protective equipment (PPE), which included but was not limited to eyewear, goggles, surgical masks, and gloves. The practice of handwashing after removal of gloves, as well as the availability of HBV immunization, was also included.

The ultimate goal of UP is to prevent the transfer of infectious agents from patient to patient; from patient to hospital staff; and from staff to patient (CDC, 1991). In order to meet this goal, there must be a "single level of care," namely UP, that will provide the maximum level of care for all patients, regardless of their disease process. UP require appropriate barrier precautions through the routine use of personal protective equipment (PPE), such as gloves and protective eyewear, if exposure to blood or other potentially infectious material may be anticipated (Centers for Disease Control, 1987, Department Of Labor, 1991). These precautions are neither disease nor diagnosis specific; they are routine, systematic and specific actions designed to offer protection and prevent transmission of microorganisms.

It is conceivable that the bloodborne pathogens of the Hepatitis B virus (HBV) and Human Immune deficiency Virus (HIV) infection may be introduced through open wounds (including inapparent ones). The incidence of HBV infection among susceptible HCP with frequent blood contact is 1.0% per year. Frequency of exposure appears to be the most important factor in the development of occupational HBV infection. For these reasons, the practice of UP by HCP is intended to prevent bloodborne pathogen exposure via mucous membrane, parental and non-intact skin, as well as prevent cross contamination of patients and HCP.

Since the transmission of bacteria by hands is one of the main causes of cross-infection in the hospital environment, handwashing is considered the most important single procedure for prevention. According to the practice controls of UP, hands must be thoroughly washed following contamination with body fluids and after removing gloves (Department Of Labor, 1989). Regardless of the ongoing debate with respect to the most effective method of degerming hands, it is a fact that handwashing and attention to barrier precautions by hospital personnel are not being complied with (Goldman & Larson, 1992).

If the basic principles of UP are practiced routinely for every patient, the transmission of bloodborne pathogens and nosocomial infections will be minimized and the number of HCP exposed to other infectious diseases will be significantly lessened.

#### Purpose of the Study

The purpose of this study was to determine if there was a significant increase in handwashing and glove use if OR RNs perceived they were at risk for bloodborne pathogen exposure; to determine the rates of compliance with UP, namely glove use and handwashing given there was a perceived risk among circulating OR RNs, and to determine if the time of OR RNs yearly attendance at a UP class had an effect on their compliance with the practice of UP.

#### Significance of the Study

As infection prevention considerations to protect the patient from nosocomial Infections are developed, a new factor comes into play: prevention of the transmission of infections, such as HBV and HIV, to HCP. It is not only necessary to protect the patient, it is now necessary to reduce exposure of the HCP to blood-borne diseases, thus the necessity for implementation of UP. Unless UPs are practiced during



encounters with all patients, the high risk and negligent behavior of the HCP will only exacerbate the spread of infection.

Medical history, laboratory tests and physical examination are not reliable in identifying all patients infected with a blood-borne pathogen. As HCP, Operating Room Registered Nurses (OR RNs) who circulate, are at an increased risk of frequent occupational exposure to HBV, HIV and other bloodborne pathogens (Becker, Cone & Gerberding, 1989; Hammond, J.S., Eckes, J., Gomez, G.A., & Cunningham, D., 1990). Such exposure-prone activities include, but are not limited to, handling bloody sponges, caring for surgical specimens, picking up bloody instruments that have fallen to the floor from the operative field, and applying dressings and tape to surgical incisions.

The chance of an OR RN acquiring an HIV infection following percutaneous exposures to blood from a patient known to be infected with HIV is currently estimated to be less than 0.25-0.3% (Bartlett, 1996, 1998). The risk of HBV infection following a similar exposure to the blood from a patient known to be HBV positive has been estimated to range from 20-33% (Hepatitis B Foundation, 1997). HBV causes more disease and death among HCP than any other hazard, including HIV infection. The Center for Disease Control (CDC) has estimated that 12,000 health care workers exposed to blood, blood products, and body fluids, are hospitalized annually for HBV infection, with 250 of those resulting in death (CDC, 1995).

### Summary

The purpose of the study and the significance of the research were discussed in Chapter I. Chapter II will describe the relevant literature regarding compliance deficiencies and level of knowledge of RNs in the practice of UP. Handwashing practices, glove use and the Health Belief Model related to attitude and the value of the study will be reviewed.

## CHAPTER II

### Literature Review

#### Overview

Health Care Personnel (HCP) are at occupational risk to a vast array of infection causing pathogens that cause substantial illness and occasionally death (Sepkowitz, 1996). An alarming and real threat for all HCP is the potential risk for occupational exposure to bloodborne diseases such as Hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C virus (HCV), cytomegalovirus (CMV) and Ebola virus. Efforts to decrease the potential for bloodborne pathogen exposure among HCP have focused on safe work practices, namely Universal Precautions (UP). First developed by the CDC in 1987, UP have gained wide acceptance in the literature and are promoted by major health care regulatory bodies as a measure to prevent the transmission of bloodborne diseases (CDC, 1991). Despite the magnitude of information in medical and nursing literature regarding exposure to bloodborne pathogens and the fact that UP practices have been shown to minimize this risk, implementation of UP continues to remain an issue of resistance by some HCP.

Literature related to the exposure of HCP to blood and body fluid is widely available. However, few studies address the preventative behavior of Operating Room Registered Nurses (OR RNs) who circulate. Due to the unique environment of the surgical suite, it is one of the highest risk areas in the hospital for exposure to bloodborne pathogens (OSHA, 1991). According to the CDC (1991), OR RNs are most at risk for bodily fluid exposure because they frequently handle blood and blood products, and are exposed to the patients' body fluids. This risk of exposure may result from the handling of surgical specimens and used bloody sponges away from the immediate sterile field. Inadequate barrier protection for the OR RNs who circulate

indicates that they are at greater risk for bloodborne disease than most other health care providers (Ronk and Girard 1994). Gerberding, Little and Rarkington (1990) undertook an observational study of surgical procedures and concluded that all surgical personnel are at risk for intraoperative exposure to blood. The highest risk of exposure occurred when the procedure lasted more than three hours, blood loss exceeded 300 milliliters, and when major vascular and intra-abdominal surgery was involved.

The person-to-person transmission of infection and the role of handwashing as a barrier precaution was convincingly demonstrated in the nineteenth century by Dr. Ignaz Semmelweis. During his years of practice as an obstetrician, he found the mortality rate of women attended by physicians was three times that of women attended by midwives. Dr. Semmelweis was unable to establish a relationship for this disparity until a colleague died from sepsis acquired from a cut sustained during a post-mortem examination. After much investigation, it was deduced that since midwives did not perform autopsies, they did not, therefore, transmit the infectious fatal organisms. Dr. Semmelweis presented clear evidence on the role hands play in the spread of nosocomial infections. Following the enforcement of strict handwashing protocols, mortality rates declined from 12% to 3% within three weeks. Similar reductions in infections, morbidity and mortality were documented in several hospitals where Semmelweis implemented his handwashing protocols (Newsome, 1993).

For more than a century now, handwashing has been a universally accepted practice to reduce the numbers of transient microorganisms on the hands. Recognized as one of the few infection control practices with efficacy, handwashing remains the cornerstone of efforts to reduce the risk of infection. The CDC Guidelines for Handwashing and Hospital Environmental Control (1985), incorporated the CDC guidelines of 1980, 1981, and 1983 as well as newly available information, and

replaced all previous handwashing and environmental control statements issued by the CDC. Included in the important changes were indications for and frequency of handwashing and glove use. Non sterile gloves should be worn when hands are likely to become contaminated with potentially infective material (blood or body fluids) since it is often not known which patients' body fluids contain hepatitis B virus or other pathogens. When gloves are worn, handwashing is also recommended after their removal because gloves may become perforated during use and bacteria can multiply rapidly on gloved hands. The Association of Practitioners in Infection Control (APIC) established standards for acceptable infection control which were published in 1988, and revised in 1995. Categories included within these standards were glove use and handwashing. The recommendations regarding the use of gloves were: "gloves should be used in addition to, not as a substitute for, handwashing; gloves should be used when activities involving blood and/or body fluids will contaminate the hands. After these activities have been completed, the gloves should be removed and the hands washed" (APIC, 1995, p. 253).

Studies conducted over the last twenty years have repeatedly demonstrated that handwashing is the single most important measure in the reduction of transmitting microorganisms from one person to another or from one site to another on the same patient. Yet it is not often performed, or if performed, carried out poorly. Casewell and Phillips (1978) conducted a study among ICU nurses and found that when strict handwashing regimes were adhered to, the number of infected patients declined. Garner and Favero (1986), found that handwashing causes a significant reduction in the number of potential pathogens on the hands. In a hospital-based trial of handwashing and infection rate conducted over an eight-month period, infection rates were halved when the staff used antiseptic products when washing their hands. Since

body substances contain large numbers of potential nosocomial pathogens, the two major practices in the prevention of hospital acquired infections and the protection against blood-borne pathogen transmission process are handwashing and glove use.

Studying 193 HCP, Larsen and Killen (1982) sought to identify factors which influenced HCP to wash or not to wash their hands. The most important factor favoring handwashing was the prevention of the spread of infection; the most important factor against handwashing was "busy-ness". Individuals who washed infrequently, less than 8 times per day, placed significant value on the detrimental effects of frequent handwashing on their own skin and on the handwashing practices of their work colleagues than did individuals who washed frequently. Frequent and infrequent washers did not differ significantly in their values regarding the factors favoring handwashing. Aware of the need to reduce nosocomial infections, HCP choosing to wash or not wash their hands may be influenced by a variety of factors; habits, time constraints, priority, and/or perceived risk to self or other patients.

The three most important reasons gloves are worn in the hospital are: 1) to provide a protective barrier and to prevent gross contamination of the hands when touching blood, body fluids, secretions, excretions, mucous membranes, and non-intact skin, 2) to reduce the likelihood that microorganisms present on the hands of personnel will be transmitted to patients during invasive or other patient-care procedures that involve touching a patient's mucous membranes and non-intact skin, 3) to reduce the likelihood that hands of personnel contaminated with microorganisms from a patient can transmit these microorganisms to another patient (Lynch, et al. 1990).

Glove use has also varied across studies, whether a self-report or observational measure was used. According to a study conducted by Stringer, Smith, Scharf, Valentine, and Walker (1991) on the use of gloves, 52% of the HCP washed their

hands after removing their gloves and 43% reported always wearing gloves to draw blood. Henry, Campbell, and Maki (1992) found no significant difference in the use of gloves when self-reported use was compared to observed use. During 1,018 patient/HCP interactions to determine the level of compliance with barrier use, Henry et al. (1992) determined that personnel, when filling out surveys, tend to report a higher level of compliance than they actually practice.

When monitoring for compliance with the use of gloves, Bowman and Nicholas (1990), found 74% of the HCP used gloves when performing patient care activities that involved contact with blood or body fluids. The results of two studies (DeVries, Burnette, & Redmon, 1991; Friedland, Joffe, Wiley, Schapire & Moore, 1992), showed that nurses increased their compliance with glove-wearing following performance feedback and educational sessions which addressed their compliance with glove-wearing.

Microbial contamination of hands and possible transmission of infection has been reported even when gloves were worn. Wearing gloves does not replace the need for handwashing. In order to protect the patient and/or nurse, hand decontamination is necessary after removal of gloves. It is possible that gloves may have small, inapparent defects, may leak as a result of puncture or may be torn during use, or the hands may become contaminated when the gloves are removed (Korniewicz, Kirwin, & Cresci, 1994). Kelen, et al. (1990, 1991) conducted a multi-state, multi-institutional investigation of glove use by HCP. This observational study in the emergency department was conducted to measure the compliance of the emergency room staff with UP while providing care to patients with critical illness or injury. The hospitals reported compliance with UP was 44.7% for situations involving no bleeding, 57.7% with active bleeding, but only 19.5% in the presence of profuse bleeding. In

determining what factors or conditions were likely to interfere with the staff adhering to universal precautions, a questionnaire was administered to each participating provider. The reasons indicated for HCP noncompliance were identified as: lack of sufficient time to put on protective apparel (47%), precautions interfered with skillful performance of procedures (33%), apparel was too uncomfortable (23%), and belief that UP didn't work (2.7%).

Olsen, et al. (1993) undertook a study to test the effectiveness of vinyl and latex gloves as barriers to hand contamination during routine hospital procedures. Their findings determined that under conditions of routine use, nonsterile examination gloves effectively function as a protective barrier 87% of the time, yet leaks were detected in 43% of the vinyl gloves tested after use. HCP reported tears in 22% of the gloves with leaks and were unaware of the other instances in which the glove leaked. These results indicate that the absence of visible leaks cannot be used by HCP as a reason to assume glove integrity. The detection of hand contamination after 13% of the procedures suggests that handwashing should routinely be performed after removal of gloves.

Bauer indicated there were several UP compliance deficiencies among O. R. personnel in a study he conducted in 1991. In order to assess the effectiveness of compliance and knowledge with regard to the use of UP, Bauer developed a survey designed to investigate employee knowledge about transmission of blood-borne diseases as well as to elicit demographic data, adverse exposure probabilities, personal protective equipment use and adverse exposures. Identifying knowledge deficits regarding prevention and transmission of blood-borne pathogens and precautionary measures toward exposure to blood-borne pathogens as areas of concern, the study showed that 53% of those nurses monitored were aware of their risk of infection.

Perceived barriers to practicing UP among 53 HCP was reported in 1994 by O'Boyle, Campbell, Henry and Collier. The factors: lack of time (74%), patient at low risk for carrying blood-borne pathogens (57%), protective devices interfered with care (55%), and equipment not available (41%) were similar to barriers identified a decade earlier by Larsen and Killen (1982). It appears that HCP are consistent in identifying that their busy schedules, perceived lack of contact with high risk patients, and inconvenience of, or discomfort with equipment are barriers to the practice of handwashing or practicing UP.

According to a multicenter survey of 1716 HCP, Gershon, et al. (1995), investigated underlying causes of non-compliance with the practice of UP. Those HCP who perceived a strong commitment to safety at their facility had a strong correlation with demonstrating compliance with UP and therefore, were more likely to complete the questionnaire addressing self-reported use of gloves. The researchers also found that most HCP were extremely knowledgeable about UP, but this knowledge was not associated with compliance. The compliance rates varied from 97% for glove use to 62% for wearing eye protection.

Identification of infected individuals and taking necessary precautions has been the traditional approach to infection control. The alternative approach, UP, assumes that all blood and body fluids are potentially infected and precautions to avoid contamination must be implemented when caring for all patients (OSHA, 1991). Yet, there is mounting evidence that although HCP are aware of the necessity to take the same precautions with all patients, they still tend to practice according to their knowledge of the patients antibody status (Cockcroft & Elford, 1994).

In 1994, Ronk and Girard conducted a descriptive study, assessing the perception of risk and compliance with UP practice of 126 nurses. Eighty percent of the



respondents stated they changed their UP practice habits if they knew the patient had HIV or HBV, 72% indicated that they always or usually washed their hands each time they removed their gloves, and 84% reported that they always or usually wash their hands after every patient contact. Nurses rated perception of risk as important because, if they do not think they are at risk, they may not adequately protect themselves through the use of UP. However, in the observational studies of handwashing practices of HCP, there was only a 41% compliance rate. The reported handwashing frequency was three times the observed frequency.

Viral hepatitis has long been recognized as an occupational risk among personnel working in the health care arena. The major risk in health care settings is from Hepatitis B infection. Serologic investigations have identified the operating room, medical wards, hemodialysis units and the clinical laboratory as areas of risk for transmission of the infection. The CDC calculated that 6,500 to 9,000 new HBV infections occurred among HCP in 1990. Given the natural history of HBV infection, 300 to 950 of these HCP (5% to 10%) will eventually develop chronic HBV infection that will lead to death.

The hepatitis B vaccine, available since 1982, has been determined to be safe and effective in the prevention of occupationally-acquired Hepatitis B infection (Valenti, 1986). According to the studies required for licensure of the vaccine, over 95% of immunocompetent persons developed protective antibodies following administration of the three vaccine series (CDC, 1987). In spite of these statistics, the CDC reported only 45% of high-risk personnel had been vaccinated (CDC, cited in Spence & Dash, 1990). Spence and Dash, (1990) reported in a study conducted in a 600-bed inner-city hospital which employs 4,000 HCP, that only 42% of high-risk nurses received the Hepatitis B vaccine. New cases of Hepatitis B rose 50% between 1978 and 1985,

despite the development of the vaccine (CDC, cited in Spence & Dash, 1990). The CDC reports that 10% of the new Hepatitis B cases occur in HCP (CDC, 1987), and as many as 30% of HCP have positive serologic markers indicating past exposure to the hepatitis virus (CDC, 1995). Doebbeling, Ferguson and Kohout (1996), found in their random sampling of HCP that 54% of previously nonimmune HCP had completed the vaccine series, while 70% had received one or more doses. Hepatitis B vaccine acceptance was related strongly to social influence and knowledge of the disease. Jaffe, et al. (1997) conducted an anonymous survey to determine HCP attitudes toward Hepatitis B vaccine. Results from the convenience sample of physicians and nurses showed that 84% agreed that "every hospital employee" should receive the vaccine and that 85% of the HCP reported receiving the Hepatitis B vaccine. Hersey and Martin (1994) conducted a national survey of 3,094 HCP to assess compliance with infection control guidelines to prevent occupational transmission of Hepatitis B virus (HBV) and human immunodeficiency virus (HIV). The results indicated that 55% of HCP reported receiving at least one of the HBV vaccination series and were significantly more likely to agree that HBV was a risk for hospital staff (97%).

The purpose of a study by Gauthier, Turner, Langley, Neil and Rush (1991), was to design an instrument that could avoid the bias commonly present with self-reporting, and yet be used accurately and consistently to observe and determine a subject's application of UP in the clinical setting. After being pilot tested to establish interrater reliability, the assessment tool was available for use by researchers and monitors to assess the strengths, weakness, or overall UP compliance of HCP. Using a checklist format, the tool addressed the compliance with barrier precautions, handwashing, and disposal of needles and sharp instruments. The instrument could

also be used as a pretest and posttest to measure the effectiveness of education or interventions designed to increase HCP compliance with UP.

The relationship between the level of knowledge of RNs concerning AIDS-related issues and the practical observance of UP was studied by Gruber, et al. (1989). The results indicated there was a relationship between knowledge and the implementation of UP. Those subjects with higher knowledge scores had lower practice scores.

In a national survey of 1,562 HCP who had frequent exposures to blood and body fluids, Willey, Dhillon, Loewen, Wesley, and Henderson (1990) determined work practices, attitudes, and knowledge pertaining to the occupational exposure did not influence HCP compliance with UP practice. Despite the high level of training and knowledge of these participants, only 55% reported routinely practicing UP. Knowledge regarding routes of transmission for bloodborne pathogens and perception of risk for occupational infection with these pathogens seemed to play different roles in influencing HCP compliance with UP. Compliers were significantly more likely to identify the correct routes of transmission for both HIV and HBV. It was demonstrated however, that increased knowledge of transmission does not have a profound impact on behavior since the compliers were not more motivated to use UP.

Although various studies address the use of UP among HCP, few specifically address operating room nurses who circulate and even fewer examine whether these nurses believe they are at risk for exposure to potentially fatal bloodborne pathogens. A study conducted by Grady, Shortridge, Davis, and Klinger (1993) measured HCP self-reported attitudes regarding exposure to blood-borne diseases and UP practice. Using the HBM and the prior work of Champion (1984), Grady developed a two-part self-report questionnaire to measure HCP attitudes toward blood-borne diseases and

UP. The study population consisted of a convenience sample of 100 RNs. Section A of the questionnaire consisted of five items which elicited the subjects' "exposure" to blood-borne diseases and formal training in UP. The subject's "yes" or "no" responses indicated that 86% had taken care of clients with blood-borne diseases; 63% reported experiencing a needlestick injury; 55% acknowledged caring for clients with HIV/AIDS; and 30% reported caring for clients who had died of AIDS. Eighty-seven percent of the subjects reported that they had received training in UP practice.

The questions in this study were devised to establish nurses as either exposed or non-exposed. Exposed RNs included those who responded "yes" to having cared for a client with a bloodborne disease or HIV/AIDS, having cared for a client who died of AIDS, or having received a needlestick injury. Those RNs indicating "no" to the questions were categorized as non-exposed. Statistically significant differences in attitudes were reported between the exposed and non-exposed RNs.

Section B was scored using a scale (5-1) ranging from a "strongly agree" response scored as high (5) to a "strongly disagree" response scored as low (1). The higher numbers (5-4) represented high self-perceptions of seriousness or susceptibility to bloodborne diseases; high agreement with use of UP; or health-related motivation. The lower numbers (1-2) represented low self-perceptions of seriousness or susceptibility to bloodborne diseases; low agreement with the use of UP; or low health-related behaviors.

Attitudes reflecting significantly lower health motivation were identified in RNs reporting caring for clients with blood-borne diseases. Higher attitudes of susceptibility and seriousness were reported for those RNs who cared for HIV/AIDS clients, and were significantly higher for those who cared for clients who had died of AIDS. This study

concluded that those HCP who are highly trained and educated in UP practice and are exposed to people with blood-borne diseases are not complying with UP.

A significant factor associated with noncompliance is the fact that more than six million HCP are at risk for exposure to bloodborne pathogens, 60% of these are nurses (CDC, 1995).

### Theoretical Framework

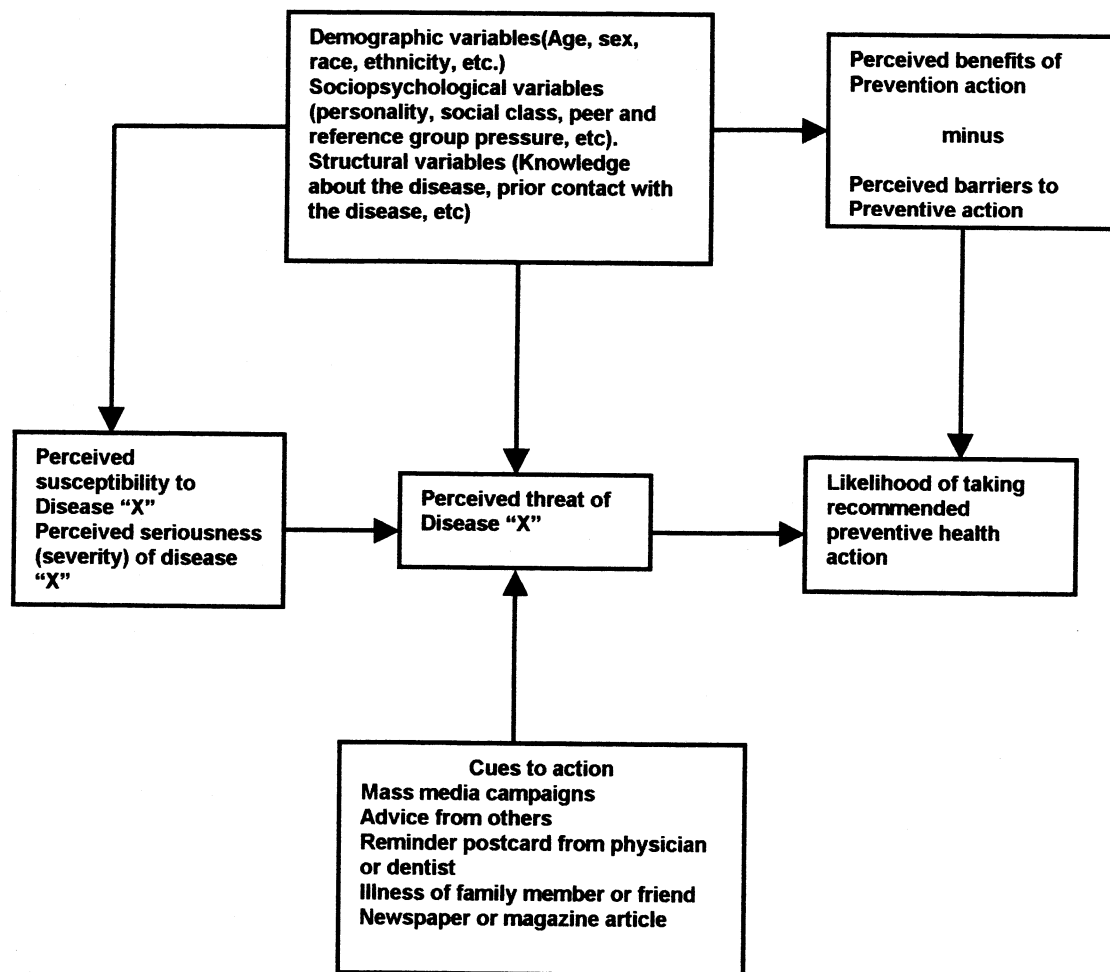
The Health Belief Model (HBM) formulated by social psychologists Hochbaum, Leventhal, Kegeles and Rosenstock in the 1950's (Rosenstock, 1974), is the theoretical framework for this study (see Figure 1, p 17). The original version of the HBM proposes that an individual's tendency for certain behaviors is affected by attitudes toward health behavior.

The model is focused on the assumption that people are most likely to engage in a given health behavior if they perceive a threat from disease, comprised of: (1) their perceived susceptibility to the disease and (2) their perception of the severity of the consequences of the disease. In the face of this threat, people evaluate the perceived benefits of the proposed health behaviors against the perceived costs or barriers to taking action (i.e. expense or inconvenience). These barriers and benefits are initially interpreted narrowly in terms of the efficacy of health practice; later they come to include perceived gains or losses in social roles or physical and economic barriers to the health action. Cues to action, such as the presence of symptoms, advice from friends, or mass medical campaigns, must be present to "trigger" the decision-making process. These identified cues affect behavior indirectly by influencing perception (Becker, 1974).

## Individual Perceptions

## Modifying Factors

## Likelihood of Action



**Figure 1.** The Health Belief Model as predictor of preventive health behavior.  
From M. H. Becker & L. A. Maiman (1975).

Used in studies of health-related behavior, the HBM attempts to explain the actions of individuals and predict their preventive health behavior. Based on this theory, Becker and Maiman (1975), propose that if HCP do not comply with UP, they either do not perceive much personal risk, do not consider the disease of great seriousness, or find the obstacles (such as difficulty, cost, discomfort, or time) to performing UP are too great. These obstacles might also outweigh any of the benefits, or the HCP simply does not see the benefit of the behavior.

HCP decisions regarding the use of protective barriers or compliance with recommended practices for reducing exposure to blood-borne pathogens are similar to patient decisions regarding health practices (Williams, Campbell, Henry & Collier, 1994). Personal susceptibility is related to the individual's belief or fear that (s)he is personally vulnerable to the disease. Perceived seriousness of a disease is dependent on the emotional response of the individuals as they contemplate the impact of the disease on their lives, including the perceived effects on the ability to work, on earning potential, on social relations, or on health be it illness or death (Williams, et al. 1994). If the individual's perception of seriousness is too high, they may avoid the preventive behavior in an attempt to reduce their own anxiety. Thus, an individual with a high perception of the seriousness of bloodborne diseases may not comply with the use of UP in an attempt to reduce anxiety through denial (Grady, Shortridge, Davis & Klinger, 1993).

Impediments to compliance with the recommended behaviors are the negative consequences that the individual believes are associated with the behaviors. These may be physical, financial, or psychological. Individuals weigh obstacles to compliance, such as expense, difficulty, pain or risk, against the possible benefits, which may be a reduction in the severity or a change in one's susceptibility to the disease. Individuals

who believe they are at risk for acquiring a disease are more likely to engage in health-related behaviors and practice protective behaviors which they perceive as feasible and effective (Williams, et. al1994).

In order for the nurse to believe (s)he is susceptible to bloodborne diseases, a combination of two factors must exist: (1) recognition of the risks of the disease such as chronic illness or death from HBV or HIV and (2) a perception of vulnerability to those risks, which is exposure to blood or body fluids (Grady, et al. 1993).

In the last three decades the Health Belief Model (HBM) has been used as the conceptual framework for research regarding behaviors related to maintenance of health or prevention of disease in asymptomatic subjects. Developed specifically to explain health-related behavior at the level of the individual decision maker, the HBM assumes that "good health" is a common goal of all persons, and differences in health behavior are due to differences in perceptions that affect the individual's motivation and ability to choose the most appropriate action (Langlie, 1977). According to Rosenstock (1974) who originally formulated the model, for individuals to take action to avoid a disease, they would need to believe:

- That they were personally susceptible to the disease. This perceived susceptibility may vary widely with the individuals. At one extreme, persons may deny any possibility that they may contract a disease, while at the other end of the spectrum, they may feel they are in real danger of getting the disease. These beliefs will be influenced by the demographic, sociopsychological, and structural variables which condition these perceptions of susceptibility to disease.
- That the occurrence of the disease would have at least moderate severity on some component of their lives. The degree of seriousness may be judged both



by the degree of emotional arousal created by the thought of the disease as well as by the kinds of difficulties that the individuals believe a given condition will create for them.

- That taking a particular action would, in fact, be beneficial by reducing their susceptibility to the condition, or if the disease occurred, by reducing its severity.
- That it would not involve overcoming important barriers such as cost, convenience, pain, or embarrassment (p. 330-331).

An action is likely to be seen as beneficial or effective if it reduces susceptibility to the disease condition or seriousness of an illness. A person's beliefs about the availability and the effectiveness of the action, not the objective facts, determine what action they will take.

Barriers are those things which arouse negative feelings toward a given action. Even though an action may be seen as reducing the threat of disease, if it is also seen as inconvenient, expensive, unpleasant, painful or upsetting, the individual may be reluctant to take action. With regard to early detection, individuals would have to believe that they could have the disease even in the absence of symptoms.

Cues to action are another variable frequently associated with the HBM. A cue or trigger to appropriate action appears to be necessary for an individual to undertake the health-related behavior. These cues might be internal, such as individuals' perception of their bodily state, or external, such as a poster at the worksite.

The intensity of the cue varies between individuals and often is related to the perceived susceptibility or seriousness. For example, if one perceives oneself to have a low susceptibility to a condition (e.g. unlikely to suffer adverse health effects from smoking), more intense stimuli would be needed to trigger a response. Conversely, with high-perceived susceptibility, a lesser stimulus would be required.

The first major study using concepts from the HBM was completed by Hochbaum to identify factors related to the decision by 1,200 subjects to have chest x-rays for the detection of tuberculosis (Hochbaum, 1958, cited in Stone, 1979). He found that 82% of those who believed they were susceptible to tuberculosis and also believed in the benefits of early (versus late) detection had one or more voluntary x-rays; 21% of the subjects with neither of these beliefs had an x-ray (Hochbaum, 1958, cited in Stone, 1979).

To better understand how constructs of the HBM are appropriate in identifying how attitudes impact on behaviors, Grady, Shortridge, Davis and Klinger (1993), developed a two-part self-report questionnaire to measure HCP attitudes. The data supported that the constructs of Seriousness, Susceptibility Barriers, and Benefits from the HBM are appropriate and theoretically supported when measuring HCP attitudes toward UP and blood-borne diseases.

A comprehensive review of 46 HBM-related investigations in 1984 provided strong empirical support for the HBM. The investigators recommended that the dimensions of this model be considered as a part of health education programming (Janz, & Becker, 1984). These studies represented both retrospective and prospective approaches. Twenty-four examined preventive health behaviors, nineteen examined sick-role behaviors and three clinic utilization studies. This review identified perceived barriers as the most powerful HBM dimension, while perceived susceptibility was a close second. Perceived susceptibility was of low significance, particularly as it related to preventive health behaviors. This fact had implications for the occupational health nurse when deciding the content of health promotion programs. Identifying and focusing on perceived barriers and perceived susceptibility, and minimizing the

emphasis on the severity of the condition of interest may lead to more successful programs.

### Research Questions

The questions this study seeks to answer are:

1. Are operating room nurses knowledgeable of their risk of being exposed to HBV or HIV?
2. Is the knowledge of risk of HBV and HIV infection by an OR RN associated with compliance with the recommended practice of Universal Precautions?
3. Do OR RNs who circulate, demonstrate compliance with Universal Precautions?
4. Is there a difference between the practice of Universal Precautions as to when the OR RN attended the UP program?
5. Is there a difference in the practice of UP with respect to vaccination status (Hepatitis B) of the OR RN?

### Definition of Terms

1. Blood-human blood, human blood components and products made from human blood.
2. Blood-borne Pathogens-pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), and human immunodeficiency virus (HIV).
3. Disinfect-inactivate all recognized pathogenic microorganisms, but not all microbial forms (i.e. bacterial endospores) on inanimate objects.
4. Engineering Controls-those methods that eliminate or minimize worker exposure to potentially infectious materials thereby eliminating a hazard. This may be by substitution or by isolating the hazard from the work environment (e.g. disposable,

puncture-resistant containers for used needles, blades and other sharps)(DOL, 1991).

5. Healthcare Personnel (HCP)-persons whose activities involve contact with patients or with blood or other body fluids from patients in a health-care setting.
6. Health Belief Model (HBM)-a set of variables drawn from sociopsychological concepts believed to influence compliance to health actions.
7. Occupational Exposure-any reasonably anticipated skin, eye, mucous membrane or parenteral contact with blood, body fluids or other potentially infectious materials of humans that may result from the performance of an employee's duties.
8. Parental Exposure-exposure occurring as a result of piercing the skin barrier (i.e. subcutaneous, intramuscular, intravenous routes)
9. Personal Protective Equipment (PPE)-specialized clothing or equipment worn by an employee to protect him/her from a hazard. (i.e. gloves, protective eyewear or faceshields, protective clothing)
10. Transient Microorganisms-microorganisms isolated from the skin. These are of concern because they are ready for transmission by the hands they are removed by mechanical friction and soap and water washing.
11. Universal Precautions (UP)-a method of infection control designed to prevent the transfer of infectious agents from patient to patient, from patient to hospital staff and from staff to patient regardless of the disease process. UP monitoring assessed using Universal Precautions Monitoring Tool (UPMT).
12. Universal Precautions Monitoring -assessment of the availability of personal protective equipment and staff compliance in the use of this equipment to protect themselves from exposure to blood, blood products and body fluids.

13. Work Practice Controls-general procedures that reduce the likelihood of exposure by altering the manner in which a task is performed (i.e. procedure to follow in the event of a personal exposure to bodily fluids) (DOL, 1991).

#### Operational Definitions

The DRWGL rate was defined in this study as a proportion of the number of times a HCP was actually observed wearing gloves while applying the surgical dressing to the incision to the number of times wearing of gloves was expected to be observed.

The handwashing rate was defined in this study as a proportion of the number of actual observations of handwashing out of the number of times they were expected to be observed handwashing.

The HEPVAC rate was defined in this study as a proportion of the number of OR RNs who stated they received the vaccine out of the number of OR RNs that were expected to receive the vaccine.

The inservice rate was defined in this study as attendance rate at an educational program on universal precautions, infection prevention and proper handwashing technique within 6 months or greater than six months at the time the subject was observed.

The MPTWGL rate was defined in this study as a proportion of the number of OR RNs actually wearing gloves while moving the patient out of the number of OR RNs that were expected to be wearing gloves.

The SPWFGL rate was defined in this study as a proportion of the number of OR RNs actually wearing gloves and using forceps to count sponges out of the number of OR RNs that were expected to wear gloves and use forceps to count sponges.

The TWGL rate was defined in this study as a proportion of the number of OR RNs actually wearing gloves while applying tape out of the number of OR RNs that were expected to wear gloves while applying tape.

The UPHWA rate was defined in this study as a proportion of the number of OR RNs actually washing their hands after contamination out of the number of OR RNs that were expected to wash their hands after contamination.

The UPHWP rate was defined in this study as a proportion of the number of times the observed OR RNs actually washed their hands following the removal of gloves out of the number of times the OR RNs were expected to wash their hands after contamination.

### Assumptions

The following assumptions were made in this investigation:

1. The OR RNs learn about HIV/HBV in safety management training class.
2. The utilization of UP will decrease the incidence of HIV/HBV infection among OR RNs.
3. The knowledge of the importance of UP in decreasing HBV/HIV transmission (and effect their health) will motivate OR RNs to utilize UP. (From HBM-perceived risk).
4. The period UP practices were observed was representative of OR RNs general UP practice.
5. The OR RNs will perform the following UP practices based on CDC/OSHA recommendations for HCP: wash their hands after they become soiled and after removing gloves.
6. The OR RNs received the full series of Hepatitis B vaccine.
7. The survey was completed honestly.

### Summary

In Chapter II the relevant literature pertaining to Universal Precautions, the Health Belief Model, handwashing behaviors and glove use were reviewed. The effect the inservice had on the practice of UP by HCP, according to the relevant studies, was noted. The study framework was identified and revised. The research questions were summarized. The assumptions of the study were identified. Chapter III will describe the methodology of this study.

## CHAPTER III

### Methodology

#### Introduction

Chapter II included a review of the relevant literature pertaining to the level of knowledge and implementation of Universal Precautions, risk of exposure to HIV and HBV that exists for HCP and the non-compliant behaviors exhibited in HCP related to UP. Chapter III will describe the research design, the operational definitions, the sample, the procedure, and the statistical analyses that were used in the study.

#### Research Design

The design was a descriptive observational study to examine the compliance of OR RNs who circulate with the OSHA policy of Universal Precautions, as related to the use of gloves and handwashing.

#### Subjects

The first hospital contacted for this study agreed to participate if OR RNs from the three surrounding area hospitals were also included. As a result, the subjects were operating room registered nurses (OR RNs) employed by four adjacent rural hospitals located in the mid-Atlantic region. These OR RNs were conveniently selected because they were nurses who circulated on all types of surgical procedures and worked on the day shift between the hours of 7A.M. and 3 P.M.

#### Instruments

An observation tool to assess the use of UP called a Universal Precautions Assessment Tool (UPAT) developed by Gauthier, et al. (1991) and designed in accordance with the CDC recommendations, was revised and utilized by the investigator to determine the OR RNs application of UP in the clinical setting (see Appendix D, p. 78). The UPAT was pilot tested by Gauthier et al. (1991) in two



hospitals to assess its usefulness in the operating room setting and to establish interrater reliability. Two simultaneous raters calculated UP compliance rates of 76.4% and 78.6% respectively for 9 nurses in Pilot Study I and 62% and 65%, respectively, for 5 nurses in Pilot Study II. The intraclass correlation coefficient of the transformed and weighted scores from Pilot Study I were then calculated, yielding a value of 0.992, with 95% confidence limits of 0.979 and 0.997 (Gauthier, et al. 1991). In order to establish consensual validity during the pilot testing period, the UPAT was submitted to a panel of three persons: two experienced and practicing infection prevention practitioners and one academician with a national reputation for related research in infection prevention (Gauthier, et al. 1991).

For the purpose of monitoring UP of the OR RNs who circulate, the instrument was modified, omitting those items unrelated to this study (wearing protective eyewear and gowns), focusing specifically on the use of gloves and handwashing. In the revised assessment tool, specific activities of the OR RN who circulates were observed.

A second instrument (see Appendix F, p. 82), adapted from an article by Bauer (1991) was used in this study as a survey designed to assess how much OR RNs who circulate know about their risk of infection, their level of knowledge about HBV and HIV and their practice behaviors related to UP. The survey was tested for content validity to assess the tool's ability to measure the UP knowledge of the OR RNs. For this study an adequate level of knowledge was defined as 10 correct answers out of 13 (84.6%).

### Procedure

The study was limited to observation of OR RNs who circulate on a variety of surgical procedures in the operating room of the four area hospitals. For this study, no differentiation between the OR RNs home hospital was established. The observations were limited to these UP: the wearing of gloves during sponge-counting activities,

wearing of gloves during application of dressings to the surgical incision, and during application of surgical tape to the surgical dressing, and during the movement of the post-surgical patient from the OR bed to the patient's bed or stretcher. In addition, handwashing behaviors following skin contamination and following the removal of gloves were also observed. There are other UP not listed on the UPAT that are recommended (i.e. protective eyewear); however, this study was limited to only those behaviors listed on the UPAT (see Appendix D, p . 78).

The data collection procedure consisted of an observational period during a variety of surgical procedures, conducted by the data collector RN over a 60-day period. Because standard dress in the operating room includes facial masks and caps to cover the hair, observations were limited to assessing the overall UP compliance of the OR RN. The instrument, Universal Precautions Assessment Tool (UPAT), (see Appendix D, p. 78), was used to monitor the practices of the OR RNs regarding UP protocols--namely appropriate glove use and handwashing habits following the removal of gloves. The sampling entailed each OR RN being observed on 2 to 4 occasions. Each observation period averaged 15 minutes for each OR RN and ran over a 60-day period of time.

After all subjects were monitored, they were given a disclosure form (see Appendix E, p.80), identifying the study and asking their participation by completing a confidential survey (see Appendix F, p. 82). Participation in completing the survey was voluntary and anonymity was guaranteed. This survey, developed by the researcher, was based on the prior work of Champion (1984) and Bauer (1991), as well as relevant literature, and was administered to the observed OR RN's who were circulating.

### Data Analyses

The data analyses were performed using the SPSS 6.1 for Windows Student Version Statistical Software (SPSS, Inc., Chicago, IL.) The sample subject demographic nominal data were tabulated by frequency analysis. The research questions were investigated by frequencies, descriptive statistics, t-tests and Spearman's rho correlations. The level for significance was set at 0.05.

### Ethical Safeguards

Occasionally, it is necessary that subjects are unaware of being observed when their behavior is under scrutiny; otherwise they may modify their behavior (Parsons, 1978). Observing OR RNs covertly has been acknowledged per quality assurance programs and should have no ethical implications since all hospital personnel providing patient care are routinely randomly monitored, without their knowledge of when, for compliance with UP. The operating room Clinical Resource nurses monitor 12 OR staff members (without their prior knowledge) every month for their compliance with UP.

The directors of each of the four rural hospitals received a letter that summarized this study proposal and requested formal permission to observe nurses in the operating room for the previously specified information. The director's signature on the letter will indicate that approval had been granted (see Appendix B, p. 72). As mentioned above, university approval of this investigation was obtained from the Committee on Human Volunteers at the Mid-Atlantic University (see Appendix C, p.,76) where the researcher is enrolled. The client-identifying information was coded when the data were collected to ensure the confidentiality of the sample subject. Only the researcher has access to the data collected, which is kept in a home office.

### Summary

The process of data collection including a description of the research design, the subjects, the instruments and procedures for data collection and analyses, and ethical considerations of the study were detailed in Chapter III. Chapter IV will detail the characteristics of the sample group and present the statistical testing results relevant to each of the research questions.

## CHAPTER IV

### Results

#### Introduction

Chapter III described the study methodology, the research design, and data collection, the methods, instruments, procedure, and the data analyses along with the ethical safeguards.

This section is organized to describe the characteristics of the sample group and to present the statistical testing results relevant to each of the research questions and the theoretical model.

#### Sample Characteristics

A total of 36 OR RNs, 35 (97%) female and 1 (3%) male, from four different hospitals were included in the study sample. The characteristics of the sample are summarized in Table 1 (p. 34). The mean number of years in nursing was 16.68 with a standard deviation of 9.3 years and a range of 2 to 35 years. The mean number of years in operating room nursing was 12.24 with a standard deviation of 8.54 and a range of one to 33 years. Prior to being observed, it had been longer than 6 months that 30.6% of the OR RNs had attended a UP class, and 69.4% had attended a class within the last six months. Each of the OR RNs was observed performing UP by a data collector RN for approximately 15 minutes. Twenty seven point eight percent of RNs were observed on two different occasions, 16.7% were observed on 3 occasions and 35% were observed on four occasions.

#### Research Questions:

1. Are operating room registered nurses knowledgeable of their being at risk for exposure to HBV and HIV?

Table 2 (p. 35) shows a summary of the responses to the 13-item survey regarding the knowledge of transmission of HBV and HIV and behaviors which comply with Infection control and UP policy (see Appendix F, p. 82). Questions 5, 8, 9, 10, 11, and 12 were answered correctly by all of the sample. Question 6 was correctly answered by 97.2% (n=35), whereas question 7, was answered correctly by 94.4% (n=34). Ninety-two percent answered in the affirmative to question 13 (n=33). Question 3 was answered correctly by 91.6% (n=33). Seventy-five percent (n=27) answered Question 2 correctly. Question 4 was answered correctly by 61% (n=22). Question 1 was answered correctly by 52.7% (n=19).

In general the OR RNs demonstrated knowledge of being at risk for exposure to HBV/HIV. The average survey score was high at 89.10% (SD=6.97, range 100-76.92) with 86% (n=31) scoring an 84.61% or greater. Table 1 (p. 34) shows the following survey score percentages, 13.9% (n=5) scored 100%, 44.4% (n=16) scored 92.3%, 27.8% (n=10) scored 84.61%, and 13.9% (n=5) scored 76.92%.

2. Is the knowledge of risk of HBV and HIV infection by an OR RN associated with compliance of the recommended practice of Universal Precautions?

Spearman's Rho correlation coefficients were calculated for the six UP practices (applies tape wearing sponges, counts sponges using forceps wearing gloves, applies dressings wearing gloves, moves patient wearing gloves, washes hands after contamination, washes hands after removal of gloves), and UP knowledge, as demonstrated by survey score. Table 3 (p. 36) shows that of the six UP practices, only one, applies tape while wearing gloves, was found to be significantly and negatively correlated with UP knowledge. ( $r = -.4438$ ,  $p = .034$ ). Therefore, the more knowledgeable the OR RNs were, the less likely they were to wear gloves when applying tape to the surgical dressing. No significant relationships were found between UP knowledge and

**Table 1. Characteristics of the Sample (n=36)**

<b><u>Subjects</u></b>	<b><u>n</u></b>	<b><u>%</u></b>
<b><u>Gender</u></b>		
female	35	97
male	1	3
<b><u>Race</u></b>		
white	35	97
black	1	3
<b><u>Nursing years</u></b>		
(Mean = 16.7 years, SD = 9.3 years)		
0 - 10 years	9	25.1
11 - 20 years	14	39.0
21 - 30 years	9	25.2
31 - 35 years	4	11.2
<b><u>OR Nursing years</u></b>		
(Mean = 12.2 years, SD = 8.5 years)		
0 - 10 years	17	47.3
11 - 20 years	13	36.3
21 - 30 years	5	14.0
31 - 35 years	1	2.8
<b><u>Inservice Attendance</u></b>		
Within 6 months	25	69.4
Greater than 6 months	11	30.6
<b><u>Survey Score (%)</u></b>		
(Mean = 89.10, SD = 6.97, Range 100-76.92)		
100	5	13.9
92.30	16	44.4
84.61	10	27.8
76.92	5	13.9

**Note.** SD = standard deviation.

**Table 2.** Summary of Responses to Survey Questions (n = 36)

<u>Questions</u>	<u>Correct n (%)</u>	<u>Incorrect n (%)</u>
1. Intact skin adequate barrier to HBV/HIV.	19 (52.7)	17 (47.3)
2. HIV viable on surface 1-3 days at room temp.	27 (75.0)	9 (25.0)
3. Shoecovers worn if potential for contamination.	33 (91.6)	3 (8.4)
4. Person with negative HIV test has insufficient amount of HIV antibodies to test positive.	22 (61.0)	14 (39.0)
5. Forty percent needlestick injuries can be avoided.	36 (100.0)	0
6. UP treat all patients as infectious.	35 (97.2)	1 (2.7)
7. All patients treated as positive for HBV/ HIV best describes UP.	34 (94.4)	2 (5.6)
8. Practice UP when handling specimens, tissue, and blood products.	36 (100.0)	0
9. Infective body fluids are semen, blood, vaginal secretions, CSF, and amniotic, peritoneal, and pericardial fluids.	36 (100.0)	0
10. Handwashing required after glove removal.	36 (100.0)	0
11. Wear gloves when counting sponges.	36 (100.0)	0
12. All nurses should have received Hepatitis B vaccine.	36 (100.0)	0
13. Received Hepatitis B vaccine.	33 (92.0)	3 (8.0)

**Note.** UP = Universal Precautions, HBV = Hepatitis B Vaccine, HIV = Human Immuno Deficiency Virus, CSF = cerebrospinal fluid



**Table 3. Spearman's Rho Correlation Comparing Practice of UP and UP Knowledge Demonstrated by Survey Score**

Practice of UP (n=36)	UP Knowledge (r)
Applies Tape wearing Gloves (**missing n=13)	-.4438* (p=.034)
Counts Sponges using Forceps wearing Gloves	-.2520 (p=.138)
Applies Dressings wearing Gloves (**missing n=11)	-.1457 (p=.487)
Moves Patient wearing Gloves	.0990 (p=.566)
Washes hands after contamination	.2749 (p=.105)
Washes hands after removal of gloves	.2623 (p=.122)

Note. r=Spearman's Rho correlation, alpha level significant @0.05

\*\*no observations performed for named UP

\*significant finding

the other five UP, wearing gloves and using forceps to count sponges ( $n=25$ ,  $r = -.2520$ ,  $p=.138$ ), wearing gloves to apply dressings ( $n=36$ ,  $r = -.1457$ ,  $p=.487$ ), wearing gloves to move the patient ( $n=36$ ,  $r=.0990$ ,  $p=.566$ ), washing hands after contamination ( $n=36$ ,  $r=.2749$ ,  $p=.105$ ), and washing hands after removing gloves ( $n=36$ ,  $r=.2623$ ,  $p=.122$ ).

3. Do OR RNs who circulate demonstrate compliance with universal precautions?

Table 4 (p. 38) shows the observed glove utilization rate for the four UP practices. Of the subjects using a forcep to count sponges 13.9% ( $n=5$ ) always utilized gloves, 13.9% ( $n=5$ ) utilized gloves greater than half of the time, 19.4% ( $n=7$ ) utilized gloves half of the time, 11.1% ( $n=4$ ) utilized gloves less than half of the time, and 7% ( $n=15$ ) never utilized gloves. Of the subjects applying dressings, 84% ( $n=21$ ) always utilized gloves, 4% ( $n=1$ ) utilized gloves half of the time, 4% ( $n=1$ ) utilized gloves less than half, and 8% ( $n=2$ ) never utilized gloves. Of the subjects applying tape 65.2% ( $n=15$ ) always utilized gloves, 17% ( $n=4$ ) utilized gloves half of the time, 8.6% ( $n=2$ ) utilized gloves less than half, and 8.6 ( $n=2$ ) never utilized gloves. Of the subjects moving patients, 69.4% ( $n=25$ ) utilized gloves, 11.1% ( $n=4$ ) utilized gloves half of the time, 5.6% ( $n=2$ ) utilized gloves less than half of the time, and 13.9% ( $n=5$ ) never utilized gloves. In general, the majority of the OR RNs were compliant with glove utilization for applying dressings, applying tape, and moving the patient. However, only one third of those same nurses wore gloves when using forceps to count sponges.

Table 5 (p. 39) shows the observed handwashing behavior rate for two UP. Of the subjects observed washing hands following hand contamination, 13.9% ( $n=5$ ) always washed their hands, 2.8% ( $n=1$ ) washed their hands a third of the time, 5.6% ( $n=2$ ) washed their hands one-quarter of the time, and 77.8% ( $n=28$ ) were never observed washing their hands. Of the subjects observed washing their hands following

**Table 4.** Universal Precautions Glove Utilization Rate (n = 36)

<u>Gloves</u>	<u>n</u>	<u>%</u>
<b><u>Counting sponges with forceps</u></b>		
Always	5	13.9
Greater than half	5	13.9
Half	7	19.4
Less than half	4	11.1
Never	15	41.7
<b><u>Applying dressings</u></b>		
Always	21	84.0
Half	1	4.0
Less than half	1	4.0
Never	2	8.0
Missing	11	
<b><u>Applying tape</u></b>		
Always	15	65.2
Half	4	17.3
Less than half	2	8.6
Never	2	8.6
Missing	13	
<b><u>Moving patient</u></b>		
Always	25	69.4
Half	4	11.1
Less than half	2	5.6
Never	5	13.9

---

**Note.** %=reported as valid percent

**Table 5. Universal Precautions Handwashing Rates (n = 36)**

<b><u>Performed Handwashing</u></b>	<b><u>n</u></b>	<b><u>%</u></b>
<b><u>After hand contamination</u></b>		
Always	5	13.9
Third	1	2.8
Quarter	2	5.6
Never	28	77.8
<b><u>After gloves removed</u></b>		
Always	6	16.7
Half	1	2.8
Third	3	8.3
Quarter	5	13.9
Never	21	58.3

glove removal, 16.7% (n=6) always washed their hands, 2.8% (n=1) washed their hands half of the time, 8.3% (n=3) washed their hands one third of the time, 13.9% (n=5) washed their hands a quarter of the time, and 58.3% (n=21) never washed their hands. In general, the OR RNs demonstrated little compliance with handwashing after hands were contaminated with blood and body fluids or after gloves were removed.

4. Is there a difference between the practice of UP as to when the OR RN attended UP program?

All OR RNs in the study attended a Universal Precautions Inservice and were divided into two groups. The first group, 69.4% (n=25) attended the inservice within 6 months of being observed and 30.6% (n=11) in the second group attended the inservice greater than 6 months of being observed. Of the two-sample t-tests performed to compare the six UP practices for the two inservice groups, handwashing after contamination (see Table 6, p. 41), was found to be significantly different between the two groups ( $t = -2.39$ ,  $df = 27.53$ ,  $p = .024$ ). The group of OR RNs in the less-than-6-months group were more likely to wash their hands after contamination than those in the greater than 6 months group ( $\bar{X}=22.33$ ,  $SD=40.45$  vs.  $\bar{X}=2.27$ ,  $SD=7.53$ , respectively). There were no statistically significant differences found between the two inservice groups on the other measures of compliance with UP (see Tables 7-11, pp. 42-46), nor were there any statistically significant differences found in the survey scores for these same two groups (see Table 12, p. 47).

5. Is there a difference in the practice of UP with respect to vaccination status (Hepatitis B) of the OR RN?

Of the 36 OR RNs surveyed and observed, 91.7% (n=33) indicated they had received the HBV vaccine and 8% (n=3) indicated they had not received the vaccine. Of the six UP practices compared with HBV vaccinated and non-vaccinated

**Table 6.** T-test Comparing Handwashing After Hand Contamination with Time of Attendance at UP Inservice (n=36).

<b>Handwashing after hand contamination</b>				
	<b>Mean %</b>	<b>SD</b>	<b>t</b>	<b>p</b>
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	22.33	40.44		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	2.27	7.50	-2.39	.024*

**Note.** UP = Universal Precautions, df = 27.53, alpha level 0.05.

\*Significant Findings

**Table 7.** T-test Comparing Application of Tape Using Gloves with Time of Attendance at UP Inservice. (n=36)

	Application of Tape using Gloves			
	Mean %	SD	t	p
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	73.14	37.11		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	90.00	22.36	1.27	.231

Note. UP = Universal Precautions, df = 10.95, alpha level 0.05.

**Table 8.** T-test Comparing Application of Dressing wearing Gloves with Time of Attendance at UP Inservice. (n=36)

<b>Application of Dressing with Gloves</b>				
	<b>Mean %</b>	<b>SD</b>	<b>t</b>	<b>p</b>
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	93.13	19.60		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	75.00	46.29	-1.06	.318

**Note.** UP = Universal Precautions, df = 8.21, alpha level 0.05.



**Table 9.** T-test Comparing Practice of Movement of Patient Using Gloves with Time of Attendance at UP Inservice. (n=36)

<b>Movement of Patient Using Gloves</b>				
	Mean %	SD	t	p
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	82.66	33.15		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	63.63	45.22	-1.42	.166

**Note.** UP = Universal Precautions, df = 34, alpha level 0.05.

**Table 10.** T-test Comparing Practice Counting Sponges with Forceps and Wearing Gloves with Time of Attendance at UP Inservice. (n=36)

<u>Counting of Sponges with Forceps and Gloves</u>				
	Mean %	SD	t	p
<u>Inservice</u>				
Equal or less than 6 months (n = 25)	37.65	28.96		
Greater than 6 months (n = 11)	34.08	39.89	-.30	.765

Note. UP = Universal Precautions, df = 26.09, alpha level 0.05.

**Table 11.** T-test Comparing Practice of Handwashing after Removal of Gloves with Time of Attendance at UP Inservice. (n=36)

	Handwashing after Removal of Gloves			
	Mean %	SD	t	p
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	26.33	39.87		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	19.69	30.33	-0.49	.626

**Note.** UP = Universal Precautions, df = 34, alpha level 0.05.

**Table 12.** T-test Comparing Scores of Survey with Time of Attendance of UP Inservice.  
(n=36)

	<u>Survey Scores</u>			
	Mean %	SD	t	p
<b><u>Inservice</u></b>				
<b><u>Group I</u></b>				
Equal or less than 6 months (n = 25)	89.53	6.23		
<b><u>Group II</u></b>				
Greater than 6 months (n = 11)	88.10	8.67	-.56	.579

Note. UP = Universal Precautions, df = 34, alpha level 0.05.

**Table 13.** T-test Comparing HBV Vaccination Status with the Utilization of Gloves in Movement of the Patient. (n=36)

	<u>Utilization of Gloves in Movement of the Patient</u>			
	Mean %	SD	t	p
<b><u>HBV Vaccine</u></b>				
Vaccinated (n =33)	74.74	38.67		
Not Vaccinated (n = 3)	100.00	.00	3.75	.001*

Note. SD=Standard Deviation, df =32, alpha level significant @ 0.05.

\*Significant Findings

groups, only two, wearing gloves while moving a patient (see Table 13, p. 48) and handwashing after removal of gloves (see Table 14, p. 50), were found to be significantly different for the two groups.

The mean for the wearing of gloves when moving a patient in the HBV vaccinated group was 74.74 and the non vaccinated group was 100.00. The non-vaccinated group was more likely to wear gloves when moving a patient than the vaccinated group ( $t=3.75$ ,  $p=.001$ ). Table 14 (p. 50) provides results of the mean for handwashing after removal of gloves in the HBV vaccinated group ( $\bar{X}=26.51$ ) than the mean in the non-vaccinated group ( $X=.00$ ). The HBV vaccinated t-test yielded a  $t= -4.03$  which was significant with a  $p=.00$ . This indicated that the non-vaccinated group did not wash their hands after removing their gloves, whereas the vaccinated group practiced the UP, washing their hands after removing gloves more consistently. There were no statistically significant differences found between the vaccinated and non-vaccinated groups on the other measures of compliance with UP. The mean and the results can be found in Tables 15-18 (pp. 51-54).

### Summary

Chapter IV described the characteristics of the sample group and presented the statistical testing results relevant to each of the research questions. In Chapter V, the findings will be discussed in relation to each of the research questions. The limitations of the study, the implications for the practice of nursing, and recommendations for further research will be noted.

**Table 14.** T-test Comparing HBV Vaccination Status with Handwashing after Removal of Gloves. (n=36)

	<u>Handwashing after removal of gloves</u>			
	Mean %	SD	t	p
<u>HBV Vaccine</u>				
Vaccinated (n =33)	26.51	37.81		
Not Vaccinated (n =3)	.00	.00	-4.03	.00*

Note. SD = standard deviation, df = 32, alpha level significant @ 0.05.

\*Significant Findings

**Table 15.** T-test Comparing HBV Vaccination Status with the Practice of Application of Dressing Wearing Gloves. (n=36)

	<u>Application of Dressing with Gloves</u>			
	Mean %	SD	t	p
<b><u>HBV Vaccine</u></b>				
Received (n =33)	86.80	31.46	*	*
Not Received (n = 3)	100.00			

**Note.** \* insufficient n in both groups to perform analysis



**Table 16.** T-test Comparing HBV Vaccination Status with Utilization of Gloves in the Application of Tape. (n=36)

	<u>Utilization of gloves in Application of Tape</u>			
	Mean %	SD	t	p
<b><u>HBV Vaccine</u></b>				
Received (n =33)	75.75	35.16	*	*
Not Received (n =3)	100.00			

Note. \* insufficient n in both groups to perform analysis.

**Table 17.** T-test Comparing HBV Vaccination Status with the Practice of Counting Sponges Using Forceps and Wearing Gloves. (n=36)

	<u>Counting Sponges Using Forceps and Gloves</u>			
	Mean %	SD	t	p
<u>HBV Vaccine</u>				
Vaccinated (n =33)	34.84	35.50		
Not Vaccinated (n = 3)	55.53	50.91	.94	.355

Note. df = 34, alpha level 0.05.

**Table 18.** T-test Comparing HBV Vaccination Status with Handwashing after Hand Contamination. (n=36)

	<u>Handwashing after hand contamination</u>			
	Mean %	SD	t	p
<u>HBV Vaccine</u>				
Vaccinated (n =33)	17.67	36.25		
Not Vaccinated (n =3)	.000	.000	-0.83	.410

Note. df = 34, alpha level 0.05.

## CHAPTER V

### Discussion

#### Introduction

The relevance of the study findings related to the theoretical framework, the sample characteristics and the research questions will be discussed in this chapter. Also, the relevance of those findings to nursing practice and future research will be noted.

#### Limitations

Perceived limitations of this study included a highly homogeneous study population and the possibility of a Hawthorne effect; that is, subjects who knew they were being observed tended to change their behavior. To minimize these effects, direct observation by the department educator or manager, acting as the investigator was made in the course of the routine workday. In this way, the OR RNs were not alerted in advance that their practice was being observed. To ensure proper monitoring, the observers met individually with the researcher in order to ascertain that all were well versed in the OSHA UP policies and procedures. Another limitation may have been observer bias, in that assessing proper implementation of UP occasionally relies on a "judgment call" by the observer. The circulating OR RNs' perception of low prevalence of blood-borne disease in this rural study population may also have an effect on their perception of risk and practice of UP.

The survey tool utilized to ascertain the OR RNs UP knowledge was adapted from Bauer (1991) and modified for the purpose of this study. This survey was submitted to expert nurses for content validity, however interrater reliability was not obtained.

The ability to generalize these findings is limited to the rural OR setting for circulating RNs. The UP behaviors of the participating OR RNs could have been influenced by the knowledge that a research project was in progress.

### Theoretical Framework

The Health Belief Model (HBM) was conceptualized to assist in the understanding of “why individuals did or did not engage in a wide variety of health-related actions” (Janz & Becker, 1984). The HBM by Hochbaum, Kegeles, Leventhal, and Rosenstock, (Rosenstock, 1974) utilized for this study, was more “concerned with the personal orientation or subjective state of the individual” (Salazar, 1991, p. 129).

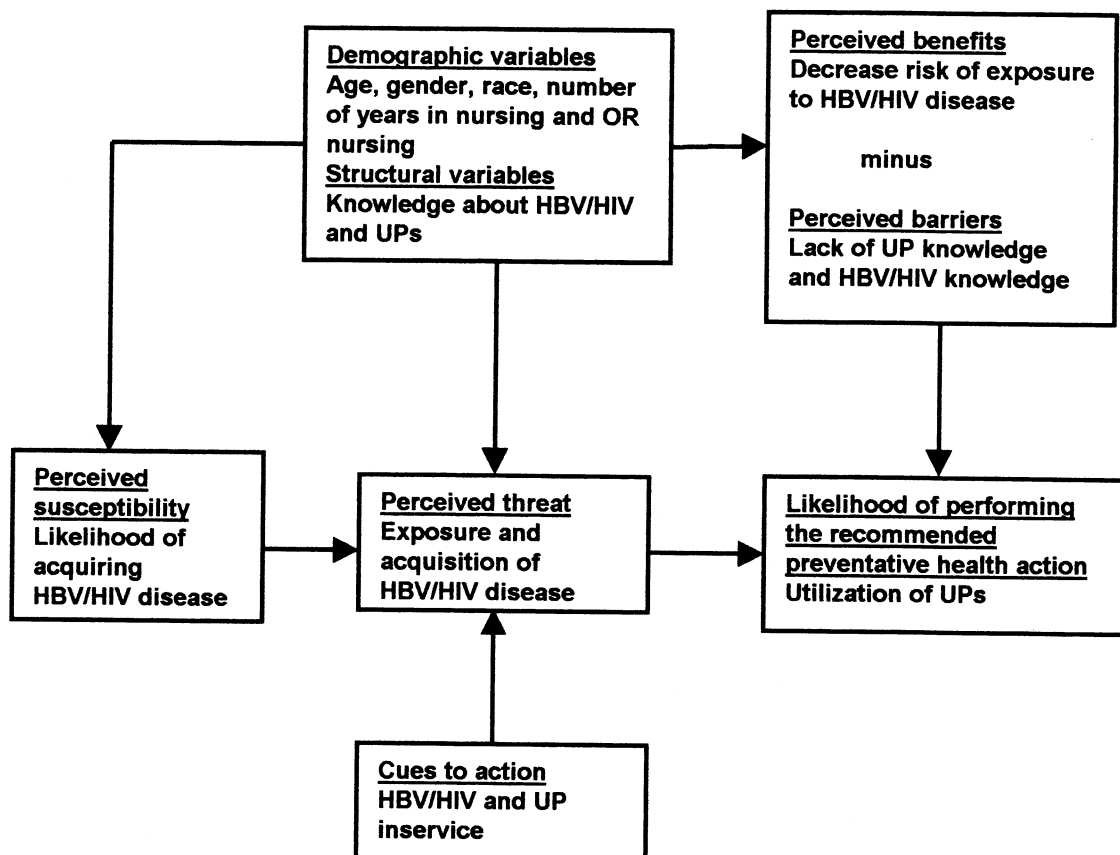
Of the individual perceptions, (see adapted HBM model, Figure 2, p.57), only the perceived susceptibility factor, the likelihood of acquiring HBV/HIV, was included. In the first modifying factors variable, the demographic variables, sex, occupation, race and years in nursing and OR nursing, were collected. However, only the occupation and the years in nursing and years in OR nursing variables were included in the study analyses. The second modifying factor variable, socio-psychological variables (see Figure 1, p. 17), was not examined in this study. The main focus of this study was the third modifying factor, the structural variable defined as the OR RNs knowledge about the HBV/HIV diseases. In the second modifying factor, the perceived threat, was the perceived threat of exposure to or acquisition of HBV/HIV disease. The third modifying factor, cues to action, included only the time the OR RN attended the HBV/HIV and UP inservice, within 6 months or greater than 6 months from the time that this study of UP behaviors were observed.

The likelihood of action factors, the perceived benefit, the decreased risk of physical exposure to HBV/HIV, and the perceived barrier, the lack of knowledge, were indirectly proportional to the evaluation of the action, the compliance of the OR RN with

## Individual Perceptions

## Modifying Factors

## Likelihood of Action



**Figure 2.** Excerpted portion of the Hochbaum, Leventhal, Kegeles & Rosenstock Health Belief Model for Universal Precautions for the OR RNs (Cosgrove, 1998).

the UPs. If the OR RN did not comply with the UP practice, it was assumed that (s)he either did not perceive that the implementation of UP would decrease the risk of acquiring HBV/HIV or (s)he did not have adequate knowledge concerning UP or transmission and prevention of HBV/HIV. Perceived threat of HBV and HIV diseases and the balance of the perceived benefits and perceived barriers influenced the outcome likelihood that the OR RN would perform the recommended preventive health action, the implementation of UP.

In the HBM a moderate level of susceptibility of acquiring a disease and perceived seriousness of a disease is necessary for behavior to be demonstrated. Those individuals whose perception of the seriousness of a disease is too high may avoid the preventive behavior in an attempt to reduce anxiety. Thus, an OR RN with an acute understanding of the seriousness of HIV or HBV may not comply with UP in an attempt to reduce anxiety through denial. This has been illustrated in several studies over the years. Hochbaum (1956) found that among persons who believed in their susceptibility to tuberculosis and in the benefits of diagnostic chest x-rays, 82% had the x-ray taken. Kegeles (1963), studied the relationship of belief and attitudinal variables to preventive dental visits. His data analyses revealed that the largest number of preventive dental visits were made by persons exhibiting belief variables of susceptibility, severity, benefits, and barriers (78%) and that as the number of beliefs decreased, so did the number of preventive visits. Hyman, Baker, Ephraim, Moadel and Philip (1994) conducted a study of women and the perceived barriers to mammography (e.g. the fear of possible chemotherapy). They found for those women who utilized mammography the benefits (early detection) outweighed the barriers.

For the limited scope of this study, the perceived seriousness of the contracted disease and the sociopsychological variables could not be considered or included.

Even with the exclusion of these variables, the selection of the HBM provided an adequate framework for this study.

### Study Findings

#### Sample Characteristics

In general, the study sample of OR RNs from four hospitals (see Table 1, p. 34) was representative of an OR RN population which is primarily female (97%) and white (97%). According to the latest national statistics of registered nurses (Keepnews, 1998), 95.1% are female, and 89.7 % are white. The study sample appears to be representative of the population. As a group, the OR RNs were experienced, the average OR RN having worked greater than 10 years in OR nursing. All of the study OR RNs attended an HBV/HIV inservice with the majority, two-thirds, having attended within 6 months of the UP observation portion of the study.

#### Research Questions

1. Are operating room registered nurses (OR RNs) knowledgeable of their being at risk for exposure to HBV and HIV?

The OR RNs in this study were found to be knowledgeable about the exposure and transmission of the HBV and HIV blood borne diseases as evidenced by the scores on the survey (see Table 3, p 36). In general, these findings are universally supported in the literature. In the Bauer study (1991), knowledge that visibly intact skin is not an adequate barrier to both HBV and HIV was demonstrated with an affirmative score on the survey by 52% of the nurse subjects. For the same question in this study, 47% of the OR RNs demonstrated they were also knowledgeable. Bauer found that only 32% of the nurses were aware that HBV remained viable on surfaces for 1-3 days at room temperature. However, in this study the majority of the OR RNs, 75%, demonstrated more knowledge about the transmission of blood-borne disease. Fifty-two percent of



the Bauer study nurses answered correctly that Hepatitis B transmission can occur by indirect means via common OR surfaces, but a greater number of this study's OR RNs (75%) answered correctly. The study OR RNs proved again to be more knowledgeable when answering the next three questions concerning UP policy. Eighty percent of the Bauer nurses and 91% of the study OR RNs correctly identified that fluid-proof shoe covers must be worn if there is potential for shoes to become soiled by blood or body fluid. Only 20% of the Bauer study nurses indicated that handwashing is required after glove removal, as compared to 100% of the OR RN study subjects. Almost all of the Bauer study nurses and the OR RNs in this study, 96% and 100%, respectively, indicated that 40% of needle stick injuries can be prevented by proper handling and disposal techniques.

2. Is the knowledge of risk of HBV and HIV infection by an OR RN associated with compliance with the recommended practice of Universal Precautions?

In this study there not only seemed to be little or no relationship with UP knowledge and UP performance, but knowledge had a negative impact on the following UP behaviors. The more knowledgeable the OR RN was with regard to risk in this study, the less likely (s)he was to use gloves while applying tape. Although knowledge was not reflected in actual practice, this finding was not unexpected per the literature review (Bauer, 1991; Willey, 1990; Stevens, Menlis, & Downs, 1991; Schillo and Reische, 1993). Kelen and colleagues (1990) found that compliance with the mandated UPs was adhered to 44.7% for situations involving no bleeding, 57.7% with active bleeding, but only 19.5% in the presence of profuse bleeding. In Ronk and Girard's study (1994), 72% of nurses indicated they always washed their hands when they removed their gloves and 84% reported washing their hands after every patient contact; yet when this group was observed, only 42% demonstrated compliance with

handwashing. Similarly, this study indicates that perceived practice is different from actual practice. Some authors have cited that the lack of UP behavior among knowledgeable health care providers may be due to the lack of perceived risk of acquiring the disease by indirect patient contact. However, Panlilio, et al. (1991), found that nurses had a very high rate of contact with blood. This blood contact occurred 83% of the time when wearing gloves while coming into contact with supplies or equipment, counting blood-soaked sponges with forceps, or activities that may be defined as indirect patient contact. Baraff and Talan (1989) found that nurses wore gloves 76% of the time when physically handling patients or having direct patient contact. Likewise, 80% of the OR RNs in this study wore gloves when physically touching and moving patients; yet, they only utilized gloves 14% of the time when counting sponges.

OR RNs can have knowledge of HBV/HIV and UP, yet may demonstrate a decrease in the use of gloves regardless of indirect or direct contact. For some this may be explained as desensitization because the environment in which they work is primarily involved with blood. For this reason, there may be no perceived risk or susceptibility to self-exposure. This may simply be considered as an occupational hazard. According to Willy, et al. (1990), those nurses who comply with UP are more likely to perceive themselves at risk for HBV infection and also have higher score for knowledge of transmission routes of HBV/HIV.

Those who believed they had a lower risk of contracting HBV/HIV, also had lower practice scores than those who considered themselves at high risk. Conversely, Gruber, et al. (1989), in their evaluation of scores according to work area, found those subjects with higher knowledge scores had lower practice scores. DeVries, Burnette,

and Redmon (1991), also found that only 40% of HCP used gloves with patient activities but increased compliance to 73% with feedback and inservices.

### 3. Do OR RNs who circulate demonstrate compliance with UP?

Overall, it was found in this study that the OR RNs who circulate demonstrated compliance with UP except with wearing gloves when counting sponges with forceps, handwashing after removal of gloves, and handwashing after hand contamination. These study results were supported by a literature review in which Henry, Campbell, Collier, and Williams (1994) found glove use was significantly associated with the type of setting. Conducting a study in a community hospital emergency room with low prevalence of HBV/HIV, Henry found that increased glove usage was associated with the increased level of patient bleeding. Similarly, in a study conducted by Gershon, et al. (1995) those nurses who perceived their risk of contracting HBV or HIV as low were significantly less likely to practice UP.

Courington, Patterson, and Howard (1991) found in a study of ICU nurses that 53% did not wear gloves, 67% cited that the gloves decreased their dexterity, and 38% perceived the wearing of gloves as unnecessary. In a study by Levin (1994), failure to wear gloves was highest when the patient was perceived low risk. Kelen et. al (1990) found the use of personal protective equipment among HCP in the emergency department was inadequate and resulted in numerous adverse exposures to blood and body fluids. UP were observed being practiced in only 44% of cases, the rate dropping to 20% in episodes of profuse bleeding.

Even though circulating OR RNs are one of the highest risk groups for coming into contact with blood and body fluids, compliance with UP in this present study was inconsistent with both direct and indirect patient care. The rationale may be that this is a rural area where the staff know directly or indirectly those persons they are caring for,

which may justify in their minds a decrease in the incidence of HBV/HIV. Overall, there may be a belief that there is less HBV/HIV in the rural area.

4. Is there a difference between the practice of UP as to when the OR RN attended the UP program?

In general, in this study attendance at inservice classes did not increase UP rates. There was a significant increase in handwashing after hand contamination with those nurses who had attended the more recent inservice. This is also supported in the literature review. DeVries, et al. (1991) used a performance feedback procedure to increase glove wearing by emergency room nurses. The percentage increases in glove wearing ranged from 22% to 49%. Schwartz, Jacobs, and Juda (1992) monitored compliance of flight nurses with UP and demonstrated the effect education had on practice. Prior to a one hour mandatory UP program the nurses used gloves in 39% of those times necessary. Following the inservice, the nurses' glove use increased to 56%.

Doebbeling, Ferguson, and Kohout (1996) conducted a handwashing study where everyone in the ICU participated in an aggressive special education program on handwashing. Nonetheless, handwashing rates were as low as 30% and did not exceed 48% during the study. These results were no better than those observed by other investigators who did not attempt to improve performance with educational interventions. Mayer, Dubbert, Miller, Burkett, and Chapman (1986), conducted a systematic evaluation of strategies for increasing handwashing among ICU nurses. After baseline observations, two interventions, (1) changing to an emollient handwashing agent and (2) providing feedback on previous day's handwashing, were implemented on the experimental unit. No increase in handwashing was observed following introduction of soap,; however, there was a 92% increase in handwashing

following feedback. This was significantly higher than handwashing on the control unit. However, the frequency of handwashing declined significantly after the feedback intervention was discontinued.

Friedland, et al. (1992) investigated the effects of an educational program on compliance with glove use in an inner city pediatric emergency department. The RNs in that department were educated regarding the reasons and need for practicing UP. For the more experienced RNs (those with greater than 4 years experience) the compliance rate with UP before the program was only 15%. After the program, this compliance rate rose to 93%, but declined to only 50% by the 5<sup>th</sup> month. The compliance rate for the less experienced nurses (up to 3 years experience) before the educational program was 70% and remained about 93% afterward. Friedland attributed the increased rate of compliance for the inexperienced nurses to their initial educational training. These nurses began their careers performing procedures in the midst of the current blood-borne disease environment and UP as standard practice, whereas, the more experienced nurses learned skills when health care workers were less cognizant of the risks of occupational exposure to blood.

Most of the OR RNs in this study were experienced nurses (mean years in nursing 16.7); therefore these compliance rates resembled the experienced RN in Friedland's study, in that there was little or no emphasis on UP in their nursing educational programs.

5. Is there a difference in the practice of UP with respect to vaccination status (Hepatitis B) of the OR RN?

In this study more OR RNs were found to be vaccinated for Hepatitis B than HCP in other studies per the literature review. The study OR RNs who are not vaccinated (n=3, 8%), were found to wear gloves when moving a post operative

patient, yet, they failed to wash their hands after removing their gloves. It would seem more likely that HCPs without Hepatitis B vaccine protection would consider themselves to be at increased risk for contracting HBV/HIV and would wash their hands. However the present study findings indicated otherwise. Therefore, it is possible that the unvaccinated OR RN does not perceive himself/herself at risk for HBV disease and/or perceives gloves as an adequate barrier. Universal Precautions is a relatively recent practice; yet handwashing is one of the simplest and most inexpensive methods to control the spread of infectious microorganisms. Handwashing benefits are well known, but compliance with handwashing requirements still remains unusually low, less than 50% (Larson & Kretzer, 1995). Failure to wash hands is a complex problem that may be caused by a lack of motivation or lack of knowledge about the importance of handwashing. It may also be caused by obstacles such as understaffing, inconveniently located sinks, absence of paper towels, an unacceptable handwashing product, and/or the presence of dermatitis caused by previous handwashing (Larsen & Kretzer, 1995).

The Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Rule, which became enforceable in July 1992, does not mandate, but recommends all HCP with frequent blood exposure receive the HBV vaccine. Therefore, despite the development of the hepatitis B vaccine in 1982, 1,000 healthcare workers contract Hepatitis B each year (Hepatitis B Foundation, 1997). Regardless of known risk of exposure to this "Silent Infection" (as it is known because carriers of HBV may not become noticeably sick and may not realize they have the disease), the Department of Labor (DOL, 1987) reports that fewer than 60% of the HCP have obtained HBV vaccination. In a survey conducted by Gruber, et al. (1989), 97% of the respondents answered that all nurses with potential exposure to blood should

receive the Hepatitis B Vaccine. However, less than 40% indicated that they had done so. Jaffe et al. (1997), conducted a survey among HCP in the southeast where 84% agreed that "every hospital employee" should receive the Hepatitis B vaccine and 85% reported compliance with receiving the vaccine. Doebbeling et al. (1996) examined the relative importance of occupational and attitudinal factors in Hepatitis B vaccine acceptance and found that 54% of previously non-immune HCP had completed the series. He also found that acceptance of the vaccine was related to social influence (physicians, supervisors, role models, friends and spouse) and knowledge of the disease and vaccine, whereas refusal was primarily related to concern about vaccine side effects and problems with vaccine access.

Unlike the literature review, the majority of the OR RNs in this study were vaccinated against HBV. The HBV vaccination is not mandatory for OR employment. However, it is highly recommended and paid for by the institution. For those employees whose level of antibody protection is in question, a confirmatory antibody titer may be performed at no cost to the individual, but is not mandated.

### Nursing Implications

Nurses who are highly trained and educated in blood-borne diseases and UP are noncompliant with the practice of UP. Contact with blood and body fluids among OR RNs continues to occur frequently, yet, many of these exposures could be prevented by changes in practice and attire (CDC, 1985). Education and persuasion have not led to sustained improvement in handwashing behaviors; therefore, health educators need to seek a variety of educational and intense training methods accompanied by performance feedback to achieve positive program outcomes. Future inservice programs using behavior modification strategies may also assist in changing the HCPs' noncompliant behaviors into behaviors reflecting compliance with UP. Also

worthwhile would be visual reminders (such as posters) for OR nurses to wash their hands, not only after contamination, but also after removal of gloves. Also informative would be an inservice workshop, where contamination of the gloves by “bugene” and use of a blacklight to visualize the contaminants that may penetrate through the gloves could be demonstrated to enlighten those glove wearers of the importance of handwashing after glove removal. The goal of 100% compliance with UPs is possible, but will require an ongoing educational commitment with ongoing intense inservice programs to incorporate UPs into daily nursing practice and then, serve as a reminder.

#### Future Research

More data collection is needed to identify which study factors, alone or in combination, contribute significantly to the problem of poor compliance with glove use and handwashing recommendations.

Repeating the study with a different population sample would yield significant volume for the data analysis. Another improvement in the repetition of this study would be that the observations are conducted by only one observer who would monitor every nurse the same number of times. A standardized inservice where all HCP are presented with a pretest on the same information, (i.e. the use of a video on “Bloodborne Pathogen Exposure for the HCP”), followed by a post test. In order to measure the effectiveness of such a video program, a control group, who had no inservice, would be observed and compared to the inserviced group.

Another point of interest would be if managers dictate the performance behavior through punitive measures, or are influential, through their own positive role model behavior, in increasing UP compliance. Measuring perceived risk of exposure using a Likert scale instead of measuring knowledge via the survey used in this study might be another consideration for further study.



### Summary

In general this study considered that OR RNs were experienced, knowledgeable nurses who had been immunized with the HBV vaccine. However, receipt of the vaccine did not correspond to their practice of UP. Wearing gloves when moving a patient and washing hands after removal of gloves were demonstrated consistently when the nurse had received the Hepatitis B vaccine. Those OR RNs who attended the UP inservice within 6 months of being observed increased their UP practice in handwashing after contamination only; yet this knowledge did not consistently transfer to increase compliance with UP. The more knowledgeable the OR RN was, the less likely he/she was to wear gloves when applying tape to the surgical dressing. This study demonstrated that in spite of the OR RNs' knowledge, they did not consistently demonstrate compliance with the practice of UP. Therefore, raising the awareness of the importance of the practice of UP is a challenge to all nurses, not only for the safety of the patient but also for themselves.

APPENDICES

**APPENDIX A**

**Thesis Committee Designation Form**

SALISBURY STATE UNIVERSITY  
DEPARTMENT OF NURSING  
GRADUATE PROGRAM  
THESIS COMMITTEE DESIGNATION

Name of  
Student:

Noriss L. Cosgrove

Date:

2/12/97

Thesis  
Topic:

Compliance with Universal Precautions  
Among Perioperative Nurses.

COMMITTEE MEMBERSHIP:

NAME

SIGNATURE

BARBARA Kellam

Barbara A. Kellam

CDNA Quinn

CDNA B Quinn

Shielda Rogers

Shielda Rodgers

Barbara Wainwright

Barbara Wainwright

Comments:

**APPENDIX B**

**Study Request Letter to Directors**

Noriss L. Cosgrove  
603 Grason Lane  
Fruitland, MD 21826

Ms. Carol Soots, R.N., MBA  
Director Patient Care Services  
Atlantic General Hospital  
Berlin, MD

Dear Ms. Soots:


I am completing my MSN at Salisbury State University this Spring and am currently working on my thesis. I would like to gather data in the Operating Room at Atlantic General Hospital and have contacted Ms. Debbie Hickman for permission.

As is presented in the attached proposal, the research will be an observational study, conducted over a 45 day period, focused specifically on appropriate glove use and handwashing habits following the removal of gloves by circulating operating room registered nurses. The sampling will entail 3-4 observations per shift, 4-5 shifts per week, 1-2 observations of the same OR RN, observing at least 75% of the OR RN's.

I would be happy to send you a copy of the thesis proposal for your review.

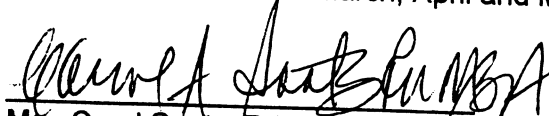
Thank you for your assistance in this matter.

Sincerely,



Noriss L. Cosgrove, RN, BSN

My signature acknowledges and gives authorization for Noriss L. Cosgrove, RN to conduct an observational study in the operating room at Atlantic General Hospital. This authorization is valid for the months of March, April and May, 1997.



Ms. Carol Soots, R.N., MBA  
Director of patient Care Services  
Atlantic General Hospital

Noriss L. Cosgrove  
603 Grason Lane  
Fruitland, MD 21826

Ms. Karen Poisker, R.N., MBA  
Vice President of Patient Care Services  
Peninsula Regional Medical Center  
Salisbury, MD 21801

Dear Ms. Poisker:

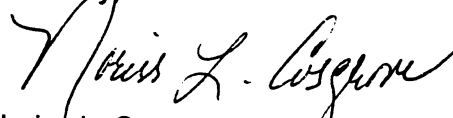
I am completing my MSN at Salisbury State University this Spring and am currently working on my thesis. I would like to gather data in the Operating Room at Peninsula Regional Medical Center and have contacted Mr. Robert Jones and Ms. Ann Street for permission.

As is presented in the attached proposal, the research will be an observational study, conducted over a 45 day period, focused specifically on appropriate glove use and handwashing habits following the removal of gloves by circulating operating room registered nurses. The sampling will entail 3-4 observations per shift, 4-5 shifts per week, 1-2 observations of the same OR RN, observing at least 75% of the OR RN's.

I would be happy to send you a copy of the thesis proposal for your review.

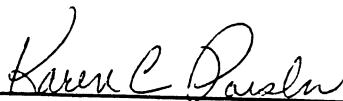
Thank you for your assistance in this matter.

Sincerely,



Noriss L. Cosgrove, RN, BSN

My signature acknowledges and gives authorization for Noriss L. Cosgrove, RN to conduct an observational study in the operating room at Peninsula Regional Medical Center. This authorization is valid for the months of March, April and May, 1997.



Ms. Karen Poisker, R.N., MBA *msn*  
Vice President of Patient Care Services  
Peninsula Regional Medical Center

Noriss L. Cosgrove  
603 Grason Lane  
Fruitland, MD 21826

Mr. Larry Hepner  
Vice President of Patient Care Services  
Shore Health Systems  
219 S. Washington St.  
Easton, MD 21601

Dear Mr. Hepner:

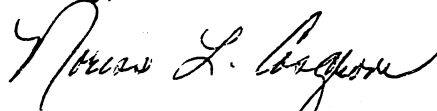
I am completing my MSN at Salisbury State University this Spring and am currently working on my thesis. I would like to gather data in the Operating Room at Easton Memorial Hospital and Dorchester General Hospital and have contacted Ms. Lisa Daugherty for permission.

As is presented in the attached proposal, the research will be an observational study, conducted over a 45 day period, focused specifically on appropriate glove use and handwashing habits following the removal of gloves by circulating operating room registered nurses. The sampling will entail 3-4 observations per shift, 4-5 shifts per week, 1-2 observations of the same OR RN, observing at least 75% of the OR RN's.

I would be happy to send you a copy of the thesis proposal for your review.

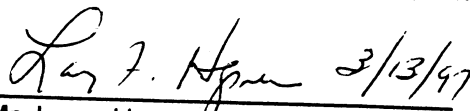
Thank you for your assistance in this matter.

Sincerely,



Noriss L. Cosgrove, RN, BSN

My signature acknowledges and gives authorization for Noriss L. Cosgrove, RN to conduct an observational study in the operating room at Easton Memorial Hospital and Dorchester General Hospital. This authorization is valid for the months of March, April and May, 1997.



Mr. Larry Hepner  
Vice President of Patient Care Services  
Shore Health Systems

cc: Ms. Lisa Daugherty  
Ms. Penny Aaron  
Ms. Peggy Himmel



**APPENDIX C**

**Committee on Human Volunteers Approval**

COMMITTEE ON HUMAN VOLUNTEERS

SALISBURY STATE UNIVERSITY

77

Date March 30, 1997

MEMO TO: Dr. Barbara Kellam

FROM: Chairman, Committee on Human Volunteers

SUBJECT: Compliance with Universal Precautions Among Operating Room

Registered Nurses who Circulate  
Title of Study


Grant Application No.  
Sponsoring Agency

Barbara Kellam, Ph.D.  
Principal Investigator or Program Director

Noriss L. Cosgrove  
Student Investigator

The Committee on Human Volunteers has considered the above application and, on the basis of available evidence, records its opinion as follows:

- (1) The rights and welfare of individual volunteers are adequately protected.
- (2) The methods to secure informed consent are fully appropriate and adequately safeguard the rights of the subjects (in the case of minors, consent is obtained from parents or guardians).
- (3) The investigators are responsible individuals, competent to handle any risks which may be involved, and the potential medical benefits of the investigation fully justify these studies.
- (4) The investigators assume the responsibility of notifying the Committee on Human Volunteers if any changes should develop in the methodology or the protocol of the research project involving a risk to the individual volunteers.

  
Chairman

Stephen Gehrich

**APPENDIX D**

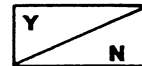
**Universal Precautions Assessment Tool**

Nurse Code: \_\_\_\_\_ No. of yrs. in nursing: \_\_\_\_\_ No. of yrs. in OR Nursing: \_\_\_\_\_  
 Time of operation: \_\_\_\_\_ Duration observed: \_\_\_\_\_ Surgical procedure: \_\_\_\_\_  
 Duration of procedure: \_\_\_\_\_ Emergency:  Scheduled:  Date: \_\_\_\_\_

**UNIVERSAL PRECAUTIONS ASSESSMENT TOOL**

**I. BARRIER PRECAUTIONS**

KEY



GLOVES

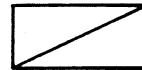
**A. Use of gloves related to:**

1) **Sponge counting activity**

Use of forcep with gloves



Use of forsep without gloves



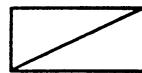
Use of gloves only



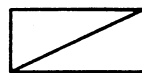
**B. Non-Intact Skin**

1) **Aplication of dressing**

With gloves

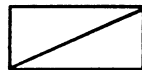


Without gloves

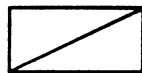


2) **Application of tape**

With gloves

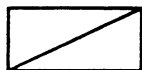


Without gloves

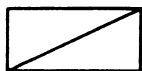


**C. Movement of patient**

With gloves

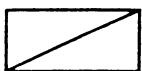


Without gloves

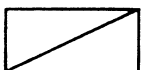


**II. HANDWASHING**

**A. After contamination of skin**



**B. After removal of gloves**



**APPENDIX E**  
**Disclosure Form**

## DISCLOSURE FORM

I am currently conducting a study on compliance with Universal Precautions. I am seeking the assistance of Registered Nurses who circulate in the operating room, in completing a questionnaire concerned with their knowledge of HIV and HBV.

The questionnaire is brief and should take about 5 minutes of your time to complete. The information you provide is confidential. Your name does not appear on the questionnaire or in the study.

Your cooperation and participation are strictly voluntary and your choice to participate or not to participate will in no way affect your employment. By completing the questionnaire, you are giving consent to participate in the study. Your participation is very valuable and will help me gather information regarding knowledge of HIV and HBV and their relevance to Universal Precautions.

If you have any questions about this study or would be interested in the results, please contact Noriss L. Cosgrove, Salisbury State University, telephone 410 543-8338. Thank you for your cooperation.

APPENDIX F

Survey

### SURVEY

Answer T or F to the following questions.

- \_\_\_\_\_ 1. Skin that is visibly intact is an adequate barrier to both HBV and HIV.
- \_\_\_\_\_ 2. HIV remains viable on surfaces for 1-3 days at room temperature.
- \_\_\_\_\_ 3. Fluid-proof shoe covers must be worn if there is potential for shoes to become soiled by blood or body fluid.
- \_\_\_\_\_ 4. A negative HIV test indicates that the person did not have enough antibody to HIV at the time of testing.
- \_\_\_\_\_ 5. 40% of needlestick injuries can be avoided by proper handling and disposal techniques.
- \_\_\_\_\_ 6. Universal Precautions regulations require treating all patients as if they are potentially infectious.
- \_\_\_\_\_ 7. All patients are treated as if they are potentially infectious for HIV and/or Hepatitis B best describes Universal Precautions.
- \_\_\_\_\_ 8. Universal Precautions should be practiced when handling surgical specimens, tissue and blood products.
- \_\_\_\_\_ 9. The most potentially infective body fluids are semen, blood, vaginal secretions, CSF, amniotic, peritoneal and pericardial fluids.
- \_\_\_\_\_ 10. Handwashing is required after glove removal.
- \_\_\_\_\_ 11. I wear gloves when counting soiled sponges.
- \_\_\_\_\_ 12. All nurses with potential exposure to blood should receive the Hepatitis B vaccine, except those with Hepatitis B antibodies.
- \_\_\_\_\_ 13. I have received the Hepatitis B vaccine or have documentation of Hepatitis B antibodies.

Excerpted portion of questionnaire from Bauer, P. (1991) Universal Precautions in OR Practice, Part III: Compliance and Knowledge, Nursing Management, 22(8), P. 48Q-48X.

PLEASE ANSWER QUESTIONS BELOW.

# of years in Nursing \_\_\_\_\_

# of years in OR Nursing \_\_\_\_\_



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**CURRICULUM VITAE**

## **CURRICULUM VITAE**

### **NORISS LEE ENNIS COSGROVE**

#### **PERSONAL DATA**

Born: San Diego, California

Children: Martin-26  
Michael-24  
Noriss-21

Home Address: 603 Grason Lane  
Fruitland, MD 21826  
(410) 543-8338

Business Address: 100 Carroll St.  
Salisbury, MD. 21801  
(410) 543-7788

#### **EDUCATION**

Diploma, 1964, in Nursing, Queen of Angels School of Nursing, Los Angeles, CA

B.A., 1985, in Psychology, Cum Laude  
Salisbury State University, Salisbury, MD

B.S., 1990, in Nursing  
Salisbury State University, Salisbury, MD

RNFA, 1996, First Assistant in Surgery  
Anne Arundel Community College  
Severna Park, MD

M.S., 1998, in Nursing  
Salisbury State University, Salisbury, MD

#### **LICENSURE AND CERTIFICATION**

##### **PROFESSIONAL NURSING LICENSE**

California R.N.#V159335  
Maryland R.N. #RO6465

BCLS Instructor-American Heart Association, Maryland  
First Aid/CPR Instructor  
Safety Council of MD

CNOR-Perioperative Nursing Practice Certification

## **PROFESSIONAL EXPERIENCE**

1990 to Present	Perioperative Educator, Peninsula Regional Center Education Department, Salisbury, MD.
1985-1990	Nurse Clinician, Operating Room, Peninsula Regional Medical Center Salisbury, MD
1985-1991	Office Nurse, Allergy Testing Dr. Franklin Johnson, Medical Center East Salisbury, MD 21801
1984-1985	Remedial Tutor, Reading-Developmental Studies Center Salisbury State University, Salisbury, MD
1969-1970	Head Nurse, Post Anesthesia Care Unit, Queen of Angels Hospital, Losangeles, CA
1966-1969	Staff Nurse, Operating Room, Queen of Angels Hospital Los Angeles, CA
1966-1967	Supervisor, Operating Room Doctors Hospital, Hollywood, CA
1966-1967	Staff Nurse, Emergency Room Huntington Memorial Hospital, Pasadena, CA
1965-1966	Staff Nurse, Operating Room Norfolk General Hospital, Norfolk, VA
1964-1965	Staff Nurse, Operating Room Queen of Angels Hospital, Los Angeles, CA

## **PROFESSIONAL ORGANIZATIONS**

1996-Present	Education Coordinator, Urology Nursing Society, Inc. 10 Concord Drive, Milford, DE
1990-1991	Secretary, Sigma Theta Tau International, Lambda Eta Salisbury State University, Salisbury MD
1993-1994	President, Association of Operating Room Nurses Lower Eastern Shore, Chapter #2105, Salisbury, MD
1992-1993	Vice President, Association of Operating Room Nurses Lower Eastern Shore Chapter #2105, Salisbury, MD
1990-1992	Secretary, Association of Operating Room Nurses Lower Eastern Shore, Chapter #2105, Salisbury, MD

- 1989-1990 President, Association of Operating Room Nurses,  
Lower Eastern Shore, Chapter #2105, Salisbury, MD
- 1988-1989 President Elect, Association of Operating Room Nurses,  
Lower Eastern Shore, Chapter #2105, Salisbury, MD

### CONSULTATION

- 1993 Assess infection prevention practices at Kandy General Hospital,  
Kandy, Sri Lanka
- 1995 Evaluate implementation of infection control practices. Instruct  
Medical/Nursing Staff in CPR, Kandy General Hospital, Kandy, Sri  
Lanka

### AWARDS

- 1989-1990 Maryland State Nursing Scholarship
- 1985 Cum Laude

### PUBLICATIONS AND PROFESSIONAL PRESENTATIONS

#### THESIS

- Cosgrove, N.L. (1998). Compliance with universal precautions among operating room  
registered nurses. Master's  
Thesis, Salisbury State University. p. 92, Figs. 2, Professor B. Kellam, Major Advisor.

### INVITED TALKS AND SEMINAR PRESENTATIONS

- 1993 "Nursing Responsibilities During Anesthesia," Department of Nursing, Salisbury  
State University, Salisbury, MD
- 1995 "Cultural Nursing-Sri Lanka" Maryland Nurses Association, Salisbury
- 1996 "Perioperative Care of the Pediatric Patient" Department of Nursing, Salisbury  
State University
- 1996 "Cultural Considerations in Nursing", Urology Nursing Society '96, Bloomington,  
MN
- 1998 "American Images of Nursing", International Perspectives on English Studies,  
American Studies and Cultural Studies in Asia in the 'Pacific Era', Bangkok,  
Thailand.

## **ACTIVITIES AND SELECTED COMMITTEES**

### **PENINSULA REGIONAL MEDICAL CENTER**

1991-1996	Quality Assurance Committee
1992-Present	Disaster Committee
1992-Present	Education Committee
1992-Present	Safety Management/Infection Control
1993-Present	Employee Activity Committee-Education, Travel
1997-Present	Trauma Committee
1998	Organ Procurement Committee

## **COMMUNITY ORGANIZATIONS**

1990 & 1991	Committee Chair, First Aid, Salisbury City Festival, Salisbury, MD
1982-1990	American Red Cross, Committee Member, Salisbury, MD
1981-1990	Coastal Hospice Society, Volunteer Patient Care, Salisbury, MD
1980-1981	Secretary, Home and School Association, St. Francis de Sales School, Salisbury, MD
1976-1984	Volunteer Health Nurse, St. Francis de Sales School, Salisbury, MD
1974-1975	President, House Staff Wives Association, University of Maryland Hospital, Baltimore, MD
1973-1974.1	Vice-President, House Staff Wives Association, University of Maryland Hospital, Baltimore, MD