# Bedside Nurses' Perceptions of Risk of Acquiring HIV Infection From the Workplace

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Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
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DEDICATION

To all the nurses who risked the unknown to provide compassionate care for people with AIDS in the days when little was known about the transmission of HIV infection,

and

To my family who supported me, from the depths of their own pain.

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The process required to obtain a masters degree required the encouragement and support of many people. Without the help of the following people this time would not have been as growth producing nor as satisfying.

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## ABSTRACT

Although research studies have begun to examine nurses' fears, attitudes and behaviors towards persons with HIV, no one has evaluated nurses' perceptions of their risk of acquiring Human Immunodeficiency Virus (HIV) from nursing activities that involve exposure to blood and body fluids. The purpose of this descriptive study is to understand nurses' perceptions of the risk of acquiring HIV infection when caring for HIV infected patients.

Specifically, nurses and HIV experts were asked to rank nine common nursing activities that they believed placed them at risk of HIV infection. Based on L. L. Thurstone's Law of Comparative Judgement, the Perceived Risk of HIV Infection Questionnaire was used to identify nurses' level of concern about HIV exposure in the workplace and their perception of risk of acquiring HIV infection while performing nursing activities that involve exposure to blood or body fluids of HIV infected patients.

The results of this study suggest that the perception of risk of acquiring HIV infection while caring for an HIV infected individual is hierarchical in

relation to specific nursing activities that involve exposure to HIV infected blood and body fluids. The findings also indicate that bedside nurses' perception of the risk of HIV infection from HIV infected patients is significantly different from Infection Control Practitioners and HIV clinical specialists. The delineation of the nursing activities that bedside nurses believe increase their risk of HIV infection has implications for administrative, educational and research endeavors that address nursing policy and educational needs relevant to the nursing care of HIV infected patients. Future research into the efficacy and application of universal precaution protocols, supported by the findings in this study, will further augment the understanding of the effect of the HIV epidemic on Manitoba nurses.

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CHAPTER I

# STATEMENT OF THE PROBLEM

## Introduction

Acquired Immunodeficiency Syndrome (AIDS) is growing in epidemic proportions, globally, nationally and provincially. Epidemiologic statistics reflect this in an alarming way. In July 1989, 208,176 people worldwide had been diagnosed with AIDS. Since 1981, 120,000 people have been diagnosed in the United States (Center for Disease Control [CDC], 1989b) and 3,990 people have been diagnosed in Canada, with 44 of these diagnosed in Manitoba (Federal Centre for AIDS, July, 1990). In addition, it is estimated that 1 to 1.5 million people in the United States (CDC, 1988b) 30,000 people in Canada (Schechter, Marion & Riben, 1988) and 184 people in Manitoba (Sekla & Hammond, 1989) are carrying the Human Immunodeficiency Virus (HIV) that causes AIDS (Barre-Sinoussi et al., 1983; Gallo et al., 1984). In Canada, there is an all province study underway to determine the carriage rate of HIV in the general population. Even if transmission of the virus were to stop completely today,

it is estimated that there will have been 7,000 to 11,000 AIDS cases in Canada by 1992 (Wells, Tostowaryk, & Rylett, 1988). Half of these will have died. In 1989, Fraser and Cox estimated that on any given day, there were between 100 to 150 AIDS patients in Canadian hospitals. In the intervening two years since this study, the estimates have risen to 250 to 300 AIDS patients in Canadian hospitals on any given day (A. Ronald, personal communication, January 1990).

At the beginning of the epidemic, 1981, research attempted to establish boundaries around the virus by identifying high risk groups. As a result, male homosexuals and Haitians became the focus of intense investigation. Over the next few years the list expanded to include intravenous drug users, prostitutes, hemophiliacs, Africans, and recipients of blood transfusions. While the vast majority of studies supported the theory that the vectors for AIDS spread were blood and semen, an occasional study suggested that AIDS could be transmitted by non sexual, non-blood borne contact (Olenski, 1983). Although Olenski and colleagues only suggested the possibility of household contact, the public did not understand the language of scientific

probability. More recent studies strongly suggest that the children similar to those identified in the Olenski report were infected perinatally from their HIV infected mothers (Olenski et al., 1983). Nevertheless, societal fears and suspicions still linger today.

Following the identification of the human immunodeficiency virus as the cause of AIDS in 1983, the emphasis slowly began to switch from high risk groups to high risk activities. Those at greatest risk engage in frequent unprotected sex with multiple partners and/or share intravenous needles thus risking the exchange of blood. However, since much of the work health care workers perform exposes them to blood and other body fluids many fear that their work activities place them at moderate to high risk of HIV infection.

Numerous articles and studies have been published in the health care and public literature about HIV transmission and the potential for occupational transmission (Meisenhelder & LaCharite, 1989b). Many educators have assumed that fears and concerns about HIV infection among health care workers will lessen as mounting evidence indicates that HIV is not easily transmitted in the work place (O'Donnell & O'Donnell,

1988). However, public and scientific journals are still publishing many studies and articles concerning HIV and the emotional and behavioral responses it causes in health care workers (Staff, 1988; Paul, 1988; Gerbert, 1989).

The goal of many HIV educational presentations has been to quell health care workers' fears about HIV transmission. A frequent outcome however, is frustration and uncertainty. Those who want to convey information--researchers, administrators and educators--seldom realize that their presentations are not reassuring. Several approaches have been used to calm nurses fears about HIV transmission in the work setting: presentation of epidemiologic data regarding HIV infection in health care settings, provision of information about HIV transmissibility, instruction in infection control protocols, and reassurance. Yet many nurses and other health care workers who do or will encounter HIV in their daily work feel less and less at ease.

Gerbert and colleagues (1989) suggested three reasons for the continuing fear among health care workers. First, researchers and educators have not yet acknowledged the legitimacy of health care workers'

fears; HIV is indeed transmissible in the health care work environment (CDC, 1989a). Second, infection control procedures cannot always prevent HIV transmission and the specific events that increase health care workers (HCWs) risk of HIV exposure have not been fully identified. Third, the perceived credibility of researchers, administrators and educators is eroding as the knowledge base of HIV infection rapidly expands causing experts to revise their opinions on many points. These three reasons exist over and above the public's fear of HIV infection centering around death, sex and stigma (Herek & Glunt, 1988).

## The Risk of HIV Infection from the Workplace

Current epidemiological evidence suggests that HIV presents a real risk to HCWs (See Literature Review). Authorities have used these data to persuade HCWs that the risk of acquiring HIV from patient care is low compared to the risk of HIV infection from sexual activities. However, many health care workers see their risk of occupational exposure to HIV as much greater than what they perceive their infinitesimal risk to be outside

the work place. Only proof that the risk of HIV infection from the health care environment is nonexistent would convince many that their fear is an overreaction.

The reality of the threat is often heightened when authorities confirm the existence of occupationally acquired HIV infection. Careful and repeated qualification and quantification have not eliminated the fear (Gerbert, Maguire, Badner, Altman, & Stone, 1989).

## Universal Precautions: A Response to the Risk

Universal precaution (UP) protocols were developed by the Public Service Center for Disease Control (CDC) in the United States (CDC, 1987a) in response to the risk of exposure to HIV infection in the health care environment (CDC, 1988a). In Canada, UP protocols were endorsed and released by the Bureau of Communicable Diseases Epidemiology, Laboratory Centre for Disease Control (LCDC) (Recommendations, 1987). Although interpreted in differing ways, the basic principles have been adopted by the large teaching hospitals throughout Canada. Nurses have been instructed in their

application. Studies have not yet been published to determine if UP have decreased or even affected the health care workers fear of infection with HIV.

## Erosion of credibility

Brandt (1988b) suggested that the authority of scientific expertise has been eroded. Moreover, Three Mile Island, Chernobyl and the threat of other environmental disasters have encouraged public distrust of official reassurances that catastrophes cannot occur.

Recent North American culture has little experience tolerating the uncertainties of epidemic disease. Before the onset of the HIV epidemic people claimed that the age of the transmissible, lethal infection was past. Epidemics like that of polio in the 1950's had receded from public memory. The fear of epidemic infection was believed to be unfounded in this modern age of antibiotics.

Expert knowledge is known to be one of the classic bases of social authority (French & Raven, 1959). Because of the rapidly changing knowledge about HIV, scientists have had to revise many of their opinions

about HIV infection and transmissibility. The constant revision has only increased the suspicions of health care workers.

Given the fall in legitimacy of experts, the social process of evaluating relative risk becomes difficult. Misunderstanding of scientists' use of probabilistic statements in describing risks exacerbates the situation. People often misinterpret a statement like "the risk of HIV transmission from saliva is theoretically possible but extremely unlikely", to mean that such transmission is possible or even likely (Herek & Glunt, 1988). Reassurances based on the small theoretical risk often appear hollow in the face of news of infected health care workers.

Brandt (1988a) suggested that in general North Americans are unable to evaluate and apply statistical principles to their everyday experience. Judgements about the probability of the risk of a given event are based more on the entire web of beliefs held by the individual than on statistical principles. People usually do not detect the biases in their judgements of probability (Tversky & Kahnman, 1974). As a profession, nurses' lack of experience and education in comparing

statistical risks has enhanced nurses' fear of HIV infection.

## Purpose of the study

Although research studies have begun to examine nurses' fears, attitudes and behaviors towards persons with HIV, no one has evaluated nurses' perceptions of their risk of acquiring HIV from nursing activities that involve exposure to blood and body fluids. The purpose of this descriptive study is to understand nurses' perceptions of the risk of acquiring HIV infection when caring for HIV infected patients.

The following questions were addressed: What are bedside nurses' perceptions of risk of acquiring HIV infection from nine nursing activities that involve exposure to blood and body fluids of HIV infected patients? Specifically, given nine nursing activities that involve exposure to blood and body fluids of HIV infected patients, how do bedside nurses and experts rank order the activities according to the potential risk of HIV infection? Do beside nurses' perceptions vary from a group of recognized HIV experts? What influenced the

rank ordering of nursing activities? And finally, how frequently would nurses and experts wear gloves when performing the nine nursing activities?

Underlying this study is the premise that nurses' fears of acquiring HIV infection from the workplace are legitimate regardless of the measurable epidemiological risk. This study will enable educators to specifically identify some of the HIV educational needs of bedside nurses. The knowledge gained will encourage effective adaptation of the generic universal precaution protocols needed to safely meet real life nursing situations. In addition, the findings of this study could form the basis of an investigation into nurses' acceptance and application of universal precaution (UP) protocols in hospitals.

CHAPTER II

# CONCEPTUAL FRAMEWORK

Nurses' occupational risk of acquiring HIV infection has been discussed in anecdotal reports, point prevalence surveys and in prospective, longitudinal studies. However, a nurse's perception of the risk of contagion when caring for people with HIV infection does not appear to be solely related to the epidemiological risk of exposure to the virus. Meisenhelder and LaCharite (1989a) suggested that nurses' perception of the risk of contagion comes from the legitimate threat of a serious disease and from the internalized condemnation associated with the AIDS label.

Meisenhelder and LaCharite (1989a) discussed this perception of risk as a theoretical extrapolation of Selye's stress-coping process. The possibility or actuality of caring for an HIV infected patient is the stimulus that leads to neurocognitive anxiety. Neurocognitive anxiety consists of the fear of the uncontrollable, unacceptable, unknown and misunderstood. As the anxiety becomes more focused, it becomes the perception of risk of acquiring HIV infection from the workplace. The affective response to the perception of

risk has been labelled the "fear of contagion". The components of the fear of contagion of HIV will be discussed as depicted in Appendix A.

Stimulus: Providing Care for HIV Infected People

The HIV epidemic has exploded in North America with AIDS and HIV infection becoming an ingrained part of the media (Hughey, Norton & Sullivan-Norton, 1989). With 30,000 people estimated to be infected in Canada, and 100 to 150 people with AIDS in our hospitals on any given day, few nurses have been able to avoid thinking about the impact of HIV infection on their careers, their health and their safety (Fraser & Cox, 1988; Clever, 1988). The fear of HIV contagion is present whether or not the nurse has cared for an HIV seropositive patient in the past. When honest, even those who are committed to providing complete, compassionate care have been affected by the hysteria surrounding HIV infection (Wood, 1989).

Neurocognitive Activity

## Neurocognitive Activity: Fear of the Uncontrollable

Nurses are at risk of exposure to HIV infection because of the nature of nursing. Exposure to blood and body fluids is a frequent and often unpredictable occurrence. Most nurses can recall at least one incident of having pricked themselves with a needle or accidentally being splashed with blood. The more vivid the event the easier it is to recall. For example, days when a nurse sustained a splash in the face with blood are remembered with clarity. Tversky and Kahneman (1974) suggested that the vividness of certain events biases the memory's ability to retrieve events, with the more vivid events being the easiest to remember. This leads to a systemic bias in a nurses' ability to evaluate the probability of a specific event.

Slovic, Fischhoff and Liechtenstein (1987) suggested that incidents perceived as being out of the control of the individual are viewed as high risk, irrespective of the probability of the event happening. Caring for the HIV infected is largely an uncontrollable part of a

bedside nurses experience. Most hospitals have enacted policies that make it very difficult for nurses to control their encounters with the HIV infected. Nurses are threatened with disciplinary action if they refuse to care for an HIV infected patient. The introduction of UP protocols on the surface appears to restore some control to the nurse. The essence of UP is the reasoned use of protective equipment. However, as bedside nurses frequently have little input into the purchase and location of protective supplies, the introduction of UP has done little to provide a sense of control. Confidentiality policies that attempt to protect the patient from the stigma surrounding a diagnosis of HIV infection frequently add to the sense of lack of control. These policies routinely prevent nurses from knowing the HIV serological status of patients, even when other members of the health care "team" have access to this information.

## Neurocognitive Activity: Fear of the Unacceptable

In North America, the fear of HIV infection is strongly associated with people that are considered

socially deviant or repulsive: the sexually promiscuous, the male homosexual and the intravenous drug user. In Canada, HIV infection has spread well beyond the male homosexual population to hemophiliacs, prostitutes, intravenous drug users and the sexual partners and offspring of the previously listed groups. Epidemiological evidence suggests that HIV infection is growing fastest in the non-white population in the United States, especially among intravenous drug users and their sexual partners. For many nurses, their risk of occupational exposure to individuals from these socially alienated groups is much higher than their perceived exposure outside the work place. Slovic, Fischhoff and Liechtenstein (1987) suggested that incidents or persons that cause dread or repulsion are associated with perceptions of high risk.

Homophobia is assumed by many to be one of the primary reasons for the persistence of the "fear of AIDS" reactions. While providing insight into the responses that care givers have to homosexual persons with HIV infection, this research cannot be generalized to the responses care givers have to all persons with HIV infection. Little has been published to date about

nurses' responses to these other socially alienated groups and whether this response is any different than nurses' responses to homosexuals.

## Neurocognitive Activity: Misunderstood and Unknown

The two concepts of fear of the unknown and misunderstanding are closely related. Health care workers are continually attempting to decipher what is known about HIV infection, acknowledge the unknown, correct misunderstandings and expose speculation. Sontag (1977) suggested that the more mysterious a disease, the more contagious it is perceived to be. The mysterious perception is reinforced by the rapid changes in knowledge concerning HIV infection over the past eight years. When AIDS was first described in 1981, little was known of its cause (Schilts, 1988). By 1985, virologists were able to identify HIV as the causative agent and epidemiologists had described the mode of transmission (Schilts, 1988).

Nurses have expressed the belief that scientists really know very little about HIV infection (Moriarity, 1988). Kahneman and Tversky (1984) suggested two

possible reasons for this; relative heuristics and availability heuristics. Attempts to allay fear and decrease the perception of risk of HIV infection are often greeted with skepticism. Past situations where administrators, scientists and physicians have offered misleading reassurances about other health risks are recalled by nurses and unconsciously extrapolated to information being communicated about HIV infection (relative heuristic). The fear and terror of being infected with HIV has been vividly portrayed in the media. Nursing journals have described instances of nurses losing their jobs because they acquired HIV infection. A single vivid case is more important than any statistic (availability heuristic).

## Perception of Risk

### Acquiring HIV Infection from the Workplace

Relative risk is a quantitative accounting of individuals infected with HIV. The scientific assessment of risk is defined as the accurate counting of lives lost

or maimed over time (Robinson, 1989). Scientists focus on a single hazard in isolation of other risks when establishing an estimate of risk (Weinstein, 1987). This is a strongly quantitative definition with the human cost usually relegated to some form of unit of production. The scientific assessment only accounts for less than 20 per cent of the public's total measure of risk (Renn, 1981). The public must attempt to respond to a number of hazards at one time (Weinstein, 1987). As a result the public uses many qualitative factors when weighing a risk.

Risk perception is the conscious or unconscious analysis of the qualitative and quantitative factors concerning the acquisition of HIV. The perception of the risk of acquiring HIV infection from the nursing workplace will be compatible with the entire web of beliefs of the individual nurse.

> Probability of death from AIDS and overall morbidity accounts for only a small proportion of the perception of risk. The effectiveness of epidemiologic data in reducing fear is undermined by the cognitive distortion that occurs when people appraise the probability of unlikely events. "Low probabilities...are overweighted, and very low probabilities are either overweighted quite grossly or neglected altogether, making decision weights highly unstable in that region. The overweighting

of low probabilities...amplifies the aversiveness of a small chance of severe loss" (Kahneman & Tversky, 1984, p.345).

## Affective Responses: Fear of Contagion

Meisenhelder and LaCharite (1989a, 1989b) defined fear of HIV contagion as the affective response to the perceived risk of acquiring HIV disease. This fear varies depending on the extent of the perceived risk of HIV infection and can be conceptualized on a continuum. One end of the continuum represents no perceived risk fear and thus no stress responses; the other extreme fear with an intense perception of risk.

As North Americans we are relatively unsophisticated in our assessment of risk. This lack of sophistication has heightened the fear response to the HIV epidemic ("The Fear of AIDS", 1985). If nurses are to respond optimally to the risk of HIV infection in the workplace, they must have a reasonably accurate perception of the magnitude of those risks. Yet the formal education of most people, including nurses, rarely includes any serious instruction in the assessment of risk.

## Summary

Fear of contagion arises from the legitimate threat of exposure to HIV infection in the workplace and the neurocognitive activities that provides the symbolic meaning of HIV infection. The more that HIV infection represents the unknown, uncontrollable and unacceptable the greater the affective response of fear of contagion. The epidemiological literature and the literature examining HCWs' attitudinal response to HIV in the workplace illustrates the behavioural manifestations of fear of contagion.

CHAPTER III

# LITERATURE REVIEW

The review of the literature provides a context for understanding nurses' perceptions of risk of acquiring HIV infection from the workplace. It was complied from a variety of sources: a manual search, a computer search, presentations from the Fifth and Sixth International Conferences on AIDS, tracking of citations, and from personal communication with HIV researchers.

This chapter will initially examine the epidemiological risk of acquiring HIV from the health care environment followed by a review of the limited research literature concerning universal precaution protocols. The review then critically evaluated research papers concerning nursing attitudes toward caring for HIV infected individuals. Finally, there is an examination of nurses' ability to evaluate risk.

## Epidemiological Risk of HIV Infection

The epidemiological risk of acquiring HIV in the workplace is under intense investigation at this time.

The first people with AIDS were hospitalized in 1978, prior to recognition that AIDS was transmissible. Since that time anecdotal reports, serological surveys and longitudinal studies have been published about the presumptive risk of acquiring HIV infection in the workplace (Henderson, 1988). Secondary findings and interpretive comments by the researchers are informative as well.

In 1983, the Center for Disease Control in Atlanta, Georgia began a multi-center longitudinal surveillance project of HCWs with percutaneous or mucous membrane exposures to blood and body fluids of persons infected with HIV. As of May, 1988, 1201 (CDC, 1989a) HCWs have been enrolled. An additional 412 HCWs met the eligibility criteria but were excluded because they did not submit to testing (306) or were not exposed to blood (saliva 56, urine 16, unknown fluids 34). Enrolled subjects came from a broad range of health care workers including 751 nurses, 164 physicians, 134 laboratory workers, 90 phlebotomists and 62 others. Ninety-eight of the study participants had direct patient or specimen contact. Eighty per cent of the exposures resulted from needlesticks, 8 per cent form other sharp objects, 7 per

cent from open wound contamination and 5 per cent from mucus membrane exposure. Of 963 workers whose serum has been tested for at least 180 days post exposure, 4 were positive for the HIV antibody and had no risk factors other than a needlestick exposure (McCray, 1986; CDC, 1988a; Marcus, 1988). Eight hundred and sixty of the 963 HCWs were exposed via a needlestick or a cut from a sharp instrument. All four seroconversions occurred as a result of a percutaneous exposure; 2 were exposed during resuscitation procedures, 1 from needle re-capping (Stricof & Morse, 1986; Marcus, 1988), and the fourth during phlebotomy (CDC, 1988a). This results in a seroprevalence rate of 0.46 per cent (4 of 860).

The National Institutes of Health have reported one seroconversion among the 1200 HCWs enrolled in its longitudinal studies (Fahey, Schmitt, Saah, Lane, & Henderson, 1988). HCWs sustained 483 parental (103) and mucus membrane (380) exposures to HIV infected blood or body fluids.

The University of California has also reported one seroconversion from the 235 HCWs with 625 needlestick injuries to HIV infected blood being followed in their study (Gerberding, Littel, & Louie, 1989). Moss and

colleagues (1986) studied 101 HCWs from University of California or the San Francisco General. Eleven HCWs were HIV seropositive. However, all identified themselves as taking part in known high risk behaviours.

Kuhls and colleagues (1987) prospectively followed 246 seronegative female health care workers for 9 to 12 months. One hundred and two of the 246 reported more than 50 contacts with blood and body fluids from AIDS patients; ten had needlestick injuries and 15 had mucus membrane exposures. One hundred and one workers had no exposure and the remaining forty - three had a low rate of exposure. No HCWs developed HIV antibodies during the follow up period.

Weiss and associates (1985) followed 361 HCWs from several medical centers in areas of moderate to high incidence of HIV infection. The subjects were predominantly physicians (239 of 361). Forty-four reported percutaneous exposure to HIV. Three of these were HIV seropositive with no other risk factors identified. One HCW was exposed from a percutaneous puncture from a colonic biopsy needle. The second HCW was exposed via two accidental needlesticks while drawing blood. The third HCW was a laboratory worker. He jammed

a capillary tube of blood into the palm of his hand. The HIV status of the blood to which he was exposed is unknown. No other risk factors were identified. This case represents probable occupational transmission because the epidemiological investigation was incomplete and the timing of the HIV seroconversion could not be documented. In addition, Weiss has identified 2 research laboratory workers that have seroconverted following exposure to concentrated forms of HIV in the laboratory setting.

Hirsh and associates (1985) studied 72 health care workers with documented exposure to HIV infected blood and body fluids. Thirty HCWs had sustained single needlestick injuries, three had blood exposure to mucus membranes or open skin wounds and 39 had skin and/or mucus membrane exposures to body fluids other than blood. All were seronegative 12 months after exposure.

A prospective study in the United Kingdom (McEvoy, Porter, Mortimer, Simmons, & Shanson 1987) examined 76 HCWs with parental, mucosal or cutaneous exposures. No seroconversions were identified.

In a Canadian longitudinal study begun in 1985, 205 parenteral or mucous membrane exposures to HIV infected

blood or body fluids have been reported to date. One person was seropositive when the initial serum was drawn. However, this person had other risk factors. It is believed that this and not the workplace exposure was the probable cause of seroconversion (Health and Welfare Canada, 1988).

In all six longitudinal studies, needlesticks were the only type of exposure that led to HIV infection. The rate of transmission based on the longitudinal studies is 0.27 per cent or approximately 3 HIV infections per 1000 exposures. If only needlesticks are considered the rate is slightly higher at 0.47% or 5 HIV infections per 1000 needlesticks with a contaminated needle (Henderson, 1988).

In summary eleven HCWs have been documented in these longitudinal studies as having acquired HIV from occupational exposure. All but one of these has come from a percutaneous exposure (Weiss, 1988). In seven cases the time of seroconversion was documented (CDC, 1988a; Marcus, 1988; Fahey, Schmitt, Saah, Lane, & Henderson, 1989; Weiss, 1988; Gerberding, Littel & Louie, 1989).

Eleven other HCWs, with documented seroconversions,

not enrolled in the longitudinal studies have been reported in anecdotal reports. All 10 denied exposure to HIV other than in the workplace (Anonymous, 1984; Okenhendler, Harzic, Le Roux, Rabin, & Clauvel, 1986; Neisson-Vernant, Arfi, Mathez, Leibowitch, & Monplaisar, 1986; CDC, 1986, 1987; Ramsey, Smith, & Reinarz, 1988; Gioannini, et al., 1988; Michelet, Cartier, Ruffault, Camus, Genetet, & Thomas, 1988; Wallace & Harrison, 1988). Six of the exposures were due to needlesticks or other sharps; four to mucosal exposure.

The literature identifies 3 additional infected HCWs in which the date of seroconversion is unknown (Grant & McEvoy, 1985; Klein, et al. 1988; Ponce de Leon, Sanchez-Mejorada, & Zaidi-Jacobson, 1988). Two of the three are due to needle stick injury. No other risk factors have been identified.

Anecdotal reports highlight that occupational HIV transmission does occur. However, such reports do not emphasize the magnitude of the risk as they provide a numerator (infected health care workers following exposures) for which there is no denominator (total number of health care workers exposed). Adequate information is often unavailable to definitively link

the HIV infection to the exposure. Longitudinal, prospective studies provide the best estimate of the epidemiological risk of HIV transmission in the health care setting. Precise documentation of adverse exposures combined with careful monitoring of the seroconversion allows researchers to identify occupational exposure with reasonable confidence.

The overall total of 25 HCWs with occupationally acquired HIV infection is considered by some to be small in comparison to the total number of health care workers in contact with HIV infected patients (Marcus & the CDC Cooperative Needlestick Group, 1988; Gerbert, Maguire, Badner, Altman, & Stone, 1989). As of June, 1989, the CDC had identified 169 HCWs with AIDS and undetermined exposure to the virus; information is incomplete for 28 because of death or refusal to be interviewed and 97 are still under investigation. Aoun (1989) charged that CDC was either purposefully or negligently under reporting the number of HCWs with occupationally acquired HIV infection. He cites his own case as an example. Even though Johns Hopkins Hospital acknowledges that the "virus was acquired while treating a patient", CDC has not included Aoun's case in their reports. The actual

tally of occupationally infected HCWs has changed little over several years. With HIV infected patients increasing and no evidence of a decrease in needlestick exposures, simple projections would suggest that the total number of infected HCWs would increase over time (Bland, 1990). Representatives at CDC suggest that the lack of increase in HIV infected HCWs may be because HCWs are now taking more precautions to protect themselves from occupational exposures; however, this has not been investigated. Others suggest that new cases of occupational seroconversion have not been reported because of the tremendous publicity and resultant discrimination associated with previous cases, (Nicolle, personal communication, January 5, 1990).

## Universal Precautions: A Response to the Relative Risk

The work of nurses involves frequent exposure to blood and body fluids. Studies presented at the Third International Conference on AIDS stressed that health care workers are frequently splattered with blood and other body fluids from patients. Graphic pictures were

shown of emergency room personnel completely covered in blood (Baker, et al., 1988). Needlestick injuries continue to be one of the most frequent and under-reported occupational injuries of bedside nurses. (Klass, Sweeny, & Harding, 1987; Jackson, 1986; Krasinski, 1987). The injuries primarily occur when used hypodermic needles are being recapped prior to disposal (McCormick & Maki, 1981; Neuberger, 1984; Reed, 1980; Ruben, 1983).

Since the onset of the HIV epidemic in the early 1980's, increased attention has been focused on infection control techniques that provide barrier protection from blood and body fluids infected with blood borne microbes like hepatitis B and HIV. In 1987, the CDC revealed that several health care workers had acquired HIV from the workplace (CDC, 1987b). Although probably unrelated, in less than 3 months the Center for Disease Control released the updated guidelines for the prevention of HIV transmission (CDC, 1987a). Also called universal precautions, these guidelines supplanted previous blood and body fluid precautions that had been issued in 1983 (AIDS Update: Recommendations for preventing transmission of HIV in heath care settings, 1988; CDC, 1983, 1989). The most recent update of the CDC Universal Precaution

protocols were released in June, 1989 (CDC, 1989a).

Prior to January 1987, Larsen (1988) was unable to identify any studies in the nursing literature that focused on the efficacy of any infection control barrier techniques, including those instituted in universal precautions (Larsen, 1988). As a result of an evaluation of the research literature supporting specific isolation techniques, the United States Government Federal Register (1987) stated that the practice of specific isolation techniques is not strongly grounded in research. Little has changed since the advent of UP (Larsen, 1989). Although UP has many advocates, and almost as many foes, no research has been reported that demonstrated its efficacy or non-efficacy in preventing HIV or hepatitis transmission in the health care setting (Lynch, Jackson, Cummings, & Stamm, 1987).

In November 1987, the United States Department of Labor, Occupational Safety and Health Administration (OSHA) decided to enforce the CDC guidelines through the use of substantial fines to non-compliant hospitals (Makulowich, 1988). This has stimulated the introduction of UP in most health care settings in the United States. Canadian hospitals do not have OSHA or its equivalent to

motivate them. Still, many US and Canadian hospitals and nursing staff have made the transition to UP hesitantly and with varying degrees of commitment (O'Kane, 1987; Harnett, 1987). At the annual conference of the association of the American Practitioners of Infection Control in 1988, universal precautions were described as an expensive, global, disruptive knee-jerk response to AIDS without a sound scientific research base (Valenti, 1988).

Even though OSHA, the CDC and LCDC strongly support the use of UP, results from the United States and Canada suggest that the application of universal precautions is minimal, even in areas of high incidence of HIV infection. In the Health and Welfare Canada longitudinal study (1988) discussed earlier, 41 per cent of the HCWs were not wearing protective apparel at the time of exposure. An estimated 34 percent of those exposed could have prevented exposure by adhering to the UP protocols (Elmslie, Mulligan, & O'Shaughnessy, 1988).

Gerberding and colleagues (1987) in their longitudinal study examining the risk of HIV acquisition in exposed HCWs found inadequate application of universal precautions. They found that 56 per cent of the HCWs

failed to use appropriate protective precautions when caring for AIDS patients; less than ten per cent over protected themselves. Even fewer HCWs used appropriate protective precautions (40 per cent) when caring for asymptomatic, HIV seropositive patients.

A non-participatory observational study from John Hopkins Hospital, with a 3 to 5 percent incidence of unsuspected emergency patients with HIV infection, demonstrated that even when supplies were conveniently provided, emergency room staff did not follow UP protocols (Kelen, DiGiovanna, Kalainov, Bisson, & Scott, 1989). Of particular interest in this study was the inverse relationship between the amount of blood in the area and the medical and nursing staff's use of gloves, gowns and masks. HCWs used gloves least frequently with trauma patients with multiple injuries. The authors did not explore the reasons for this behaviour.

Moriarity (1988), a senior editor of RN, summarized the results of a survey of readers. No information was given concerning the characteristics of the respondents and non-respondents. Three quarters of the respondents expressed a moderate to high fear of AIDS. The majority (no numbers) of readers did not believe the medical world

knew very much about HIV and AIDS. In spite of the fear, 60 per cent do not use universal precautions all of the time, with all patients. Few studies have examined HCWs response to UP, and none have yet assessed UP effect on the relative risk of HIV infection.

Campbell (1990) examined the compliance of emergency department workers to UP protocols in a mid-size hospital, in an area with a moderate prevalence of HIV infection. Using non-participant observation and a self report survey he reported that appropriate gowns were worn 12 per cent of the time, masks 2 per cent of the time, goggles nine per cent of the time, and gloves 80 per cent of the time. Gloves were worn for IV insertion 55 per cent of the time. Campbell and associates (1990) concluded that a significant number of HCWs failed to appropriately apply UP protocols to their practice.

Two studies have attempted to evaluate the acceptability and implementation of UP by nurses. Gruber and colleagues (1989) tried to evaluate the relationship between knowledge of HIV infection and the implementation of UP with a questionnaire. While survey methodologies have severe limitations when attempting to evaluate actual practice, the study does raise some important

issues. Those with the lowest knowledge scores were more likely to implement UP. Those least likely to implement UP also believed that their risk of HIV exposure in the workplace was low.

Lowen and colleagues (1989) tried to evaluate nurse-midwives acceptance and use of precautions to prevent blood borne infections by asking about specific adherence to individual items from the CDC guidelines. A total of 1,784 (60.2%) actively practicing nurse-midwives completed the questionnaire. Forty-five percent stated they did not use UP in their practice; 38 per cent of these felt that UP were unnecessary. Of the 55 per cent using UP, over half failed to confirm their answer by reporting the use of specific components of the UP protocol. Sixty-five percent reported being soaked through to the skin with blood or amniotic fluid at least once in the preceding six months (25.1 per cent reported 5 or more such splashes). Those who reported using UP recognized the epidemiological risk of hepatitis B and HIV more frequently than those who reported not using UP.

In summary, UP implementation has been strongly urged by government agencies in Canada and the US. However, research to support the efficacy of the UP

protocols is not available. Nurses actual implementation of UP appears to relate in part to knowledge of HIV transmission and to a perceived risk of acquiring HIV from the patient care environment. Further study is needed to add to the understanding of nurses' perceived risk of acquiring HIV from the HIV infected patients.

## Caring for HIV Infected Patients: Nursing Attitudes

### Caring for Patients with AIDS

A number of studies have identified nurses' fear response to providing care for HIV infected patients. In the first study published about nurses' fears and attitudes towards AIDS, Reed, Wise and Mann (1984) surveyed 267 urban hospital staff. Eighteen per cent returned the survey. In spite of this very poor response rate, this study is one of the most referenced studies in the AIDS and nursing literature. The researchers found that nearly 67 per cent of the nursing staff reported some form of anxiety when caring for AIDS patients. Eighty per cent reported fear of acquiring AIDS while giving nursing care. Three per cent refused

to care for AIDS patients. This study was conducted before HIV had been identified as the causative agent in AIDS.

Nurses' attitudes about caring for persons with AIDS were assessed by van Servellen, Lewis and Leake (1988). Three thousand questionnaires were randomly mailed to practicing nurses in California with a response rate of 42.3 per cent. Although the majority had some form of AIDS education, only 12 per cent correctly identified AIDS symptoms. Most (68.7 per cent) identified high risk groups correctly. The majority however, tended to exaggerate the risk for low risk groups with only 11 per cent correctly identifying low risk groups. Nineteen per cent failed to identify appropriate isolation precautions, half of these were overcautious errors. Nurses who were more comfortable with AIDS patients and had greater experience were less likely to be overcautious. Those with greater knowledge, however, were not necessarily more comfortable. Twenty four per cent believed they were at moderate or high risk of contracting AIDS because of occupational exposure.

Andre (1988) divided AIDS attitude responses into four sets; fear, anger, anxiety and other. Forty-two

nurses registered in an AIDS inservice were surveyed. Fear of contagion, although not defined, was expressed by 67 per cent of the nurses. Ninety-two per cent stated cardiopulmonary resuscitation (CPR) would be delayed or not performed at all on people with AIDS (PWAs). Fear was cited as the sole reason for the delay.

Blumenfield and colleagues (1987) surveyed nurses of a large New York hospital to determine their attitudes concerning caring for PWAs. An anonymous ten question survey was distributed with an initial response rate of 33 per cent. Sixty per cent were more afraid of caring for PWAs than for persons with hepatitis B. Over 80 per cent would hesitate to do mouth to mouth resuscitation on PWAs.

## AIDS and Homosexuality

A number of studies about caring for patients with AIDS have focused on nurses' responses to homosexuality. In the early years of the epidemic, male homosexuals were identified as frequently engaging in sexual behaviors that increased their risk of acquiring HIV infection. This combined with the pre-existing social dislike of

homosexuality resulted in many studies that examined nurses response to AIDS as a reflection of nurses' response to homosexual patients. Although some researchers have assumed that any study of nurses' responses to AIDS must examine their response to homosexuality (Barrick, 1988; Pleck, O'Donnell, O'Donnell, & Snarey, 1988; Young, 1988; Young, Koch, & Preston, 1989; Douglas, Kalman, & Kalman, 1985), others have shown that homosexuality and fear of AIDS are two separate and unique attitudes underlying nurses responses (Scherer, Haughey, & Wu, 1989; Bouton, Gallagher, Garlinghouse, Leal, Rosenstein, & Young, 1987).

Bouton and associates (1987) developed a tool for measuring the fear of AIDS which has a reliability of .89 (Cronbach's alpha). Factor analysis of the responses identified four unique factors in a person's attitude towards AIDS; Homophobia, Fear of Contact, Public Health Factor and Personal Factor. They suggested that the Fear of Contact, Public Health and Personal factors describe an individual's perceived susceptibility or risk of acquiring AIDS.

Scherer, Haughey and Wu (1989) randomly surveyed registered nurses from New York State to determine

nurses' knowledge and attitudes about caring for PWA. The overall response rate was 51 per cent (581 of 1139). The questionnaire consisted of 4 scales that examined attitudes toward homosexuality as separate from fear of HIV infection. Content validity was determined by a panel of experts. Half of the respondents were fearful of contracting HIV from working with PWA and were concerned that they were putting their families at risk, with older nurses being the most fearful. Younger nurses supported the rights of PWA, yet tended to be more negative towards homosexuals. All nurses demonstrated a hierarchy of concern for patients; they were more concerned for those that got AIDS from a blood transfusion than for those who acquired AIDS through sexual activity. Ten per cent found caring for homosexuals distasteful, although 87 per cent felt their partners should be given courtesy and respect. The questionnaire appeared biased in its attempt to identify nurses' negative attitudes. For example, one question asked if AIDS had increased negative feelings about homosexuals, but no question addressed the possibility of positive feelings.

A second survey by Haughey, Scherer and Wu (1990)

evaluated nurses knowledge about AIDS transmission, treatment and care. The researchers suggested that nurses who had cared for PWAs were significantly more knowledgeable than those without experience.

## Perceived Risk of HIV in the Workplace

One hundred and thirty-four perinatal nurses in Ann Arbor, Michigan were surveyed to determine knowledge, attitude and fears about AIDS (Prince, Beard, Ivey, & Lester, 1989). Even though the epidemiological risk of perinatal nurses has been judged to be low, 85 per cent expressed moderate to high fear of AIDS. This was explained by the infectious, incurable and fatal nature of AIDS and the high body fluid contact nurses have in the perinatal setting. The nurses' greatest fear was not knowing the HIV status especially in an emergency situation.

Brennan (1988) reported on a survey of nurses working in 18 different hospitals caring for AIDS patients. The response rate appeared very small although the number of non-respondents was not given. The study suggested that the awareness of the risks of caring for

HIV infected patients has made many nurses more afraid, especially of mistakes or errors occurring in emergency situations. Seventy-two per cent stated that more information concerning the relative risk of caring for an AIDS patient was needed. Although not a thorough or systematic study, it does provide some insight into perceived risks from the nurses point of view.

Link, Feingold, Charp, Freeman, and Shevlov (1988) examined medical and pediatric residents' perception of the risks of contracting HIV infection from the workplace. The residents overestimated their risk of contracting HIV infection when caring for patients. Grade, Barnof, Ficarrotto, Zegan, and Zeigler (1989) assessed health care students (sample size unknown) to determine their perception of personal and occupational risk of HIV transmission. Items on the questionnaire were chosen for their common occurrence in personal life and professional practice. While some items involved professional exposure to blood or body fluids, most items described situations involving social contact. The majority of students overestimated their risk when compared to the informed opinions of experts. Specific items that increased perception of risk were visual signs

of illness, known seropositivity and patient dementia. Limited knowledge of transmission factors correlated positively with overestimation of risk, as did attitudes considered counter to optimal care. Multiple regression analysis demonstrated that negative attitudes were the best predictor of overestimation of risk. These reports are the only ones that have addressed some of the specific perceptions of risk HCWs have about acquiring HIV infection.

One study examined the concerns of nurses that have had a self identified exposure to HIV infected blood or other body fluids (Wiley, Heath, Acklin, Earl, & Barnard, 1990). Of the 323 registered nurses responding to a questionnaire, 64 (20 per cent) reported HIV exposure. This high number was concerning to the researchers as only 15 exposures had been reported to the occupational health department in the prior 3 years. The researcher suspected that the participants may have included exposure to body fluids that are not considered HIV infectious fluids by the CDC guidelines. For example, they may have included urine or stool as an HIV infectious fluid. The nurses that reported exposure expressed greater concern about the risk of

occupationally acquired HIV infection than did those not exposed ($p < 0.001$). While 80 per cent of the total sample stated that they thought universal precautions prevented exposure to HIV, 20 per cent stated that universal precautions were not totally preventive and that exposure could not always be anticipated. The percentages were similar when comparing those exposed and those not exposed. Researchers involved in a study that identified the AIDS attitudes of nurses and other health care workers have suggested that future efforts should be directed towards assessing specific fears and professional behaviors rather than simply looking at attitudes (Turner, Gauthier, Ellison, & Greiner, 1988).

One element of perceived risk is the trust that nurses have in the information that they receive concerning HIV. In a study of 461 new nursing graduates sponsored by the American Association of Colleges of Nurses, Cassells and Redman (1989) found that 28 per cent had minimal or no trust in the available HIV information. In addition, fewer than 40 per cent felt that the latest information on the HIV epidemic was not available to them in the work setting.

## Canadian Studies

It is important that Canadian studies on HIV infection and its effect on Canadian nursing be undertaken. The July 3, 1989 issue of MacLean's published the results of a survey comparing the difference between Canadians and Americans. Fundamentally, Canadians pride themselves on tolerance, Americans on freedom and independence (Staff, 1989). These difference may well be reflected in the response Canadian nurses have to persons with AIDS or HIV infection. In addition, the vast differences between the profit oriented health care system in the United States and the socialized health care system in Canada affects the social, political and financial response to the epidemic and as a result the role of nursing.

Only, two Canadian based studies have been published in the nursing literature. The first by Bowd and Loos (1987) examined the knowledge and attitudes of 114 students enrolled in the Bachelor of Science program at an Ontario university. The study is inadequately described, especially as the main finding compares the knowledge of the student nurses with the knowledge of an

unidentified group of student teachers. Further, there is no discussion about the attitudinal section of the questionnaire although attitudinal tables comprise a large portion of the report.

The second Canadian study compared the knowledge and perception of AIDS between 65 registered nurses enrolled in a Bachelor of nursing program at the University of Lethbridge and 70 nursing students registered in generic programs across Canada (Armstrong-Esther & Hewitt, 1989). One third of the total sample erroneously believed that HIV was transmitted by saliva and unsanitary conditions. The generic students believed they had access to a wide range of information, with newspapers and television playing an important role. However, they were also more likely to consider overprotecting themselves through the superfluous use of gloves than were the registered nurses. Eighty per cent of the registered nurses and 69 per cent of the generic students expressed concern about contracting AIDS from the health care setting.

## Evaluation of Risk

Numerous studies have shown that people (including experts) have great difficulty in judging probabilities and making predictions in uncertain situations (Kahneman & Tversky, 1984; Nisbett & Ross, 1980; Slovic, Fischhoff, & Liechtenstein, 1977). Once experts were forced to go beyond their area of expertise they were as prone as lay people to misjudge the potential risk in a given situation (Fischhoff, Slovic, & Liechtenstein, 1978).

Psychometric scaling methods have been used to identify attitudes concerning risk perception (Brown & Green, 1980; Fischhoff, Slovic, Liechtenstein, Read, & Combs, 1978; Johnson & Tversky, 1984; Renn 1981; Slovic, Fischhoff, & Liechtenstein, 1979, 1980). Slovic, Fischhoff, and Liechtenstein (1987) summarized the results of these and other psychometric studies and have identified three factors that influence a person's assessment of risk: the degree to which the risk is understood, the degree to which the risk evokes a feeling of dread, and the number of people exposed to the risk. It was found that these factors, especially the dread factor, correlated highly with a person's perception of

risk.

## Summary

The risk of HIV transmission in the patient care environment is real with more than 25 HCWs having acquired HIV infection from the workplace. Parenteral exposure is the primary mode of transmission. In response to this risk, most hospitals across Canada have introduced UP protocols. The effect of UP on the relative risk of HIV acquisition is still largely uninvestigated although most advocates of UP protocols imply that it will decrease both the actual and perceived risk. In spite of this, preliminary studies suggest that HCWs do not regularly apply UP protocols even in high risk situations.

Most nursing studies have attempted to examine nurses' attitudes and behavioural responses to caring for HIV infected persons. Fear of providing care to HIV infected patients is reported in almost all nursing studies and is most frequently documented by describing inappropriate application of UP protocols or refusal to care for PWAs. The studies often ignore or dismiss the

HCWs' legitimate risk of serious illness associated with caring for an HIV infected patient and attempt to fully explain the fear by discussing the homophobic responses of HCWs.

A number of studies have identified specific nursing activities that may influence the perception of risk. The studies and anecdotal reports described suggest that nursing activities implicated in or perceived to increase the risk of occupational acquired HIV infection are: re-capping and not re-capping needles following an injection, putting pressure on arterial line sites, taking part in resuscitation efforts, venipuncture procedures and providing basic hygienic care for a patient. However, no systematic examination of nurses' perception of risk associated with nursing activities involving exposure to HIV infected blood and body fluids has yet been reported.

Psychometric scaling methods have been used to examine perceptions of risk and would be appropriate methodology to answer the research questions.

CHAPTER IV

# METHODOLOGY

## Study Design

The survey methodology chosen for this descriptive study is the method of paired comparisons derived from L. L. Thurstone's Law of Comparative Judgement (Dunn-Rankin, 1983a). This is a well recognized methodology for scaling a set of stimuli according to psychological preferences.

## Setting

The setting for this study was Winnipeg, Manitoba. The city has a very low incidence of HIV infection. The actual number of known HIV infected people in Manitoba is thought to be less than 400. Epidemiologists estimate that the number of HIV infected patients actually cared for in Manitoba hospitals is very low.

## Subjects

Four groups of subjects were approached to participate in this study; medical nurses, surgical nurses, students in the baccalaureate program for registered nurses (BN/RNs), and HIV experts.

### Medical and Surgical Nurses

The medical and surgical nurses for this study were a convenience sample of all the nurses working full-time or part-time as bedside nurses on the medical and surgical wards of St. Boniface General Hospital, Winnipeg. The number of known HIV infected individuals admitted to this hospital since 1985 is less than 50. Registered nurses providing direct patient care for more than 15 hours per week were defined as bedside nurses. The rationale for selection of bedside nurses was based on the premise that nurses who regularly provide direct patient care would be able to identify the activities that increase their perception of risk of HIV infection.

Procedure to recruit nurses

Once ethical approval was received, permission to approach the nurses was obtained following the access protocol of the nursing research department of St. Boniface Hospital (Appendix J). After receiving access, the investigator met with all the head nurses of the medical and surgical units to explain the study and answer any questions.

On a daily basis (Monday to Friday), the investigator went to selected wards. There were 6 medical and 7 surgical wards. Two to three wards were visited each day. The investigator introduced herself to the nurse in charge of the day and evening shifts and requested permission to approach the nurses working that shift. The charge nurse had the opportunity to request that the investigator return to the ward at a more convenient time. Once permission to recruit nurses on a specific shift had been received, the investigator introduced herself to the staff nurses at the shift change report and invited them to participate in the study. Abstracts of the study were posted on the ward bulletin board and distributed to any nurse that wanted

one (Appendix F). Written consent was obtained prior to giving the questionnaire to participants (Appendix E). The investigator left the questionnaire with the consenting individuals asking them to complete it during the shift. Once the questionnaire was completed the nurses returned the questionnaire in a sealed envelope to a mutually agreed location on the ward. The investigator collected the questionnaires from these locations on a daily basis. This procedure was repeated a minimum of four times per ward to ensure that all full and part time nurses had an opportunity to take part in the study.

## Nurses in the Baccalaureate Program for Registered Nurses

Nurses registered in the Baccalaureate Program for Registered Nurses at the University of Manitoba were also enrolled in the study. In addition to their studies, all were actively practicing nursing, full time or part time, in one of the hospitals in Winnipeg or the surrounding area. Because the BN/RNs were regularly providing direct patient care, they were able to identify the activities that they believed increased their risk of HIV infection.

The information supplied by this group was analyzed separately from the hospital nurses as concerns about HIV infected patients may vary in different nursing populations.

Procedure to Recruit BN/RNs

The BN/RNs were invited to participate in the study at the end of a regular class. Because of the need for anonymity, students were not asked to sign a consent; rather a letter on the front of the questionnaire informed them that completion of the questionnaire represented consent to participate. To ensure that the BN/RNs were not coerced to participate, the class instructor was not involved in the recruitment of nurses.

Those wishing to participate handed in their questionnaires at the end of the class. Neither the class instructor nor the investigator were in the room during the questionnaire collection so that those choosing not to participate could not be identified.

## HIV Experts

Thirty expert subjects were asked to participate. Two criteria were used when deciding "expert" status. The individual had to be either a recognized provider of HIV clinical care in Canada (nurse or physician) or an Infection Control Practitioner actively involved in instructing bedside nurses in the application of universal precaution protocols. All potential participants were approached by mail. This mail-out included a covering letter (Appendix I), a copy of the abstract (Appendix F), a copy of the questionnaire (Appendix D), and a stamped, addressed envelope. As only one of the thirty people approached had not returned the questionnaire at six weeks, no reminder letters were sent out.

## Protection of the Rights of Human Subjects

This research proposal was reviewed by the Nursing Ethical Review Committee, School of Nursing, University of Manitoba, Winnipeg, Manitoba (Appendix Q). All potential study subjects were provided with a verbal

and/or written description of the study (Appendix F). Subjects were informed that they were under no obligation to participate in the study and were free to withdraw at any time. If a subject chose to participate in the study, he or she was asked to sign the consent form (Appendix E) and was given a copy of the study abstract. All subjects were given the opportunity to request a summary of the study results.

The participants were asked to complete a questionnaire (Appendix D). To assure anonymity, the questionnaire had no personal identification information of any kind. Questionnaires and consent forms were separated and stored in a locked cabinet. At no point was an individual questionnaire isolated for analysis.

## Perceived Risk of HIV Infection Questionnaire (Appendix D)

The first part (I) of the questionnaire was to determine the HIV educational and experiential background of each participant. Two questions were included to

determine the participant's knowledge of the documented epidemiological risk of acquiring HIV infection from a needlestick or from a mucus membrane exposure to HIV infected blood or body fluids.

The second (II) and third (III) parts are based on nine nursing activities that involve exposure to blood and body fluids (Appendix B). The nine activities chosen had been identified in previous studies (Grade, Barnof, Ficarrotto, Zegan, & Zeigler, 1989, Blumenfield, Smith, Milazzo, Seropian, & Wormser, 1987) or identified by nurse educators as activities that increase bedside nurses' perceptions of risk while caring for HIV infected patients. A panel of nursing experts reviewed the nine activities to validate that they covered the spectrum of bedside nurses' possible exposures to blood and body fluids. The nursing experts consisted of a clinical nurse specialist working with medical nurses, senior nurses actively practicing medical and surgical nurses and Professors of Nursing involved with students on the medical and surgical wards at St. Boniface General Hospital, Winnipeg.

Part IIA of the questionnaire elicited the frequency with which the participants had performed the nine

nursing activities over the last year. Part IIB documented how often the participants thought that gloves should be worn when performing the nine nursing activities.

In Part III of the questionnaire, the nine nursing activities were presented in unique pairs based on Thurstone's Law of Comparative Judgements (Edward, 1957; Dunn-Rankin, 1983a). A total of 36 comparative judgements were presented. Ross's method of optimal orders (Ross, 1974) was used to determine the order in which the paired items were presented to the experts and the nurses. The development of the third section of the questionnaire is detailed in Appendix C.

The questionnaires were color coded to indicate the participants group: blue, medical nurses; white, surgical nurses; yellow, BN/RNs; and green, experts. The questionnaire took 15 minutes to complete.

## Analysis

### Analysis of Part I, IIA and IIB

An explanation of any discrepancy in the ranking of activities between the HIV experts and the medical, surgical or BN/RN nurses was sought through examination of the educational and experiential data collected from Part I and IIA of the questionnaire. The information gathered from Part IIB will hopefully form the basis for ongoing research into the application of universal precaution protocols in the workplace.

Part I of the questionnaire explored the individual's level of concern about acquiring HIV from the workplace and the sources of HIV information most frequently employed. Descriptive statistics and the Mann-Whitney U two sample test for non-parametric data were used to identify any differences in the four subject groups. The relationship between the four study groups' level of concern about acquiring HIV infection from the workplace and the estimation of the epidemiological risk of acquiring HIV through a needlestick or mucus membrane expose was determined with Kendall's tau. Finally, the

correlation between each groups' level of concern and their use of educational sources was explored again using the Kendall's tau test statistic.

Part IIA, the frequency of performing each of the nine nursing activities, was described using mean and median descriptive statistics. Any identified differences were tested for statistical significance using the student t-test.

The differences between the groups in the anticipated frequency of wearing gloves, Part 11B, was examined using Mann-Whitney U test statistic.

## Analysis of Part III

### Thurstone's Law of Comparative Judgements - Case V

The analytic methodology chosen to identify the ranking of nursing activities relating to nurses' perceptions of risk of acquiring HIV from the workplace was Case V of Thurstone's Law of Comparative Judgement. The paired comparison data was collected in Part III of the questionnaire when the nine stimuli were judged in every possible combination. The data was complied using

the methodology described in Edwards (1957) and Dunn-Rankin (1983a, 1983b).

Thurstone's law of comparative judgement.

Thurstone (1974) postulated that given a set of n stimuli such as the nine nursing activities, each will possess in varying but unknown degrees some attribute, for example, a sense of riskiness. The only restriction on stimuli is that the subjects be able to rank one item above the other according to some attribute (Dunn-Rankin, 1983a). He assumed that the n stimuli could be ordered along an unknown psychological continuum with respect to the identified attribute. The more any two stimuli are separated on the continuum the more frequently subjects would identify one item as containing more of the attribute under investigation. (Bock & Jones, 1968). In this study the attribute under investigation was perceived riskiness. It is important to note that each of the stimuli may vary with respect to more than one attribute and thus the stimulus order within the continuum will vary depending on the attribute

being measured (Edwards, 1957).

It is assumed that for each stimulus and amongst all subjects, there is a most frequently aroused perception of risk. Thurstone called this the modal discriminal process. For each stimulus, the "perception of risk" will be normally distributed around that stimuli's most frequent or modal response. For any normal distribution the mean, median and mode have exactly the same value. The identification of this mean/modal numerical value forms the scale of the stimulus items.

The full mathematical equation used to express Thurstone's Law is

$$\underline{S}_i - \underline{S}_j = z_{ij} \sqrt{\underline{o}_i^2 + \underline{o}_j^2 - 2\underline{r}_{ij}\underline{o}_i\underline{o}_j}$$

where $\underline{S}_i$ and $\underline{S}_j$ are the mean responses to the stimuli, $z_{ij}$ is the normal deviate equivalent to an empirically determined proportion, $\underline{p}_{ij}$, $\underline{o}$ is the standard deviation around each stimuli and $\underline{r}$ is the correlation between stimuli. This equation states that the normal deviate, $z_{ij}$, is a function of the difference between the mean responses to the stimuli, the standard deviation around the stimuli and the correlation between the stimuli.

In this study of perceptions of risk, there were

nine nursing activities or stimuli. The determination of the scale values describing the ranking of the nine stimuli required the application the Thurstone's Law equation for each of the possible pairs (36). However, these 36 equations had 54 unknowns; nine scale values, nine standard deviations and 36 inter-correlations. Since it was possible to only have nine known values, the $z_{ij}$'s, the solution of the system of 36 equations was impossible (Edwards, 1957).

In order to approximate the solution to this system of equations Case V methodology was chosen in which

$$\sqrt{\underline{o}_i^2 + \underline{o}_j^2 - 2\underline{r}_{ij}\underline{o}_i\underline{o}_j}$$

is assumed to be a constant and is made equal to 1. That is, the Case V approximation requires assumptions of equal dispersion of reactions around each stimulus and uncorrelatedness between judgements of the different items (Dunn-Rankin, 1983a). Based on these assumptions, Case V of the Law of Comparative Judgement then becomes

$$\underline{S}_i - \underline{S}_j = z_{ij}.$$

Case V is the simplest of the various cases Thurstone and other researchers explored. It has been applied successfully to data collected from a number of subjects to determine the ranking of independent stimuli on a

psychological continuum (Bock & Jones, 1968).

## The Scale Value: Determination of the Modal Discriminal Process

The numerical value of the modal discriminal process was determined by finding the mean of all the comparative judgements about a given stimuli.

First, the subjects made all possible comparative judgements about the "n" stimuli. From this, an empirical frequency was counted corresponding to the number of times that each stimulus was judged riskier than the other. For example, the comparative judgements of all the medical nurses between the stimuli i ($\underline{S}_i$) "giving an intramuscular injection to a known HIV infected patient" and stimuli j ($\underline{S}_j$) "taking part in a full code (CPR) on a known HIV infected patient" identified the number of times that each stimulus was judged more risky than the other. Let

$$f_{ij} = i > j$$

where $f_{ij}$ was the frequency of $\underline{i}$ being judged more risk than $\underline{j}$. This frequency was then expressed as a proportion by dividing frequency by the total number of

subjects making the judgement. With N equaling the number of subjects

$$p_{ij} = f_{ij}/N$$

where $p_{ij}$ was the proportion of times that i was judged riskier than j.

The proportion $p_{ij}$ was then expressed as a normal deviate $z_{ij}$ by means of a normal deviate table.

Schematic representation of the paired comparisons

The data collected from Part III of the questionnaire was initially summarized to identify the frequency with which each nursing activity was perceived to be more risky than each of the other nursing activities. A series of frequency, proportion and normal deviate matrices were then developed for each of the subject groups under investigation. All subsequent data manipulation depended on this schematic.

The fundamental appearance of all the matrices was that of nine columns and nine rows. Each of the columns represented one of the nine nursing activities used in the paired comparative judgements as does each of the rows (See figure 1). Each cell entry corresponds to the

number of times that the column item was judged to be riskier than the row item.

A series of three matrices, one for frequencies, one for proportions and one for normal deviates were required to determine the scale of perceived risk for each nursing group. All matrices took the format of the Matrix in Figure 3-1. The experts required an additional matrix which will be discussed later under the heading Incomplete Data Matrix.

The cells on the diagonal of the matrix involve a comparison of each stimulus item with itself. By convention, they were assumed to be equal N/2, half the total number of subjects making the judgements. By convention the diagonal of the frequency matrix is filled in with zeros, and the diagonal of the proportion matrix with 0.50. The normal deviate corresponding to the proportion 0.50 is 0.00 (Edwards, 1957).

Figure 3-1

The Fundamental Matrix

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | | | | | | | | | |
| IV | | | | | | | | | |
| ART | | | | | | | | | |
| IM | | | | | | | | | |
| DRS | | | | | | | | | |
| EME | | | | | | | | | |
| SPT | | | | | | | | | |
| STL | | | | | | | | | |
| URN | | | | | | | | | |

The following code applies:

| | |
|---|---|
| CPR | taking part in a full code (CPR) on a known HIV infected patient. |
| IV | establishing an intravenous infusion on a known HIV infected patient. |
| ART | putting pressure on an arterial line site on a known HIV infected patient. |
| IM | giving an intramuscular injection to a known HIV infected patient. |
| DRS | changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze. |
| EME | holding a kidney basin for a known HIV infected patient when he/she is vomiting. |
| SPT | assisting a known HIV infected patient in the production of a sputum specimen. |
| STL | bathing a known HIV infected patient who is incontinent of stool. |
| URN | emptying a urinary catheter drainage bag for a known HIV infected patient. |

Complete data matrices: Medical, Surgical and BN/RN Nurses

To determine the scale values of the nine stimuli, the mean of the column values of the normal deviate matrix were determined. Each scale value (column mean) was the standard deviation from the mean of all the scale values. Since the origin of the perceived risk psychological continuum was arbitrary, the scale value with the lowest value was made the zero or origin value. This allowed for comparison between scales. It is important to note that the addition of new items to this scale would not alter the values of the nine stimuli already in the scale (Bock & Jones, 1968).

Incomplete data matrix: Experts

Edwards (1957) stated that most researchers, where the number of subjects in each group is less than 200, prefer to ignore comparative judgements where $p_{ij}$ is greater than 0.98 and less than 0.02 because the extreme values have been shown to be less reliable. When a

proportional cell entry was near 1.00 it could be stated with confidence that the column stimuli ($\underline{S}_i$) for this particular judgement was definitely judged more risky than the row stimuli ($\underline{S}_j$). However, the scale separation between $\underline{S}_i$ and $\underline{S}_j$ for this entry can not be determined because the z value corresponding to 1.00 $p_{ij}$ was indeterminate.

The proportion matrix for the Expert subject group had a number of cell entries that were greater than 0.98 and less than 0.02. The extreme p values were ignored when the z matrix was developed. Thus, there were missing cell entries and an incomplete data method for determining the scale values was used.

Initially, the frequency and proportion matrices were determined, similar to the complete data method. Next, the proportion matrix was rearranged so that the sum of the columns was ordered from largest to the smallest sum. A corresponding normal deviate matrix was developed, ignoring those cells where the proportion was greater than 0.98 and less than 0.02.

Then, using the general formula

$$z_{2j} - z_{1j} = \underline{S}_2 - \underline{S}_1$$

where the z cell entries in the column on the left ($z_{2j}$)

were subtracted from the cell entries in the column on the right ($z_{1j}$), a matrix of column differences was developed. This matrix was called the successive difference matrix. The columns of the successive difference matrix were summed and the mean value of each column determined.

Finally, the scale value of each stimulus was determined. First, the proportion matrix was reviewed and the stimulus item with the lowest column sum was identified. The lowest mean value from the normal deviate difference matrix became the scale value for this stimulus item. For example, as URN had the lowest column sum from the proportional matrix, the scale value of URN became the value of the lowest mean value from the normal deviate difference matrix. The remaining eight scale values are determined by cumulatively adding the column means of the normal deviate difference matrix. The stimulus relating to each scale value followed the reverse order of the proportion matrix (from smallest to largest column sum). (Appendix M)

The incomplete data method gives the scale values in terms of the separations between adjacent stimuli. The method used for complete data gives the scale values

expressed in terms of the stimuli's deviations from the mean of all the scale values. Edwards (1957) stated that the same relative scale would result if the complete data matrices were analyzed using the incomplete method.

Comparison within scales

It was then necessary to determine if the position on the scale of each of the nine scale values was unique.

Using the proportion matrices, the difference between each column item and the column item of the stimulus urine was determined and placed in matrix format. The urine stimuli was chosen as the focus because it had the lowest scale value for all four subject groups. The end result was an eight column, nine row matrix entitled Scale Difference Matrix for each group. Since the urine stimuli subtracted from itself would of course be zero, there were only 8 columns rather than the usual nine. (Appendix P).

The columns headings were altered to allow clarity when discussing the results. For example, CPR became UCPR. The eight columns became the sample values used

in the application of the student t-test to determine if the distance on the scale from the URN value to any other stimulus scale value was significantly different from the distance from URN to any of the neighbouring stimulus scale values.

The nine nursing activities were then segregated by the significant findings into smaller clusters identified as maximum perceived risk, moderate perceived risk, lower perceived risk, and minimum perceived risk.

Comparison between scales

According to Edwards (1957), if the data from the complete matrices (BN/RNs, medical and surgical nurses) where treated in the same manner as the incomplete data matrix, the same relative scale as that derived from the "complete data" analysis would result. Thus, the position of the scale value for each nursing activity can be compared between all groups.

The four scales were compared to each other using the Scale Difference matrix described under Comparison Within Scales. The student t-test was applied to determine the probability of any differences.

## Internal Consistency

### Estimated Proportions: A Measure of the Goodness of Fit

To determine if the assumptions for Case V analysis were met it was necessary to check the observed scale values for internal consistency with estimated proportions. Mosteller (1951) proposed a chi-squire test of the goodness of fit of the entire matrix of proportions. The actual steps for the chi-square test for internal consistency were described by Guilford (1954). This test determines how closely the empirical proportions agree with those that were expected. If the assumptions of Case V were met, than the discrepancies between the empirical and expected could be attributed to sampling error.

First, a theroretical, Z' matrix was developed of the theoretical normal deviates. The theoretical normal deviates were identified using the empirical normal deviate scale values and making all possible subtraction of pairs. It was only necessary to construct half the matrix (ignoring the diagonal cells) as the upper and

lower halves were identical except for sign.

Second, from the Z' matrix a corresponding P' matrix was developed using the same normal deviate tables used in the development of the empirical normal deviate matrix.

Next, both the empirical ($p_{ij}$) and theoretical (P') proportion matrices were transformed into theta matrices ($\underline{\theta}$ and $\underline{\theta}'$). Theta is the angle whose sine is /p. This is done using arcsine tables.

Finally, the chi-square formula

$$x^2 = N/821 \sum (\underline{\theta} - \underline{\theta}')^2$$

was applied, where N is the number of subjects making the judgements. The interpretation of a chi square value is always dependent on the degrees of freedom. In this instance

$$df = (n - 1)(n - 2) / 2$$

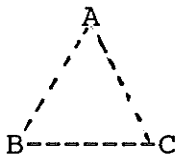
where n equaled the number of stimuli (9).

Internal Judge consistency (Circular Triads)

Inconsistences in an individual subject's comparative judgements may have occurred through disinterest, lack of a distinguishable difference between

stimuli, or a general personality or ability trait (Edwards, 1974; Dunn-Rankin, 1983b). This can effect the assessment of the internal consistency of the questionnaire.

For example, if a subject was presented with all possible pairs of any three stimuli; A, B, and C; it would be expected that if A was judged to be riskier than B and B riskier than C, then A would be judged riskier than C. A circular triad occurs whenever A is judged riskier than B; B riskier than C; and C riskier than A.




Judge inconsistency was identified by computing the number of circular triads present in the results of each subject. The student t test was then applied to determine the overall consistency of the judges in each group was similar.

The number of circular triads was determined by looking at each subjects' responses within the schematics of another matrix. Again the columns and rows are identified by the nine stimuli. Each time a column stimulus is judged riskier than a row stimulus a "1" is

entered into the matrix cell. When the row stimulus is judged riskier than the column a "0" is entered into the cell. The number of circular triads is then determined by

$$d = (1/12)(n)(n - 1)(2n - 1) - 1/2\Sigma a^2$$

where $n$ is the number of stimuli and $a^2$ is the squared sum of all the column stimuli. Dunn-Rankin (1983b) identified that for nine stimuli, the maximum number of circular triads that can occur is 30 or $n^3 - n /24$, where $n$ equals the number of stimuli.

The coefficient of consistence, zeta, is defined as

$$\text{zeta} = 1 - (24d/n^3 - n) \text{ when n is odd.}$$

If a subject was totally inconsistent, zeta would equal 0; if he or she was totally consistent then zeta would equal 1.

## Agreement Between Judges: Homogeneity and Kendall's Coefficient of Agreement

Coombs, Dawes and Tversky (1970) suggested that the larger the scale range the more homogeneity amongst the judges concerning the attribute under study. The range

of the group scales were compared to identify the existence of a difference in the homogeneity towards the perception of risk of acquiring HIV infection from the nine nursing activities.

Edwards (1974) suggested that even though individual judges may demonstrate few circular triads (coefficient of consistence near one), they may not agree amongst themselves. Dunn-Rankin (1983b) described a statistic, u, the coefficient of agreement, developed by Kendall in 1948. This statistic provided a means of determining the degree of agreement between judges. This was applied to the judgements of all four subject groups.

First T must be defined.

$$T = (\leqslant f_{ij}^2 - m\leqslant f_{ij}) + (mC_2)(nC_2)$$

where $\leqslant f_{ij}^2$ = the sum of the squared fij entries below the diagonal of the frequency matrix

$m$ = the number of subjects

$\leqslant f_{ij}$ = the sum of the $f_{ij}$ entries below the diagonal

$mC_2$ = the number of combinations of m judges taken 2 at a time or m(m - 1)/2

$nC_2$ = the number of combinations of n

stimuli taken 2 at a time or n(n - 1)/2

Kendall's coefficient of agreement can then be defined as

$$u = (2T/(mC_2)(nC_2)) - 1$$

If u takes any positive value whatsoever there is a certain amount of agreement among the judges; maximum u is 1, minimum u is -1.

The chi-square test for the coefficient of agreement is

$$x^2 = (4/m - 2)(T - (1/2(mC_2)(nC_2)(m - 3)/(n - 2)).$$

The degrees of freedom are

$$df = (nC_2)\ (m(m - 1)/(m - 2)^2).$$

## Summary

This chapter has outlined the methods used in conducting a study into bedside nurses' perceptions of risk of acquiring HIV infection from the workplace. The study design was based on Thurstone's Law of Comparative Judgement. The Case V Methodology of Thurstone's Law of Comparative Judgement formed the basis of the analysis.

CHAPTER V

# RESULTS

The results of this descriptive study are presented in a manner that is intended to illustrate the analytic process used by the researcher to interpret the data. In addition, this description will aid in decisions about future directions for development of a research program.

First, the characteristics of the four subject groups are described in terms of their similarities and differences. Next, the four scales of the nine nursing activities are presented as they were derived from the statistical manipulation of the matrices. Third, the within and between scale differences for all four groups are characterized with emphasis on similarities and differences. Finally, the tests for internal consistency are presented.

Overall, the results of this study suggest that bedside nurses can rank order nursing activities according to the perceived risk of HIV infection when caring for HIV infected patients. In addition, bedside nurses' perceived risk of HIV infection from the workplace is significantly different from HIV experts.

## Sample Characteristics

### Sample Size

Three groups of nurses were approached in the spring of 1990, to participate in this study; medical nurses and surgical nurses from St. Boniface General Hospital, Winnipeg; and students in the baccalaureate program for registered nurses at the University of Manitoba, Winnipeg. Two hundred and sixty-two nurses volunteered to take part in the study. However, it was necessary to exclude from the scale analysis any of the respondents who failed to complete all 36 comparative judgements found in Part III of the questionnaire (see Table 4-1).

One hundred and ninety-seven nurses (80%) from the medical and surgical nursing staff at St. Boniface General Hospital elected to participate in the study over the six week data collection period in February and March, 1990, with 168 (68.3 per cent of all the medical and surgical nurses) returning questionnaires. Twenty-three of the 29 questionnaires not returned were given out on a Friday but not collected until the following

Monday. The investigator believes that the length of time between distribution and collection allowed questionnaires to be misplaced or forgotten. However, this belief cannot be substantiated. After checking the 168 returned questionnaires for completion of Part III, 154 (62.6%) questionnaires were retained for scale analysis. Of the 14 questionnaires that were discarded because of incompleteness, 9 stated somewhere on the questionnaire that they did not believe there was a true choice between some of the paired nursing activities.

Eighty-four students in the baccalaureate program for registered nurses volunteered to take part in the study. Eighty of these indicated that they were actively practicing at the bedside. Seventy-seven handed in completed questionnaires. BN/RN nurses that were also working at St. Boniface General Hospital on one of the 13 wards involved in the study were asked to participate in the medical or surgical nurses' groups rather than the BN/RN group.

No attempt was made to determine if the non-participants systematically differed from the participants. It might be hypothesized that the non-respondents from St. Boniface General Hospital may not

have been working on the units during the four to five days the investigator was present and recruiting. They may also have felt their work day was too busy to try and complete the 15 minute questionnaire. The 4 BN/RN non-respondents may have already completed a questionnaire at their place of work or they may not have been in attendance in the three classes which the investigator attended to recruit participants. Others may not have been interested in exploring the effects of the HIV epidemic on their nursing practice.

The expert group consisted of thirty nurses and physicians either clinically involved with HIV patients or actively involved in teaching bedside nurses about HIV or universal precaution protocols. Twenty eight experts returned completed questionnaires. One of the non-respondents returned the questionnaire with a comment explaining that he was not actively involved in HIV care or HIV education at this time and thus did not feel qualified to act as an expert in a study of this nature. The characteristics of the other non-respondent were unknown.

## Experience Caring for HIV Infected Patients

The majority of individuals in all four groups had some experience caring for HIV infected patients. However, 35 (45.5%) of the BN/RN's, 37 (47.4%) of the surgical nurses and 18 (22.8%) of the medical nurses had not cared for any known HIV infected patient. Unexpectedly, three of the expert group had not cared for any HIV patients (see Table 4-2). Although it can not be proven, it is assumed that these three experts were infection control practitioners whose HIV expertise was derived from their focus on teaching HIV and universal precaution protocols to nursing staff.

As was expected, the experts had cared for significantly more HIV infected patients than had any of the three nursing groups. Sixty-one (77.4%) of the medical nurses cared for more than four HIV infected patients, with nine (11.4%) having cared for ten or more HIV infected persons. While 42 (54.8%) of the BN/RN nurses and 41 (52.6%) of the surgical nurses had cared for more than four patients, only seven students and one surgical nurse had cared for more than ten HIV patients.

Medical nurses had emptied significantly more

Table 4-1

Number of Subjects Participating in the Study

| Group | Number of Responses | Completed Questionnaires | Working > 15hr / wk |
|---|---|---|---|
| Medical Nurses | 86 (64.0%) | 77 (57.5%) | 77 |
| Surgical Nurses | 82 (73.2%) | 77 (68.5%) | 77 |
| BN/RN Nurses | 94 (100%) | 80 (85.1%) | 77 |
| Experts | 28 (93.3%) | 26 (87.7%) | n/a |
| (n/a–not applicable) | | | |

Table 4-2

Number of HIV Patients Cared For in the Past 12 Months

| GROUP | None | 1–4 | 5–9 | 10 + |
|---|---|---|---|---|
| Medical Nurses | 18 (22.8%) | 41 (51.9%) | 11 (13.9%) | 9 (11.4%) |
| Surgical Nurses | 37 (47.4%) | 35 (44.9%) | 5 (6.4%) | 1 (1.3%) |
| BN/RN Nurses | 35 (45.5%) | 31 (40.3%) | 4 (5.4%) | 7 (9.1%) |
| Experts | 3 (10.7%) | 3 (10.7%) | 1 (3.6%) | 21 (75.0%) |

urinary catheter bags ($p < 0.01$) and bathed more HIV infected incontinent patients than had the experts, BN/RNs or surgical nurses ($p < 0.01$). (see Table 4-3). The experts on the other hand had taken part in more cardio-pulmonary resuscitation efforts (codes) and had held more arterial line sites than had any of the nurses. Both the experts and the medical nurses had performed the other five nursing activities significantly more often than had the surgical or student nurses ($p < .01$)

## Concern About Acquiring HIV Infection

When compared to any of the three nursing groups, the experts were significantly less concerned about acquiring HIV infection from the work place ($p < 0.0001$) (Table 4-4). However, there were no significant differences between any of the groups when asked how often they thought about their risk of acquiring HIV infection from the workplace.

Table 4-3

Frequency of Performing Nursing Activities

| Nursing Activities | Mean Number of Times Nursing Activity Performed | | | |
|---|---|---|---|---|
| | Medical Nurses | Surgical Nurses | BN/RN Nurses | Experts |
| CPR | 0.080 | 0.05 | 0.116 | 0.75^ |
| ART | 0.480 | 0.25 | 0.168 | 3.14^ |
| IV | 2.09* | 0.62 | 0.844 | 2.71* |
| EME | 2.03* | 0.47 | 0.766 | 2.03* |
| DRS | 1.75* | 0.47 | 0.580 | 2.43* |
| IM | 2.30* | 0.45 | 0.494 | 3.68* |
| STL | 2.63+ | 0.36 | 0.740 | 0.390 |
| URN | 4.1*+ | 0.74 | 1.370 | 0.640 |
| SPT | 1.45* | 0.14 | 0.420 | 1.21* |
| $t > 2.7$ | $p < .01$, * Medical Nurses or Experts > BN/RNs & Surgical Nurses ^ experts > Medical, Surgical & BN/RN Nurses + Medical Nurses > Experts | | | |
| CPR | taking part in a full code (CPR) on a known HIV infected patient. | | | |
| IV | establishing an intravenous infusion on a known HIV infected patient. | | | |
| ART | putting pressure on an arterial line site on a known HIV infected patient. | | | |
| IM | giving an intramuscular injection to a known HIV infected patient. | | | |
| DRS | changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze. | | | |
| EME | holding a kidney basin for a known HIV infected patient when he/she is vomiting. | | | |
| SPT | assisting a known HIV infected patient in the production of a sputum specimen. | | | |
| STL | bathing a known HIV infected patient who is incontinent of stool. | | | |
| URN | emptying a urinary catheter drainage bag for a known HIV infected patient. | | | |

## Sources of HIV Information

The subjects were asked to identify the frequency with which they had used a number of common sources of HIV information within the last year (Table 4-5). Ninety-five per cent (254) of all the subjects had used more than two sources of information in the past year.

Medical nurses attended significantly more hospital inservices than had their surgical counterparts ($p < 0.01$). In comparison, the BN/RN nurses attended more educational programs outside of work, some presumably associated with their present studies ($p < 0.01$). Although not statistically significant, surgical nurses used newspapers, lay magazines, and television as frequently as BN/RN nurses and more frequently than medical nurses as a source of HIV information. Surgical nurses also took advantage of professional HIV information in the form of workshops, inservices and professional journals significantly less frequently than did the other nurses.

Experts attended educational programs both in and out of work significantly more frequently when compared to the total sample of nurses as well as when compared

Table 4–4

Level of Concern

| Group | No to Mild Concern | Moderate to Very Concerned |
|---|---|---|
| Medical Nurses | 33 (37.8%) | 46 (58.2%) |
| Surgical Nurses | 37 (47.5%) | 41 (52.5%) |
| BN/RN Nurses | 34 (44.2%) | 43 (55.8%) |
| Experts | 26 (96.3%) | 1 (3.7%)* |

* $p < 0.0001$
$z = 4.55, 4.35, 4.5$ respectively for Medical, Surgical & BN/RN Nurses

Table 4–5

Number of Individuals Frequently Using Sources of HIV Information

| GROUP | Medical Nurses | Surgical Nurses | BN/RN Nurses | Experts |
|---|---|---|---|---|
| Lay Magazines | 10 (12.8%) | 14 (17.9%) | 15 (19.5%) | 4 (14.3%) |
| Newspapers | 21 (26.6%) | 27 (34.6%) | 29 (37.7%) | 6 (21.4%) |
| Professional Journals (1,2) | 23 (29.1%) | 21 (26.6%) | 38 (49.4%) | 26 (92.8%) |
| Friends & Colleagues | 24 (30.4%) | 24 (30.8%) | 20 (24.7%) | 22 (78.6%) |
| Television | 21 (25.6%) | 27 (34.7%) | 22 (28.6%) | 3 (10.7%) |
| Education Outside Work (1,2) | 3 (3.90%) | 5 (6.6%) | 13 (16.9%) | 10 (35.0%) |
| Education During Work ( 2,3,4) | 18 (23.0%) | 4 (5.0%) | 10 (13.0%) | 11 (39.3%) |

| Significant differences between: | chi square | Significance |
|---|---|---|
| (1) BN/RNs > Med, Surg Nurses | > 9.02 | $p < 0.01$ |
| (2) Nurses < Experts | > 27.66 | $p < 0.004$ |
| (3) Surgical Nurses < All Others | > 10.30 | $p < 0.0001$ |
| (4) Medical > Surgical Nurses | > 8.94 | $p = 0.003$ |

to the medical or BN/RN nurses ($p < 0.01$). Experts sought out friends, colleagues and professional journals on a significantly more frequent basis than did any of the nurses ($p < 0.004$).

Surprisingly, there were no significant correlations between the level of concern about HIV in the workplace and the frequency of use of any of the listed sources of HIV information.

## Knowledge: Epidemiological Risk of HIV Infection

Two knowledge questions were asked in Part I of the questionnaire. All groups were asked to identify the risk of becoming HIV infected after a needlestick or mucus membrane exposure to HIV infected blood or body fluids. The literature states that the epidemiological risk of acquiring HIV infection after a needlestick is less than one per cent and after a mucus membrane exposure, less than one half per cent.

As expected 27 (96.4%) experts stated that the risk of exposure after a needlestick was less than one per cent. However, only 13 (16.4%) medical and 12 (15.6%) surgical nurses correctly identified the epidemiological

risk. The BN/RN nurses had significantly more individuals answering this question correctly ($p < 0.00001$). Conversely, 34 (43.0%) medical nurses, 42 (54.6%) surgical nurses and 22 (28.6%) BN/RN's estimated the risk to be over 25 per cent (see Table 4-6).

The relationship between the estimation of risk and the level of concern about acquiring HIV infection from the workplace was examined using Kendall's tau. No significant correlations were identified. In addition, there was no significant correlation between the estimated needlestick or mucus membrane risk and the source of HIV information frequently used.

Similar results occurred when the participants were asked to estimate the risk of HIV infection following a mucus membrane exposure (see Table 4-7). All of the experts estimated the risk to be less than one per cent while only 29 (36.1%) of the medical nurses and 22 (28.6%) of the surgical nurses answered less than one per cent ($p < 0.0000005$). The BN/RN's had significantly more individuals, 43 (55.9%), choosing the answer of less than one per cent documented in the HIV literature ($p < 0.007$).

Table 4-6

Risk of HIV infection following a needlestick

| Estimated Risk | Medical Nurses | Surgical Nurses | BN/RN Nurses | Experts |
|---|---|---|---|---|
| Less than 1% (1,3) | 13 (16.4%) | 12 (15.6%) | 37 (48.1%) | 27 (96.4%) |
| From 2 to 5% | 12 (15.2%) | 9 (11.7%) | 15 (19.5%) | 1 (3.6%) |
| From 6 to 25% | 18 (25.3%) | 14 (18.2%) | 3 (3.9%) | 0 |
| From 26 to 50% (2) | 11 (13.9%) | 10 (13.0%) | 6 (7.8%) | 0 |
| Over 50% (2) | 23 (29.1%) | 32 (41.6%) | 16 (20.8%) | 0 |

| Significant difference between: | chi square | Significance |
|---|---|---|
| (1) Experts > Each Nurse Group | 27.4 | $p < 0.00001$ |
| (2) Med, Surg Nurses > BN/RNs | 6.77 | $p < 0.04$ |
| (3) Experts & BN/RN > Other Nurses | 78.3 | $p < 0.0000005$ |

Table 4-7

Risk of HIV infection following a mucus membrane exposure

| Estimated Risk | Medical Nurses | Surgical Nurses | BN/RN Nurses | Experts |
|---|---|---|---|---|
| Less than 1/2% (1,3) | 12 (15.2%) | 13 (16.9%) | 26 (33.8%) | 25 (89.3%) |
| From 1/2 to 1% | 17 (21.5%) | 9 (11.7%) | 17 (22.1%) | 3 (10.7%) |
| From 2 to 5% | 11 (13.9%) | 10 (13.0%) | 17 (22.1%) | 0 |
| From 6 to 25% | 13 (15.2%) | 13 (16.9%) | 6 (7.80%) | 0 |
| From 26 to 50% (2) | 12 (15.2%) | 17 (22.1%) | 8 (10.4%) | 0 |
| Over 50% (2) | 15 (19.0%) | 15 (19.0%) | 3 (3.90%) | 0 |

| Significant difference between: | chi square | Significance |
|---|---|---|
| (1) BN/RNs > Other Nurses | 9.84 | $p = 0.007$ |
| (2) BN/RNs ≤ other Nurses | 14.2 | $p = 0.0008$ |
| (3) Nurses < Experts | 63.8 | $p < 0.0000005$ |

## Choice to Wear Gloves

Figures 4-1 to 4-9 show the frequency with which the participants would choose to wear gloves when performing the nine nursing activities. The nursing groups were remarkably similar in their estimation of when they would or would not wear gloves. Except for one instance where surgical nurses would choose not to wear gloves when obtaining a sputum specimen, the vast majority of nurses would usually or always wear gloves when performing any of the nine nursing activities.

In sharp contrast, the majority of experts would never or seldom choose to wear gloves to obtain a sputum specimen (85.7%), give an intramuscular injection (71.4%), or empty a urinary catheter bag (64.3%). The experts appear to be more divided on when to wear gloves when establishing an intravenous infusion or when contact with stool, emesis, or drainage from a dressing is expected. Although not as unified as the nurses, the majority of experts would choose to wear gloves when taking part in cardio-pulmonary resuscitation (82.1%) or when putting pressure on an arterial line site of an HIV infected patient (82.1%).

FIGURE 4-1

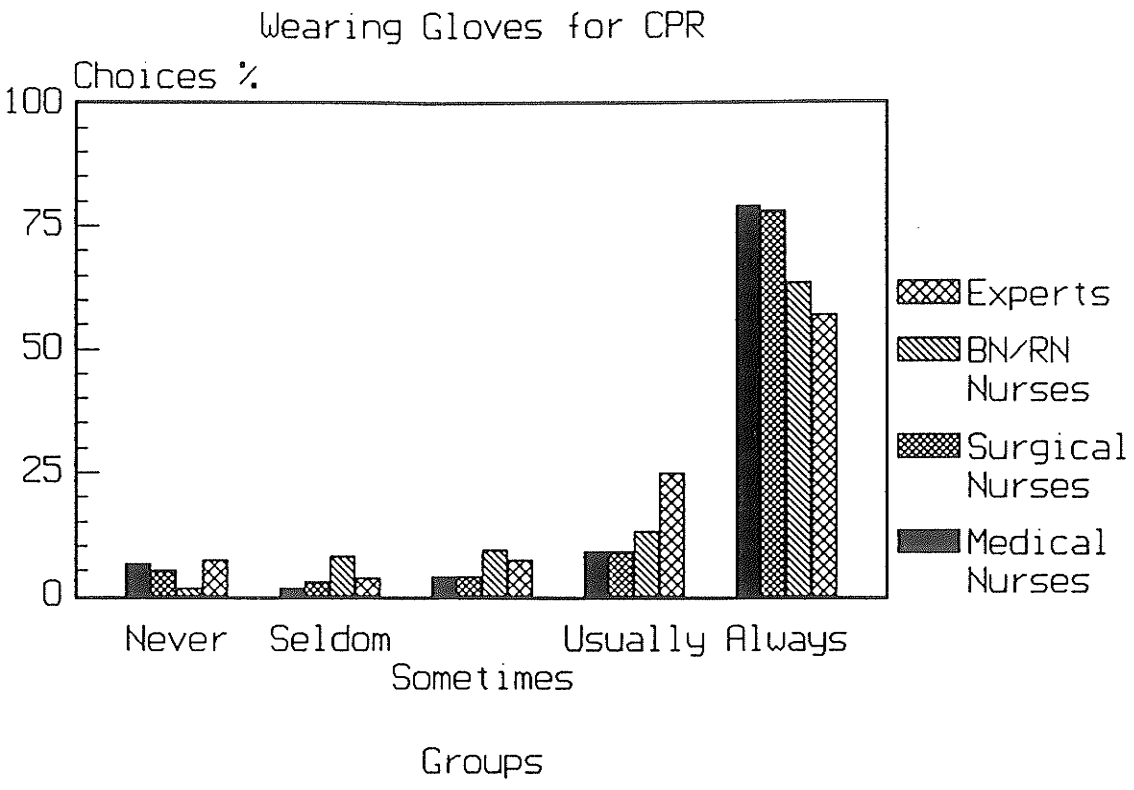



FIGURE 4-2

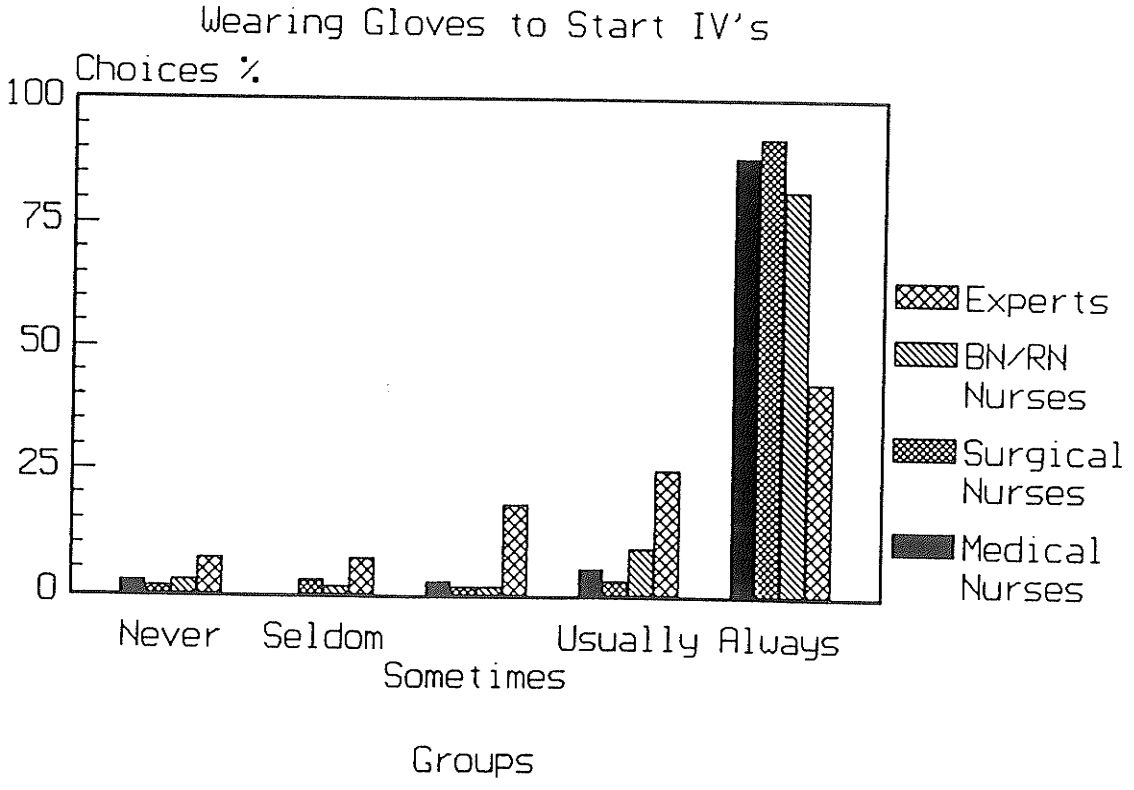


FIGURE 4-3

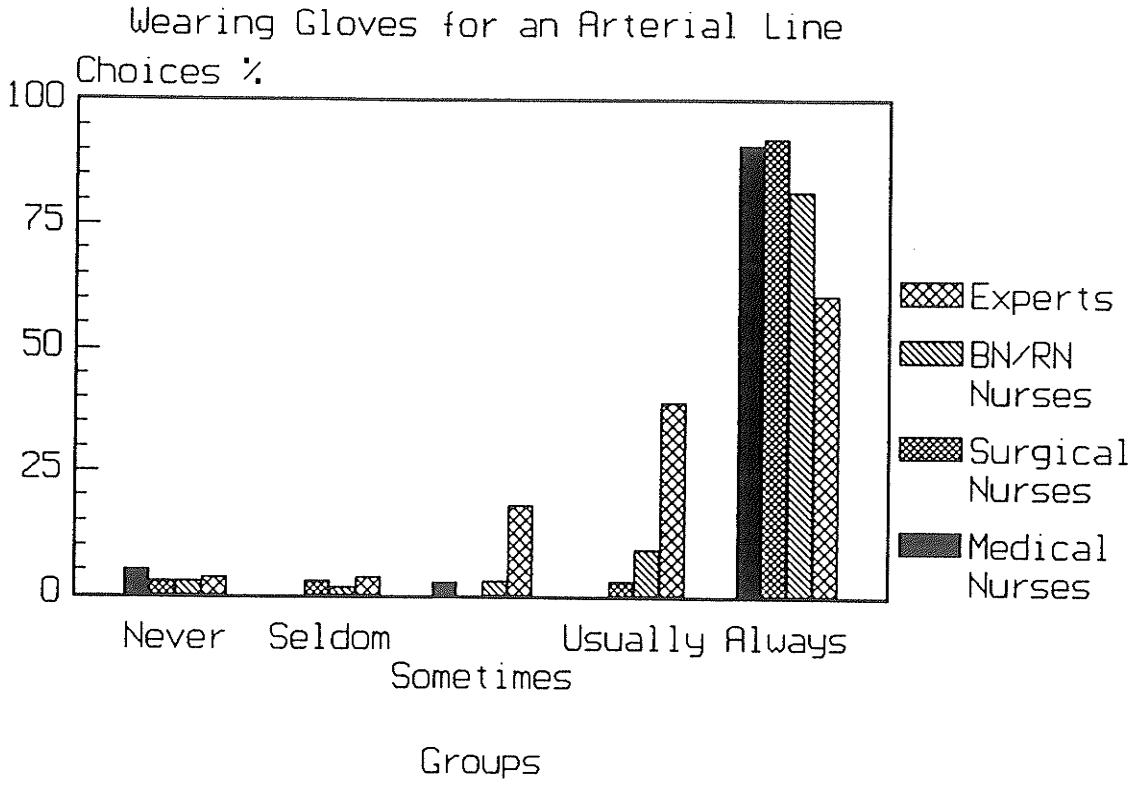



FIGURE4-4

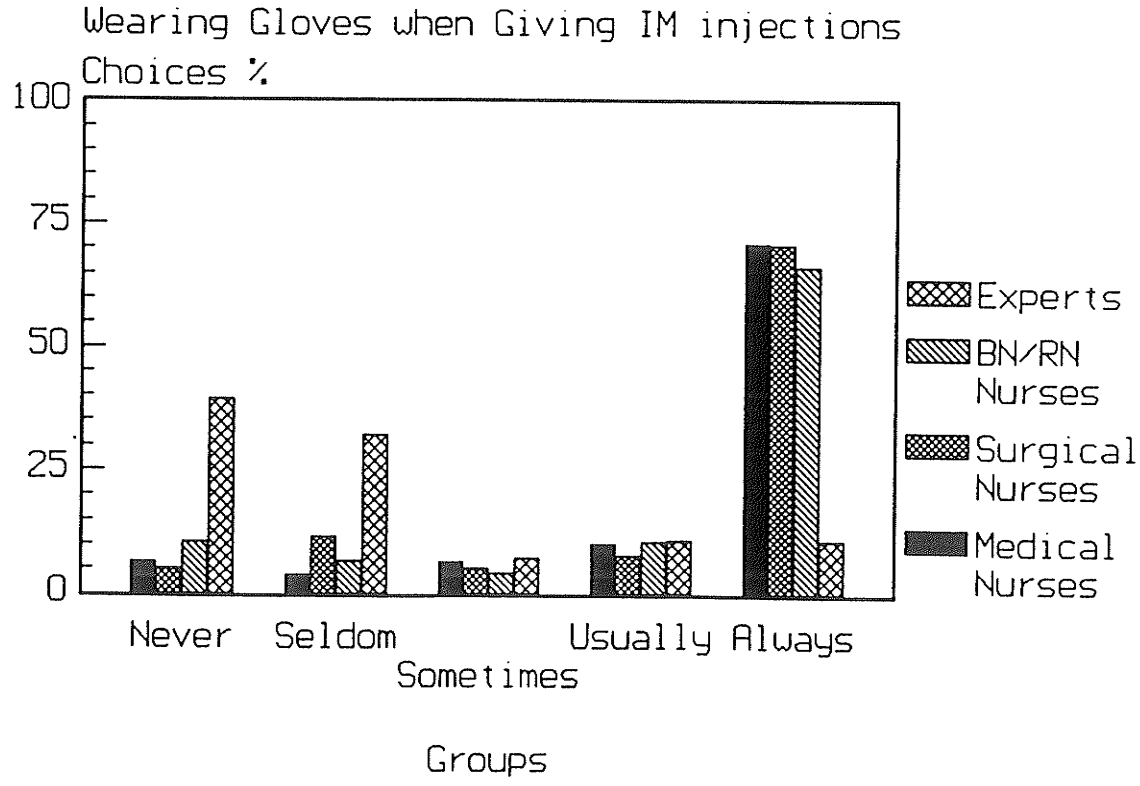


FIGURE 4-5

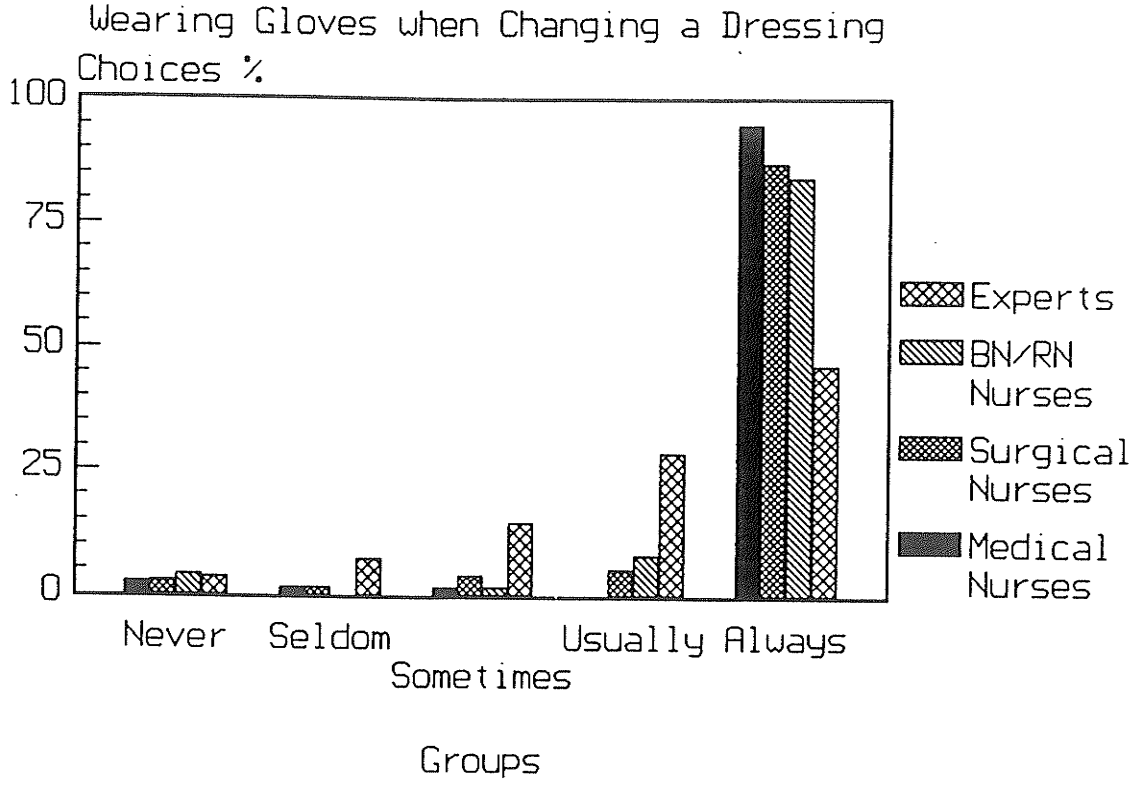



FIGURE 4-6

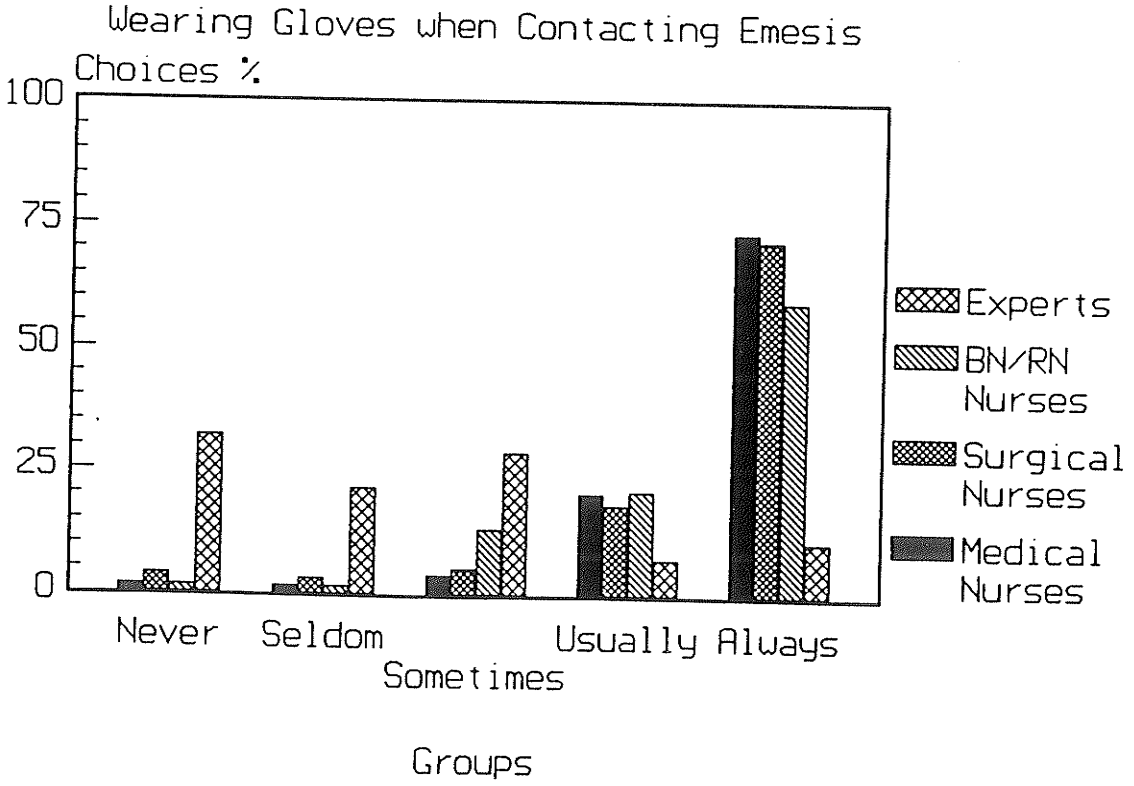


FIGURE 4-7

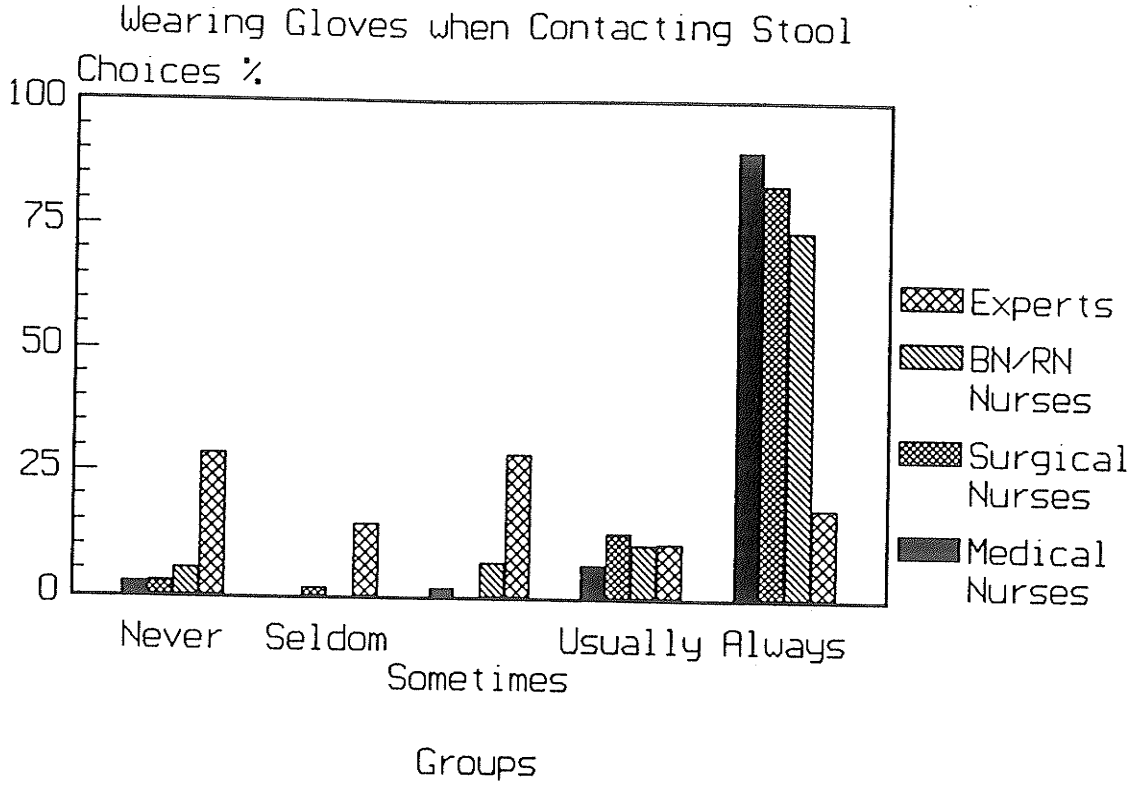



FIGURE 4-8

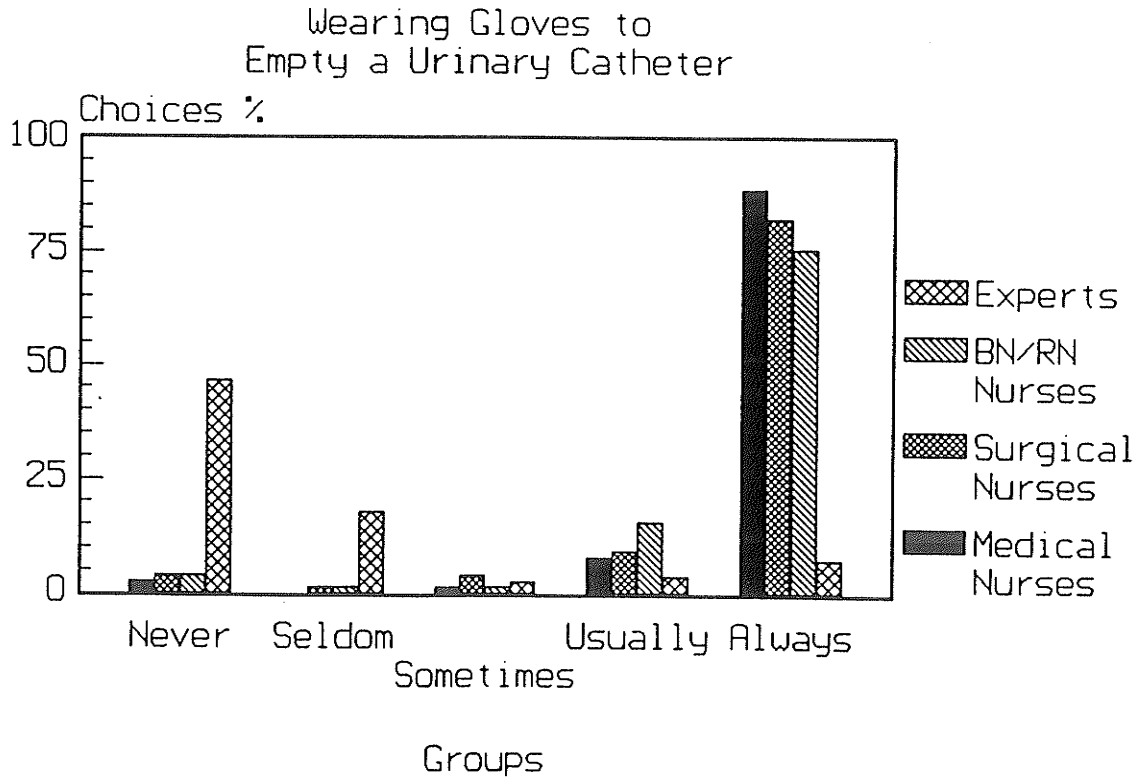
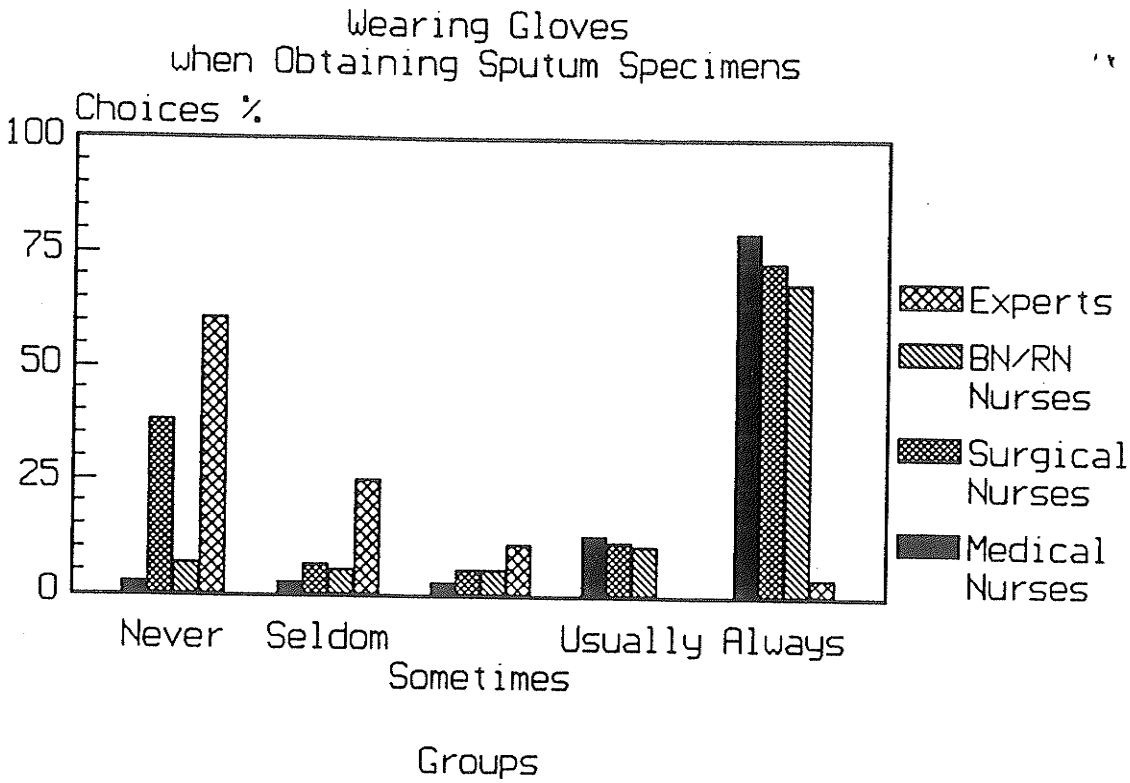


FIGURE 4-9


Wearing Gloves
when Obtaining Sputum Specimens
Choices %
100
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25
0
Never
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Sometimes
Usually
Always
Groups
Experts
BN/RN Nurses
Surgical Nurses
Medical Nurses

## The Scales

The frequency, proportion and normal deviate matrices for each of the nursing groups can be seen in Appendix L. The last row on each of the normal deviate matrices, identified as mean, contains the relative scale values for each of the nine nursing activities. As the zero value of all Thurstone scales was arbitrary, the column mean with the smallest value, URN, was then made equal to zero and the rest of the scale adjusted accordingly. The final scale values for each of the nursing groups is found in Table 4-8.

The development of the expert scale required additional steps because a number of the data cell entries in the expert proportional matrix were greater than 0.98 or less than 0.02. Appendix M shows the frequency, proportion, normal deviate, and successive difference matrix necessary for the development of the expert scale. The final manipulation to create the expert scale from the mean values can be found on the last line of the successive differences matrix (Appendix N). As the Urine item has the lowest scale value, it is

assigned the arbitrary zero value, and 2.894 (scale value for Experts Urine item) is subtracted from each value to form the zero based scale. The final scale values for the experts perception of the risk of acquiring HIV infection from the workplace can be seen on Table 4-8.

Table 4-9 shows the rank ordering of the nine nursing activities based on the scale values. The ordering by all three groups of nurses was remarkably similar. Only two discrepancies were evident, taking part in a code and putting pressure on an arterial line site were inverted on the medical nurse scale and stool and sputum were inverted on the BN/RN nurses scale.

All four groups judged taking part in a code, establishing an intravenous and putting pressure on an arterial line site as involving the greatest risk. However, the rank order varied. The experts believed that taking part in a code involved the greatest risk, followed by establishing an intravenous and putting pressure on an arterial line site. All three nursing groups felt that establishing an intravenous involved the greatest risk. The fourth and fifth items, changing a dressing and giving an intramuscular injection, were inverted on the experts scale compared to the choice of

all three nursing groups. The remaining four items emesis, stool, sputum and urine were similar across the four scales.

Figures 4-10 shows the four scales in graphic form.

Figure 4-10

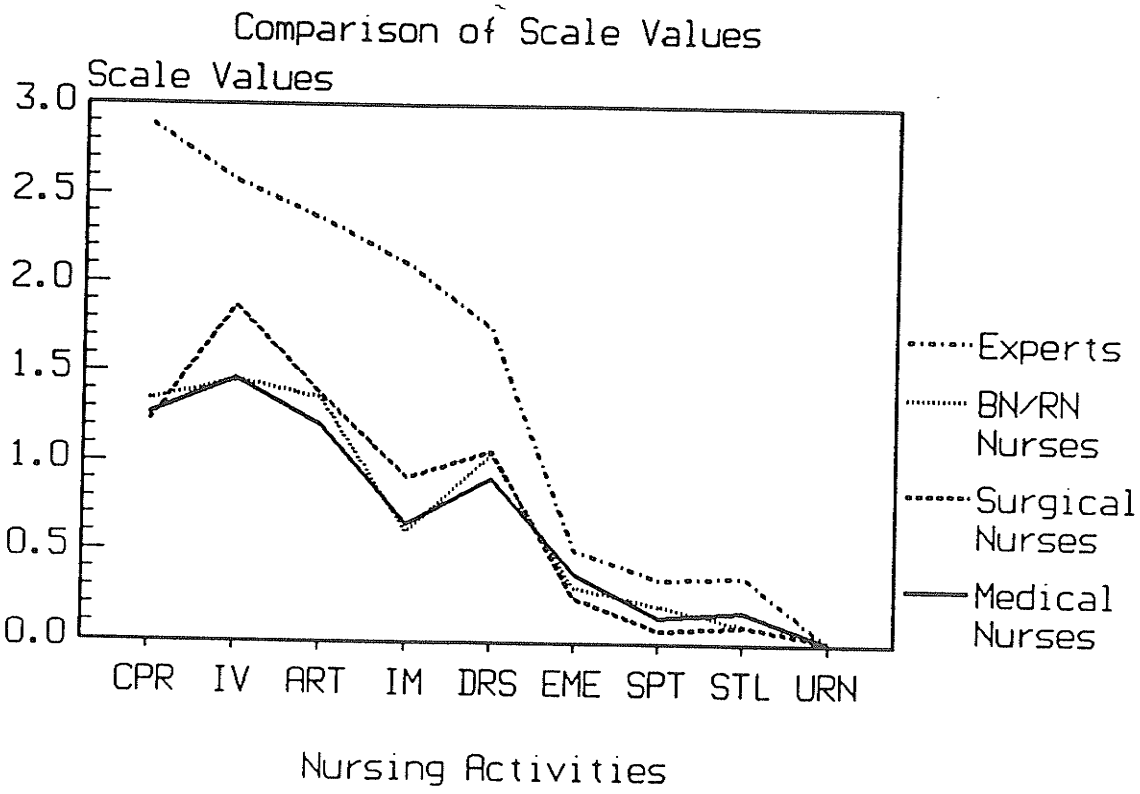

Table 4-8

Scales representing the Perceived Risk of Acquiring HIV

| Group | Scale Values | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
| Medical Nurses | 1.27 | 1.47 | 1.21 | 0.65 | 0.91 | 0.38 | 0.13 | 0.17 | 0.0 |
| Surgical Nurses | 1.23 | 1.87 | 1.38 | 0.92 | 1.07 | 0.24 | 0.06 | 0.09 | 0.0 |
| BN/RN Nurses | 1.35 | 1.46 | 1.36 | 0.61 | 1.05 | 0.30 | 0.20 | 0.09 | 0.0 |
| Experts | 2.89 | 2.57 | 2.36 | 2.11 | 1.75 | 0.51 | 0.35 | 0.37 | 0.0 |

| | |
|---|---|
| CPR | taking part in a full code (CPR) on a known HIV infected patient. |
| IV | establishing an intravenous infusion on a known HIV infected patient. |
| ART | putting pressure on an arterial line site on a known HIV infected patient. |
| IM | giving an intramuscular injection to a known HIV infected patient. |
| DRS | changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze. |
| EME | holding a kidney basin for a known HIV infected patient when he/she is vomiting. |
| SPT | assisting a known HIV infected patient in the production of a sputum specimen. |
| STL | bathing a known HIV infected patient who is incontinent of stool. |
| URN | emptying a urinary catheter drainage bag for a known HIV infected patient. |

Table 4-9

Rank Order of the Nine Nursing Activities
from Maximum to Miniumum Perceived Risk

| Groups | Nursing Activities (max) | | | | | | | | (min) |
|---|---|---|---|---|---|---|---|---|---|
| Medical Nurses | IV | CPR | ART | DRS | IM | EME | STL | SPT | URN |
| Surgical Nurses | IV | ART | CPR | DRS | IM | EME | STL | SPT | URN |
| BN/RN Nurses | IV | ART | CPR | DRS | IM | EME | SPT | STL | URN |
| Experts | CPR | IV | ART | IM | DRS | EME | STL | SPT | URN |

| | |
|---|---|
| CPR | taking part in a full code (CPR) on a known HIV infected patient. |
| IV | establishing an intravenous infusion on a known HIV infected patient. |
| ART | putting pressure on an arterial line site on a known HIV infected patient. |
| IM | giving an intramuscular injection to a known HIV infected patient. |
| DRS | changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze. |
| EME | holding a kidney basin for a known HIV infected patient when he/she is vomiting. |
| SPT | assisting a known HIV infected patient in the production of a sputum specimen. |
| STL | bathing a known HIV infected patient who is incontinent of stool. |
| URN | emptying a urinary catheter drainage bag for a known HIV infected patient. |

## Within Scale Differences

The significance of the ranking order of the nursing activities must be viewed in terms of the unique and statistically significant positioning of the items within the scale. As a result, it was necessary to determine if the rank ordering and scale values within each scale were uniquely different from each other.

Appendix P show the Scale Difference Matrices for each group. The student t-test was applied to determine if the distance on the scale from urine (URN) to any specific scale value was significantly different than the distance from urine (URN) to any of the neighbouring scale values. This was used to determine if the scale values were significantly different and unique from the surrounding values.

### Medical Nurses

Taking $p < .05$ as the significant cut off value, the scale positions for the medical nurses clustered together in four distinct classes (See Table 4-10 and

Figure 4-11).

1. The scale positions of CPR, IV and ART were not significantly different from each other, while all three were different from the DRS position.
2. The DRS position was not significantly different from the IM position. Both were significantly different from the EME position.
3. The EME position was significantly different from the SPT and STL positions.
4. SPT and STL positions were not significantly different from each other.

The resultant clusters for medical nurses are listed on Table 4-14.

Surgical Nurses

The cut off points between the nine stimuli were also very distinct for the surgical nurses. Taking $p < .05$ as the significant cut off value, the scale positions for the surgical nurses clustered together in four classes (See Table 4-11 and Figure 4-12).

1. The IV scale position was significantly different from any other.

2. The ART and CPR positions were not significantly different from each other but were significantly different from the DRS and IM positions.
3. The DRS and IM positions were not significantly different each other and both were significantly different from the EME, STL, and SPT positions.
4. The EME, SPT, and STL positions were not significantly different from each other.

The resultant clusters for surgical nurses are listed on Table 4-14.

BN/RN Nurses

The cut off points between the nine stimuli were distinct for the BN/RN nurses. Taking $p < .05$ as the significant cut off value, the scale positions for the BN/RN nurses clustered together in four classes (See Table 4-12 and Figure 4-13).

1. The IV, CPR and ART scale positions were significantly different from the DRS position.
2. The DRS position was significantly different from the IM position.

3. The IM position was significantly different from the EME, STL, and SPT positions.
4. The EME, SPT, and STL positions were not significantly different from each other.

The resultant clusters for BN/RN nurses are listed in Table 4-14.

Experts

Unlike the nursing groups, the cut off points between the nine stimuli were not distinct for the experts. The perception of risk of the intramuscular injection item was not significantly from all the items from either above or below it on the scale. Taking $p < .05$ as the significant cut off value, the scale positions for the experts cluster together in four classes (See Table 4-13 and Figure 4-14).

1. The CPR and IV scale positions were not significantly different from each other.
2. The ART and IM positions were significantly different from the highest CPR position but IM position was not different from the IV and ART

positions.

3. The IM position was also not significantly different from the DRS position.
4. The IM and DRS positions were significantly different from the EME, SPT, and STL positions.
5. The EME, SPT, and STL positions were not significantly different from each other.

The resultant clusters for Experts are listed in Table 4-14.

TABLE 4-10

The Probability that Medical Nurses Scale Positions are Uniquely different from the Surrounding Values

| Nursing Activity | Scale Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
| CPR | --- | .128<br>(1.60) | .686<br>(.411) | .0005<br>(4.39) | .01<br>(2.76) | <.0001<br>(7.55) | <.0001<br>(10.1) | <.0001<br>(12.3) |
| IV | | --- | .062<br>(2.01) | .0005<br>(4.36) | <.0001<br>(5.89) | <.0001<br>(9.41) | <.0001<br>(13.4) | <.0001<br>(12.2) |
| ART | | | --- | .03<br>(2.34) | .001<br>(3.98) | <.0001<br>(7.03) | <.0001<br>(10.5) | <.0001<br>(9.49) |
| IM | | | | --- | .097<br>(1.76) | .053<br>(2.09) | .0004<br>(4.44) | .001<br>(3.88) |
| DRS | | | | | --- | .0005<br>(4.33) | <.0001<br>(7.29) | <.0001<br>(6.5) |
| EME | | | | | | --- | .015<br>(2.73) | .054<br>(2.08) |
| SPT | | | | | | | --- | .580<br>(.565) |

*p value out of brackets *student t-test in brackets, ()

| | |
|---|---|
| UCPR | the difference between the URN column and CPR column from z matrix. |
| UIV | the difference between the URN column and IV column from z matrix. |
| UART | the difference between the URN column and ART column from z matrix. |
| UIM | the difference between the URN column and IM column from z matrix. |
| UDRS | the difference between the URN column and DRS column from z matrix. |
| UEME | the difference between the URN column and EME column from z matrix. |
| USPT | the difference between the URN column and SPT column from z matrix. |
| USTL | the difference between the URN column and STL column from z matrix. |

Table 4-11

The Probability that Surgical Nurses' Scale Values
are Uniquely different from the Surrounding Values

| Nursing Activity | Scale Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
| CPR | --- | .0005<br>(4.34) | .452<br>(.771) | .04<br>(2.19) | .531<br>(.638) | <.0001<br>(8.68) | <.0001<br>(9.81) | <.0001<br>(11.6) |
| IV | | --- | .004<br>(3.01) | .0001<br>(5.38) | <.0008<br>(4.14) | <.0001<br>(11.2) | <.0001<br>(12.3) | <.0001<br>(13.8) |
| ART | | | --- | .018<br>(2.63) | .245<br>(1.21) | <.0001<br>(8.38) | <.0001<br>(9.58) | <.0001<br>(10.7) |
| IM | | | | --- | .19<br>(1.35) | .0008<br>(4.11) | .0001<br>(5.41) | .<0001<br>(5.60) |
| DRS | | | | | --- | <.0001<br>(6.0) | <.0001<br>(7.23) | <.0001<br>(7.72) |
| EME | | | | | | --- | .062<br>(2.01) | .094<br>(1.78) |
| SPT | | | | | | | --- | .52<br>(.656) |

*p value out of brackets *student t-test in brackets ()

| | |
|---|---|
| UCPR | the difference between the URN column and CPR column from z matrix. |
| UIV | the difference between the URN column and IV column from z matrix. |
| UART | the difference between the URN column and ART column from a matrix. |
| UIM | the difference between the URN column and IM column from z matrix. |
| UDRS | the difference between the URN column and DRS column from z matrix. |
| UEME | the difference between the URN column and EME column from z matrix. |
| USPT | the difference between the URN column and SPT column from z matrix. |
| USTL | the difference between the URN column and STL column from z matrix. |

Table 4–12

The Probability that BN/RN Nurses Scale Positions
are Uniquely different from the Surrounding Values

| Nursing Activity | Scale Values | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
| CPR | --- | .42<br>(.812) | .97<br>(.004) | .0002<br>(4.87) | .039<br>(2.24) | <.0001<br>(7.73) | <.0001<br>(8.77) | <.0001<br>(9.94) |
| IV | | --- | .453<br>(.769) | <.0001<br>(5.89) | <.005<br>(3.27) | <.0001<br>(9.15) | <.0001<br>(10.4) | <.0001<br>(11.7) |
| ART | | | --- | .0002<br>(4.91) | .036<br>(2.29) | <.0001<br>(7.78) | <.0001<br>(8.82) | <.0001<br>(9.98) |
| IM | | | | --- | .0084<br>(3.0) | <.05<br>(2.07) | .01<br>(2.85) | .0018<br>(3.73) |
| DRS | | | | | --- | <.0001<br>(5.78) | <.0001<br>(6.82) | <.0001<br>(8.0) |
| EME | | | | | | --- | .422<br>(.823) | .09<br>(1.77) |
| SPT | | | | | | | --- | .350<br>(.958) |

*p value out of brackets *student t test in brackets ()

| | |
|---|---|
| UCPR | the difference between the URN column and CPR column from z matrix. |
| UIV | the difference between the URN column and IV column from z matrix. |
| UART | the difference between the URN column and ART column from z matrix. |
| UIM | the difference between the URN column and IM column from z matrix. |
| UDRS | the difference between the URN column and DRS column from z matrix. |
| UEME | the difference between the URN column and EME column from z matrix. |
| USPT | the difference between the URN column and SPT column from z matrix. |
| USTL | the difference between the URN column and STL column from z matrix. |

Table 4-13

The Probability that Expert Scale Positions
are Uniquely different from the Surrounding Values

| Nursing Activity | Scale Values | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
| CPR | --- | .351<br>(.961) | .05<br>(2.12) | .016<br>(2.69) | .0009<br>(4.06) | <.0001<br>(9.49) | <.0001<br>(9.43) | <.0001<br>(11.5) |
| IV | | --- | .362<br>(.939) | .124<br>(1.62) | .012<br>(2.83) | <.0001<br>(7.33) | <.0001<br>(7.40) | <.0001<br>(8.50) |
| ART | | | --- | .423<br>(.823) | .054<br>(2.07) | <.0001<br>(6.71) | <.0001<br>(6.80) | <.0001<br>(7.91) |
| IM | | | | --- | .270<br>(1.12) | .0001<br>(5.10) | .0001<br>(5.26) | <.0001<br>(5.89) |
| DRS | | | | | --- | .001<br>(3.90) | .0008<br>(4.09) | .0003<br>(4.57) |
| EME | | | | | | --- | .736<br>(.344) | .739<br>(.338) |
| SPT | | | | | | | --- | .955<br>(.006) |

*p value out of brackets *student t test in brackets ()

| | |
|---|---|
| UCPR | the difference between the URN column and CPR column from z matrix. |
| UIV | the difference between the URN column and IV column from z matrix. |
| UART | the difference between the URN column and ART column from z matrix. |
| UIM | the difference between the URN column and IM column from z matrix. |
| UDRS | the difference between the URN column and DRS column from z matrix. |
| UEME | the difference between the URN column and EME column from z matrix. |
| USPT | the difference between the URN column and SPT column from z matrix. |
| USTL | the difference between the URN column and STL column from z matrix. |

Figure 4-11

Probability that Medical Nurses Scale Values

are Significantly Different

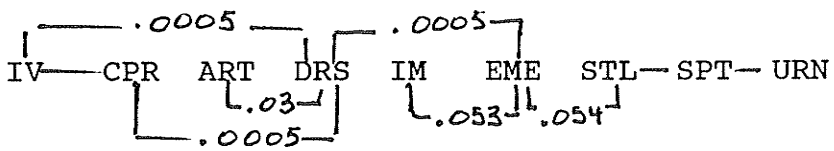


Figure 4-12

Probability that Surgical Nurses Scale Values

are Significantly Different

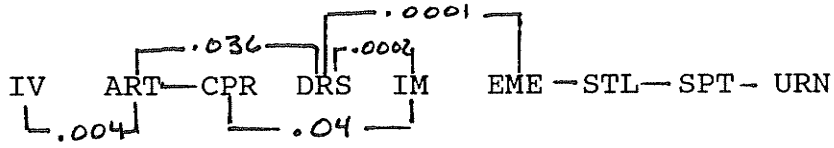

Figure 4-13

Probability that BN/RN Nurses' Scale Values

are Significantly Different

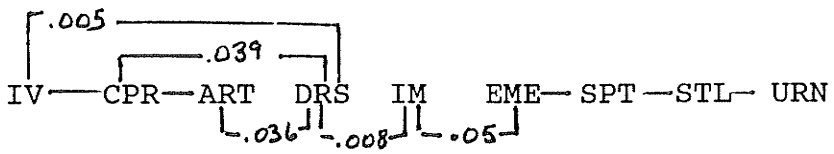


Figure 4-14

Probability that the Experts' Scale Values

are Significantly Different

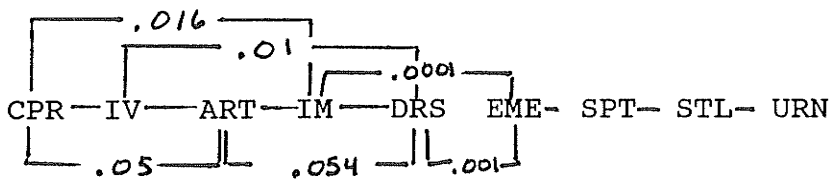

Table 4-14

Clustered Positions of the Scale Items

| Groups | Perceived Maximum Risk | Perceived Moderate Risk | Perceived Lower Risk | Perceived Minimum Risk |
|---|---|---|---|---|
| Medical Nurses | IV<br>CPR<br>ART | DRS<br>IM | EME | STL<br>SPT<br>URN |
| Surgical Nurses | IV | ART<br>CPR | DRS<br>IM | EME<br>STL<br>SPT<br>URN |
| BN/RN Nurses | IV<br>CPR<br>ART | DRS | IM | EME<br>SPT<br>STL<br>URN |
| Experts | CPR<br>IV<br>ART | (IM) | DRS | EME<br>SPT<br>STL<br>URN |

| | |
|---|---|
| CPR | taking part in a full code (CPR) on a known HIV infected patient. |
| IV | establishing an intravenous infusion on a known HIV infected patient. |
| ART | putting pressure on an arterial line site on a known HIV infected patient. |
| IM | giving an intramuscular injection to a known HIV infected patient. |
| DRS | changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze. |
| EME | holding a kidney basin for a known HIV infected patient when he/she is vomiting. |
| SPT | assisting a known HIV infected patient in the production of a sputum specimen. |
| STL | bathing a known HIV infected patient who is incontinent of stool. |
| URN | emptying a urinary catheter drainage bag for a known HIV infected patient. |

## Between Scale Differences

The position of the scale values on the three nursing scales were remarkably similar. The nursing scales did not differ significantly on the scale positions of taking part in a code, the arterial line site, the intramuscular injection, changing a dressing, emesis, stool, sputum or urine. The position of the intravenous scale value differed significantly between the surgical nurses ($x = \bar{}1.84$) and both the BN/RN ($x = \bar{}1.46$, $t = 3.9$, $p = 0.001$) and medical nurses ($x = \bar{}1.47$, $t = 3.81$, $p = 0.052$).

The position of four items on the expert scale differed from all three nursing scales on four items (CPR, IV, ART, and IM) (Appendix O). In addition, experts and the medical nurses differed significantly on the dressing scale position.

The emesis, stool, and sputum scale positions did not differ significantly with their respective counterparts on any of the four scales.

The overall range of the scales differed with the medical and surgical nurses' scales ranging to 1.46 and 1.47 respectively. The BN/RN nurses range was 1.87 and

the experts range was 2.89 (Table 4-8). This suggested that the experts had the greatest degree of homogeneity in their attitudes toward the perception of risk of HIV infection from the nine nursing activities.

Another measure of homogeneity used was Kendall's coefficient of Agreement (Table 4-15). All groups demonstrated a significant amount of agreement between judges. The closer the value "U" was to 1.00 the closer the judges were to complete agreement about the choices they made when choosing between the pairs. The judgements of the 26 experts were very similar throughout 36 paired comparisons. While the nurses did not display the same strong similarity of choice, it must be remembered that if U takes on any positive value there is a certain amount of agreement between the judges in that group (see Appendix O for between scale differences by scale item).

## Internal Consistency

### Estimated Proportions: A Measure of the Goodness of Fit

Table 4-16 shows the results of Mosteller's test

for Internal consistency. The p values of less than 0.01 suggest that the scale is not internally consistent for the medical nurses and the experts. The matrices used to derive the chi square values were examined to see if the reason for the lack of consistency might relate to any one stimuli or nursing activity. The intravenous item contributed to the largest portion of the discrepancies in both cases. If the item "establishing an intravenous" is removed, both the expert and the medical scale are consistent ( $p > 0.01$). This suggests that the data collected from the medical nurses and experts for the intravenous item were inconsistent with the Case V methodology, either by unequal dispersion of reactions around the intravenous stimulus or a lack of independence between establishing an intravenous and another item (Dunn-Rankin, 1983a). Because the inconsistency involves only one item the resultant scale remains reliable, however, conclusions about the intravenous item should be drawn with caution.

## Internal Judge Consistency (Circular Triads)

Circular triads describe the internal consistency

Table 4-15

Agreement between Judges

| Groups | "U" | Chi Square | Degrees of Freedom | Z Score | Significance |
|---|---|---|---|---|---|
| Medical Nurses | 0.272 | 801 | 37 | 31 | $p < 0.001$ |
| Surgical Nurses | 0.363 | 1057 | 37 | 37 | $p < 0.001$ |
| BN/RN Nurses | 0.303 | 890 | 37 | 34 | $p < 0.001$ |
| Experts | 0.709 | 732 | 41 | 29 | $p < 0.001$ |
| "U" | Kendall's coeficient of agreement | | | | |

Table 4-16

Mostellier's test for Internal consistency

| Groups | Chi Square | Degrees of Freedom | Significance |
|---|---|---|---|
| Medical Nurses | 54 | 28 | $p < 0.01$ |
| Surgical Nurses | 36 | 28 | $p = 0.25$ |
| BN/RN Nurses | 39 | 28 | $p = 0.15$ |
| Experts | 67 | 28 | $p < 0.01$ |
| Medical Nurses (IV item removed) | 38.4 | 26 | $p = 0.06$ |
| Experts (IV item removed) | 42.9 | 26 | $p = 0.052$ |

Table 4-17

Mean Number of Circular Triads

| Group | Mean per Group | Number of Subjects with > 5 Triads |
|---|---|---|
| Medical Nurses | 2.823 | 18 (23.4%) |
| Surgical Nurses | 2.333 | 9 (11.7%) |
| BN/RN Nurses | 2.281 | 14 (18.2%) |
| Experts | 0.837 | 0 |

of the individual judges. The maximum number circular triads for a set of nine stimuli is 30. Table 4-17 shows the average number of circular triads within each group. Experts had significantly fewer circular triads than the nursing groups ($t=2.29-2.39$, $p<=.02$), thus demonstrating more consistency in their individual judgements.

## Summary

The characteristics of the nurses and experts participating in this study were described using parametric and non-parametric tests. The three nursing groups were very similar; the experts differed significantly from the nurses on level of concern, knowledge of the epidemiological risk from needlestick and mucus membrane exposure, sources of HIV information, and choices of when to wear gloves.

The paired comparison data set was analyzed using Case V Methodology of Thurstone's Law of Comparative Judgement and found four scales ranking the nine nursing activities according to the perception of risk of HIV infection. Results demonstrated that nursing activities can be ranked in terms of a perception of risk. The rank order and the scale values of taking part in a code,

establishing an intravenous infusion, putting pressure on an arterial line site, giving an intramuscular injection, changing a dressing, and holding a kidney basin differed between the experts and all the nurses. Within scale tests for item uniqueness demonstrated a clustering of nursing activities so that four classes of risk emerged: maximum, moderate, lower and minimum perceived risk. It is important to note however, that the intramuscular injection item in the moderate class of the expert group is not as distinct as all other classifications.

The final chapter of this thesis discusses the differences between the scales in the light of the characteristics of the participants, the literature, and the Fear of Contagion conceptual framework.

CHAPTER VI

# DISCUSSION AND IMPLICATIONS

This study has expanded nursing knowledge about the fear nurses have when caring for HIV infected patients. It explored nurses' perceptions of risk of acquiring HIV infection from specific nursing activities. The results of this study suggest that the perception of risk of acquiring HIV infection from HIV infected patients is hierarchical in relation to specific nursing activities involving exposure to HIV infected blood and body fluids.

This chapter will examine the scale ranking and clustering of nursing activities and identify implications for administrators, educators and researchers concerning the nursing care of HIV infected patients.

## Ranking the Nine Nursing Items

The most important findings of this study were the four scales ranking the perception of risk of acquiring HIV infection from nine nursing activities that involved exposure to HIV infected blood and body fluids. The

scales provide insight into nurses' perceptions of the relative risk of each of the nine nursing activities in relation to each other. It is possible that there were other nursing activities that nurses believed involved a greater risk than those evaluated by this study. The validity of the present scales would not be affected however, as the scale positions of the items would not change if another item was added, or if any were removed.

Twelve studies presented in the literature review discussed nurses' fear of HIV infection in terms of a global concept of "providing nursing care to HIV patients". This all encompassing classification is far too simple when examining nurses' fears within the HIV epidemic. While a number of studies have examined the fear from the perspective of homophobia or from the perspective of the application of universal precaution protocols, no studies to date have examined nurses' fears by breaking down the concept of "providing nursing care to HIV patients" into specific activities. This study demonstrated that nurses were able to rank nursing activities that involved exposure to HIV infected blood and body fluids, in an hierarchical order.

The study also illustrated that nurses' responses

to caring for HIV infected patients are not irrational and non-scientific. By breaking the fear of providing care to HIV patients into fear associated with specific nursing activities, the concerns of nurses were delineated. Educators, administrators and researchers can now respond with specific, focused policies that address those nursing activities that nurses have identified as increasing their risk. This type of focused response will be more effective in ensuring quality care for HIV infected persons.

## Experience

Striking differences were identified between the experts' scale and those of the three nursing groups. The experts' scale spanned a much larger range than did any of the nurses' scales. The greater range indicated a more homogenous set of responses, implying, that as a group, the experts were more confident of their choices (Bock & Jones, 1968). Potentially, the experts had a much firmer grasp and a greater trust of and/or familiarity with the epidemiological literature which suggested that in the health care setting blood was the

only identified agent of transmission, especially when associated with a needle stick or other percutaneous exposure.

Overall, the experts had cared for significantly more HIV infected patients than had any of the nurses. The literature suggested that health care workers that had more experience caring for people with AIDS or HIV infection had less fear of acquiring HIV from the workplace (Andre, 1987). It would follow then that those with the most experience would have a homogenous set of responses and thus a greater scale range about the nursing activities that increased the risk of HIV exposure. While potentially explaining the experts' scale range, the relationship between scale range and experience did not follow through with the medical nurses. Even though the medical nurses had cared for more HIV infected patients than had the surgical or BN/RN nurses, all nursing scale ranges were similar. It is interesting to note that even in the area of the scale representing those nursing activities that the medical nurses had performed more frequently, (emesis, stool, urine) the range from urine to emesis was similar between all four groups.

## Epidemiology and Risk Evaluation

Another important finding was the difference in the rank order and clustering of the items on the four scales. If the epidemiological literature was used as a major source of information about the risk of HIV infection from the health care setting, nursing activities involving the use of sharp instruments would rank the highest on the scales. Nurses and experts, cognizant and accepting of these findings would judge taking part in a code, establishing an intravenous and giving an intramuscular injection as involving the greatest risk of HIV exposure.

The most striking divergence from the epidemiological literature was the ranking of the intramuscular injection item. Even though percutaneous exposure via used intramuscular needles was the most frequent source of HIV exposure documented in the literature, none of the groups placed intramuscular injections in the maximum risk cluster. The experts judged that giving an intramuscular injection was significantly less risky than taking part in a code,

establishing an intravenous, or putting pressure on an arterial line site. The nurses all ranked giving an intramuscular injection as less risky than changing a dressing. The clustering of activities revealed that surgical and BN/RN nurses ranked giving intramuscular injections as the median item on the scale, significantly less risky than the items in the maximum and moderate risk clusters and significantly more risky than the items in the minimum risk cluster (see Table 4-14).

An explanation for the positioning of the intramuscular injection may be found in the risk literature. Slovic and colleagues (1987) suggested that in general, risks from common events were frequently underestimated. Jagger, in her presentation at the 1990 Sixth International Conference on AIDS, suggested that nurses were so familiar with giving intramuscular injections that most failed to consider such a common event hazardous. She also queried why nurses were not clamouring for efficient, effective, protective needle and syringe equipment. The low ranking of the intramuscular injection item suggested that nurses may not see the need for protection from used needles and syringes.

It is obvious that, even for the experts, epidemiological evidence was also not the sole factor in evaluating the risk of the items which did not involve exposure to sharps. Blood contact with mucus membranes was documented in five cases of occupational HIV transmission, although most epidemiologists suggested that the risk of transmission via this route was far less than that caused by inoculation with a sharp object. Only two cases of occupational transmission have been tentatively linked to contact with emesis, stool, sputum or urine (Grant & McEvoy, 1985; Zeigler, Cooper, Johnson, & Gold, 1985). Scientists have suggested that the amount of HIV virus present in these body fluids is so small that huge volumes would have to be ingested before an infectious dose was reached. The nurses and experts who applied this information would have ranked the risk from putting pressure on an arterial line and changing a dressing lower than activities involving exposure to sharp instruments. As well, emesis, stool, sputum, and urine would be ranked as low as possible.

Contrary to the literature, all four groups ranked putting pressure on an arterial line site as posing a significantly greater risk than giving an intramuscular

injection. Although not statistically significant, the experts were the only group to rank intramuscular injections as riskier than changing a dressing. Medical nurses rated emesis as significantly riskier than stool, sputum or urine in contrast to the other three groups.

The differences in the ranking of the intravenous item must be examined in the light of the results of the tests for internal consistency. Surgical nurses judged establishing an intravenous as the most risky nursing activity, with taking part in a code and putting pressure on an arterial line as significantly less risky. The experts, and medical and BN/RN nurses judged establishing an intravenous, taking part in a code, and putting pressure on an arterial line site as all involving the maximum risk. While these differences are interesting, it must be remembered that the intravenous item was identified as the item responsible for the inconsistency in the scale values of medical nurses and experts. It is possible that the wording of the IV activity implied different ideas to the different groups. For example, establishing intravenous infusions holds the potential needlestick exposure as well as the potential for skin exposure to large amounts of blood. In addition, taking

part in a full code would certainly involve establishing an intravenous infusion, perhaps making it difficult to compare risks between these two items.

## Conceptual Framework: Fear of Contagion

The Fear of Contagion conceptual framework aided in the interpretation of the four scales (Appendix 1). The ability of the nurses and experts to rank order the nursing activities supported the concept that caring for HIV infected patients involved a perceived risk of acquiring HIV infection. If there was no perception of risk, all items would have been clustered together with no identifiable scale.

The ability to rank order the nursing activities lent support to Meisenhelder and LaCharite's (1989a) contention that the "stimuli" for Fear of Contagion was the possibility or actuality of caring for an HIV infected patient. The framework also suggested that responses to HIV in the workplace involved the interaction of qualitative and quantitative factors. The existence of hierarchical scales, that were different from the one that might be proposed solely based on

epidemiological research, suggested that the position of the scale items were determined in part by qualitative factors.

The implications from the neurocognitive activity involving the "fear of the uncontrollable" suggested that those activities which held a greater potential for unpredicted blood or body fluid exposure would be perceived as involving more risk. Taking part in a code, establishing an intravenous, or putting pressure on an arterial line, and even holding an emesis basin often call for quick responses in uncontrollable situations. This may explain the medical nurses' rating of exposure to emesis as significantly riskier than exposure to stool, sputum, or urine.

Gloves provide extra protection for nursing activities that did not involve sharp instruments such as, changing a dressing, bathing a patient incontinent of stools or obtaining a sputum or urine specimen. These items may have been viewed as more controllable and thus less risky.

The neurocognitive activity of "fear of the misunderstood or unknown" may have influenced choices as well. Fear of the misunderstood may have increased or

decreased the participants' perception of risk. The volume of published research into HIV infection, over the past ten years, has been extraordinary. However, with such exponential growth has came much confusing, partial, and sometimes contradictory information, both in the lay literature as well as the professional journals. Moriarity (1988) found that the majority of respondents did not believe that enough was known about HIV to state conclusively that certain body fluids did not pose a high risk of HIV infection. Comments written on the Perceived Risk of HIV Questionnaire suggested that some of the subjects experienced this fear. Two such comments were: "You never know for sure that there is no blood in the stool." or "How do you know for sure that the amounts of HIV in the urine cannot cause infection?".

## Limitations of the Study

### Threats to Validity

Construct validity consisted of determining whether the paired comparison methodology was measuring what it was used to measure. One threat to construct validity

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related to the nine nursing activities chosen for study. It could be argued that since both the United States Center for Disease Control and the Canadian Laboratory Centre for Disease Control have stated that emesis, sputum, stool and urine involve negligible risk of HIV transmission, the inclusion of these items in the questionnaire provided no useful information (Freidland, & Klein, 1987). However, the literature suggested that nurses remain confused about sources of HIV exposure and many do not believe that scientists know enough about HIV transmission to state conclusively that HIV cannot be transmitted by these fluids (Moriarity, 1989). In order to rank order all body fluids that medical and surgical nurses believe involve a risk of acquiring HIV infection, it was necessary to include all body fluids about which nurses have expressed concern. The Within Scale Analysis allowed identification of those items that nurses believed presented minimal risk. However, no attempt was made to determine if the respondents considered any particular item as not involving risk of HIV exposure. Future research of this nature may benefit from a series of questions asking respondents to state explicitly whether or not they believe a given item presents a real

risk of HIV transmission.

Another threat to construct validity related to the focus of the nursing activities involving known HIV infected patients. Since there is no practical way of knowing who is or is not infected it may have been artificial to exclude nursing activities involving patients of unknown HIV serological status from consideration. However, as little is known about specific nursing activities that are associated with the perception of the risk of acquiring HIV infection from patients, it was reasonable to focus initially on one subgroup of patients. An equally valid study would repeat the questionnaire focusing on patients of unknown HIV serological status. A comparison of the scales from such a study with the results of the present study might provide additional insight into the responses nurses have to HIV seropositive patients.

A third threat to construct validity was evaluation apprehension, in which the respondents wanted to appear competent. This threat was decreased in two ways. First, when recruiting participants the researcher stressed that an individual questionnaire would never be singled out for analysis and additionally that no

specific ward would be compared to any other. Second, the anonymous nature of the questionnaire in conjunction with paired comparison format prevented the researcher's bias from effecting the respondents' choices.

Maturation effects and item selection bias presented a threat to internal validity. As the respondents encountered each of the nine items in different combinations a clarification of perception may have developed over the course of making the 36 comparative judgements. The use of Ross's method of "Optimal Orders in paired comparisons" ensured that maximum spacing for the maximum number of items was obtained, thus reducing the occurrence of this threat.

Finally, external validity was threatened as nurses were not randomly selected into the study. As intact groups of medical, surgical and BN/RN nurses were recruited, generalizability of the study was limited. However, because nurses in all three groups displayed a wide range of experience working with HIV infected patients this threat was reduced.

## Implications for Nursing Administrators and Educators

### Risk Education

Nurses are at risk for exposure to HIV because of the nature of their work. Many nurses in this study expressed a high degree of concern about acquiring HIV from caring for HIV infected patients. Interpretation of the scales in this light suggested that the concern varies with the nursing activity. In anticipation of the fear reactions so frequently associated with the admission of HIV infected patients to hospital, St. Boniface General Hospital had conducted many inservices in the two years prior to this study. These included presentation of epidemiological data regarding HIV infection in health care workers, information about HIV transmission, instruction in infection control procedures, as well as the provision of reassurance (Ms. P. Hosang, Director of Medical Nursing, personal communication, 1990).

Nurses' perception of grave risk will only be eliminated if there is proof that the risk was non-

existent. Actual reports of the prevalence of HIV infection among patients and the development of post-exposure protocols for treatment of exposed workers serve to emphasize the reality of the threat (Gilbert, Maguire, Badner, Altman, & Stone, 1989).

The large number of incorrect answers to rating the risk of infection from needlestick and mucus membrane exposures suggested that many nurses in this study had little understanding of the epidemiological risk of transmission or that they did not trust the information they had.

If nurses are to respond optimally to the risk of HIV infection they must have a reasonably accurate perception of the magnitude of the risk. Slovic, Fischhoff and Liechtenstein (1987) suggested that the formal education of most professionals rarely included serious instruction in the assessment of risks. Even experts, unless specifically educated in risk evaluation, have great difficulty in judging probabilities. The following points suggest how risk evaluation might be incorporated into educational programs. First, discussions about the risk of HIV transmission need to include a clear acknowledgement that the risk does exist

and that concern is warranted. In addition, if the term "low risk" is to have any meaning it must have specific referents to the nurses' daily experience.

## Sources of HIV Information

It is important for nursing administrators and educators to become aware of the sources nurses use to gain their information about HIV infection. In 1984, Reed, Wise, and Mann stated that the most frequent source of HIV information was from television. They postulated that the cause was the dearth of HIV information available in the nursing literature. Articles on HIV infection are now present in abundance in the nursing literature, yet nurses in this study still regarded television and the lay literature as a more frequent source of HIV information. Surgical nurses displayed the strongest tendency to use television, lay magazines and newspapers for HIV information.

The reasons why nurses use the lay media more than the experts was not identified in this study. However, it may relate to the trust nurses have in scientific

opinion regarding HIV. The knowledge base for HIV infection is new and rapidly expanding and experts have had to revise their opinions on many points. Over the years the incubation time and percentage of HIV infected people who will get AIDS has risen and the estimation of the occupational risk has been revised downward (Schilts, 1987). Moriarity (1988) found that nurses did not believe experts knew enough about HIV to conclusively state that the risk of HIV infection from patient care was low.

A second reason for the use of lay media may relate to the focus of the data being communicated and the motives behind it. Nurses may have found the answers to their concerns best addressed in the lay media. Until very recently the focus of the HIV literature had been on objective data about HIV transmission or on maintaining continuity of care, often with strong coercive messages for bedside nurses. Personal security has been the focus of much of the HIV reporting in the lay media (Hughey, Norton, & Sullivan-Norton, 1989). Benedict (1990) found that clinical nurses were most concerned about patient care and their personal health and security.

Nursing administrators and educators need to strive to cultivate the credibility of the HIV information communicated to the nursing staff. The accuracy of the information must be continually scrutinized. Every effort must be made to delineate what is known, what is unknown and what is reasonable speculation. Preliminary findings should be reported with extreme caution with appropriate caveats and with inconsistencies acknowledged (Gerbert, Maguire, Badner, Altman, & Stone, 1988).

## Universal Precaution Protocols

Much of the literature discussing universal precaution protocols present universal precautions as the panacea for nurses fear of HIV infection. Nursing educators and others instructing bedside nurses in universal precaution protocols, must be aware that the protocols do not guarantee protection against HIV exposure. Universal precaution protocols are not research based and represent no more than the "best guess" of HIV authorities. As a result many controversies exist about appropriate application (Campbell, B., 1989). The question examining when nurses

and experts would choose to wear gloves in the care of HIV infected patients reflects one of these controversies. The experts did not demonstrate any consensus about wearing gloves when establishing an intravenous, changing a dressing, giving an intramuscular injection, or when potentially contacting stool or emesis. There is also a marked difference between the nurses and experts over the use of gloves in eight of the nine nursing activities. Taking part in a code is the only activity in which the nurses and the experts agree about glove use.

Nursing administrators and educators obviously cannot wait until conclusive research on the efficacy of universal precautions is available before designing protocols to decrease the risk of exposure. The limitations as well as the benefits of universal precautions must be clearly communicated. An awareness of the lack of research on the efficacy of universal precaution protocols must be carefully weighed with the need of bedside nurses to prevent undue exposure to HIV infected blood and body fluids. It is incumbent on all involved with infection control to support careful, exacting research into the efficacy and efficiency of

universal precaution protocols. It is equally important to communicate the results to the bedside nurse.

## Implications for Future Research

The method of paired comparisons could be applied when a researcher wanted subjects to subjectively distinguish between pairs of stimuli (Guilford, 1954; David, 1963). Its use should be considered when attempting to rank order stimuli that have small or unknown differences between them. The method of paired comparison could also serve as the criterion of validity to check other less accurate methods where the results of the other methods were held in question (Guilford, 1954).

### Use of the Devised Scales for Other Research

Edwards (1957) argued that the manner in which an individual responds to the scale items would enable inferences about the person's attitude location on the same psychological continuum. The scales record the judged perception of risk about the nine nursing

activities. They do not say anything about the attitude that nurses associate with the performance of the activities. However, the scale values can be used to obtain estimates of nurses' attitudes about performing the nursing activities.

The nine nursing activity statements would be re-written and presented to medical and surgical nurses with instructions to indicate whether they agree or disagree with the statements. Edwards (1957) assumed that the agree/disagree responses were a function of the attitude associated with the statement. For example, the CPR item might be re-written to read: Taking part in a full code (CPR) on a known HIV infected patient places me at risk of acquiring HIV infection.

Using the scale values derived in this present study, an attitude score for each individual could then be obtained by finding the median of the scale values of the items with which the person agreed. The lower the median value the higher the sense of risk.

## Future HIV Nursing Research

Continued research on the effects of the HIV

epidemic on nursing in Manitoba is important. Nurses are thinking about the effect of HIV on their practice. This can be supported from the present study. First, the rapid recruitment of nurses into the study was indicative of the importance bedside nurses place on understanding HIV from a nursing perspective. One hundred per cent of BN/RNs, 73.2 per cent of surgical nurses and 64 per cent of medical nurses signed consents to participate in the study in the six week recruitment period.

Second, nurses in Manitoba are providing care to HIV infected patients. Even though Manitoba has a low incidence of HIV in the provincial population, and St. Boniface General Hospital has admitted less than 30 individuals that were known to be HIV infected, 64.5 per cent of the St. Boniface General Hospital nurses surveyed had cared for a known HIV infected patient. This may largely be because the average person with AIDS will be admitted 10 times over the course of the illness (Fraser & Cox, 1988).

The initial step in this research program was to identify the nursing activities that are viewed as increasing risk of HIV exposure. A subsequent step will

be to determine if the nine nursing activities form a comprehensive list of activities that are perceived as risky by medical and surgical nurses. Two potential additional items came to light during the course of this investigation; the first involves the necessity of cleaning up a blood spill; and second the provision of terminal care for the body of an HIV infected patient.

A subsequent step in this research program is to explore the application of universal precaution protocols, both in situations that nurses perceive as risky and in those that are not. The data examining glove usage from this study supported the contention that even among experts there was a lack of consensus about appropriate glove use. An even larger discrepancy was identified between the experts and all the nurses on when to wear gloves. If the experts' median responses were taken as the appropriate response to an HIV infected patient, nurses displayed a high incidence of over protective behavioural intentions for all nine nursing activities tested. In other studies exploring the application of universal precautions, there were discrepancies between studies examining behavioural intentions in which nurses display a high incidence of

over protective behaviors and observational studies in which compliance with universal precaution protocols was minimal (Armstrong-Ester & Hewitt, 1989; van servellen, Lewis, & Leake, 1988; Gerberding, et al., 1987; Kelen, DiGiovanna, Kalainov, Bisson, & Scott, 1989; Campbell, S., 1989, 1990; Lowen, Dhillon, Willy, Wesley, & Henderson, 1989).

A study of compliance with universal precaution protocols using both qualitative (non-participant observation) and quantitative (self report survey) is planned to increase the understanding of the efficacy and application of universal precaution protocols.

Other research questions arising from this study include: What is the bedside nurses' perception of risk of HIV infection in a population of patients where the HIV status is unknown; and What additional nursing activities are of concern to nurses in specialty areas?

## Summary

The results of this study suggest that the perception of risk of acquiring HIV infection while caring for an HIV infected individual is hierarchical in

relation to specific nursing activities that involve exposure to HIV infected blood and body fluids. The findings also indicate that bedside nurses' perception of the risk of HIV infection from HIV infected patients is significantly different from Infection Control Practitioners and HIV clinical specialists. The delineation of the nursing activities that bedside nurses believe increase their risk of HIV infection have implications for administrative, educational and research endeavors that address nursing policy and educational needs relevant to the nursing care of HIV infected patients. Future research into the efficacy and application of universal precaution protocols, supported by the findings in this study, will further augment the understanding of the effect of the HIV epidemic on Manitoba nurses.

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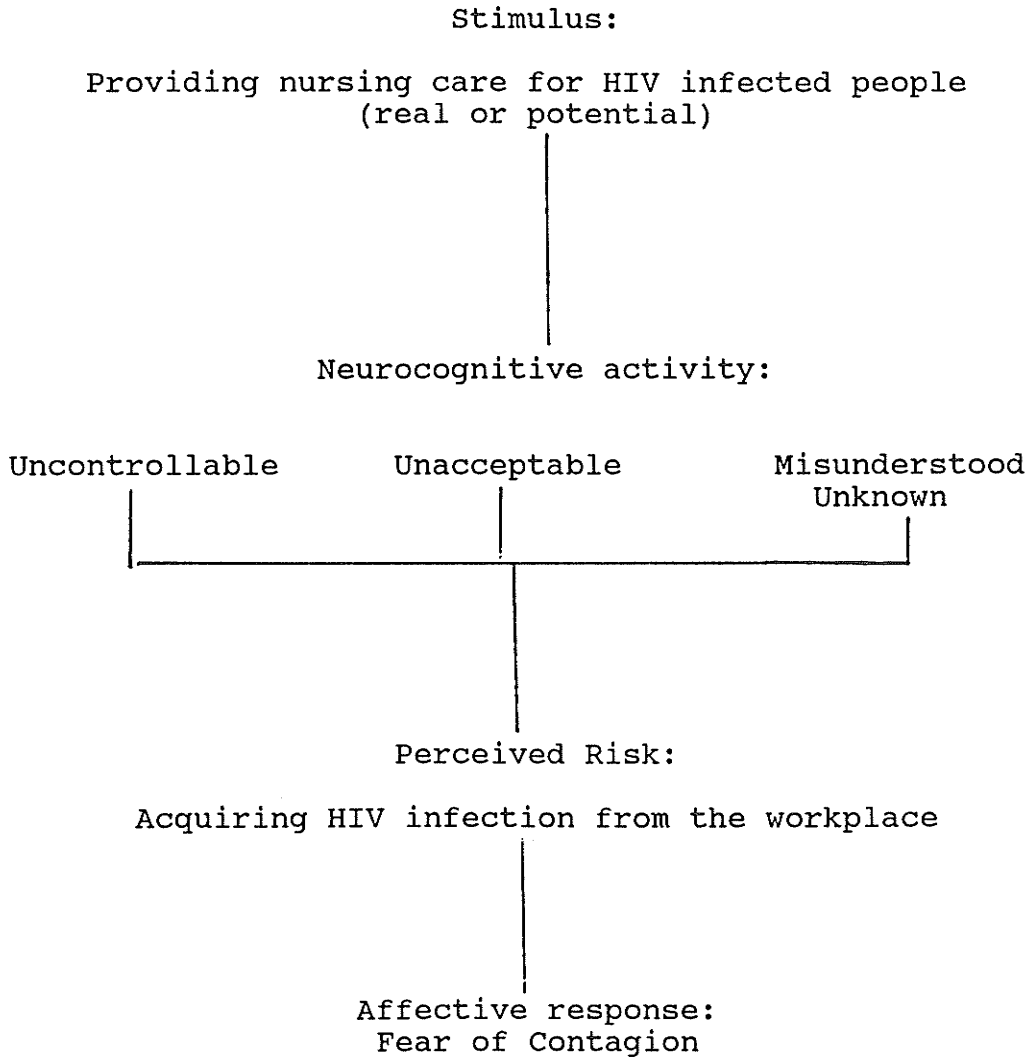
# APPENDICES

# Appendix A

## Fear of Contagion Model



# Appendix B

## Nine Nursing Activities

1. taking part in a full code (CPR) on a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.
3. giving an intramuscular injection to a known HIV infected patient.
4. emptying a urinary catheter drainage bag for a known HIV infected patient.
5. bathing a known HIV infected patient who is incontinent of stool.
6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
8. putting pressure on an arterial line site on a known HIV infected patient.
9. assisting a known HIV infected patient in the production of a sputum specimen.

# Appendix C

## Development of the Perceived Risk of HIV Infection Questionnaire

1. Items for the first section of the questionnaire were taken from a study conducted at St. Paul Ramsey Medical Center in Minnesota. These items have been piloted tested and have a Cronbach's alpha of .78 to.81. (Campbell, 1989)

2. Nursing Activities 1, 2, 3 and 8 listed in Appendix B have been identified in the literature as increasing the relative risk of HIV infection in the health care setting. Items 4, 5, 6, 7 and 9 were identified by bedside nurses and nurse educators as activities with which nurses have frequent contact and that are perceived as increasing a nurses' risk of HIV infection.

3. Ross's Method of Optimal Ordering

With a total of nine items, the total number of possible pairs was 36. The order within the pairs and the overall order of all the pairs was determined using Ross's "Optimal orders in the method of paired comparisons". This method ensured that the maximum

spacing for the maximum number of items was obtained. Whether or not the spacing or ordering makes a difference in the choices of subjects has not been proven. It seems reasonable to assume, however, that the further the items are separated the smaller the chance for a selection bias. A matrix provided the basis for ordering items for presentation.

First all items were numbered, in this case from 1 to 9. As determined by Ross's method, there were 5 rows and 8 columns in the matrix. In the fifth row, the first pair in the first column was an identical pair. Other identical pairs appeared in this row in all the odd numbered columns. The other pairs in the fifth row were repetitions of pairs already found on the matrix. Ross's rules that governed the use of the pairs in the fifth row were as follows: a) The second number in each identical pair was replaced with the number 1. b) The pairs occurring in the even columns of the fifth row were ignored. Finally, the order for presentation was determined by reading down the column and then moving to the right column by column.

The Ross Matrix: The format

| I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|
| 1-2 | 2-3 | 1-3 | 3-4 | 1-4 | 4-5 | 1-5 | 5-6 |
| 3-n | n-4 | 4-2 | 2-5 | 5-3 | 3-6 | 6-4 | 4-7 |
| 4-(n-1) | (n-1)-5 | 5-n | n-6 | 6-2 | 2-7 | 7-3 | 3-8 |
| 5-(n-2) | (n-2)-6 | 6-(n-1) | (n-1)-7 | 7-n | n-8 | 8-2 | 2-9 |
| 6-(n-3) | (n-3)-7 | 7-(n-2) | (n-2)-8 | 8-(n-1) | (n-1)-9 | 9-n | |

The Ross Matrix: Applied

| I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|
| 1-2 | 2-3 | 1-3 | 3-4 | 1-4 | 4-5 | 1-5 | 5-6 |
| 3-9 | 9-4 | 4-2 | 2-5 | 5-3 | 3-6 | 6-4 | 4-7 |
| 4-8 | 8-5 | 5-9 | 9-6 | 6-2 | 2-7 | 7-3 | 3-8 |
| 5-7 | 7-6 | 6-8 | 8-7 | 7-9 | 9-8 | 8-2 | 2-9 |
| 6-1 | | 7-1 | | 8-1 | | 9-1 | |

Order of Items

1. taking part in a full code (CPR) on a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

3. giving an intramuscular injection to a known HIV infected patient.
9. assisting a known HIV infected patient in the production of a sputum specimen.

4. emptying a urinary catheter drainage bag for a known HIV infected patient.
8. putting pressure on an arterial line site on a known HIV infected patient.

5. bathing a known HIV infected patient who is incontinent of stool.
7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
1. taking part in a full code (CPR) on a known HIV infected patient.

2. establishing an intravenous infusion on a known

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
1. taking part in a full code (CPR) on a known HIV infected patient.

2. establishing an intravenous infusion on a known HIV infected patient.
3. giving an intramuscular injection to a known HIV infected patient.

9. assisting a known HIV infected patient in the production of a sputum specimen.
4. emptying a urinary catheter drainage bag for a known HIV infected patient.

8. putting pressure on an arterial line site on a known HIV infected patient.
5. bathing a known HIV infected patient who is incontinent of stool.

7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

1. taking part in a full code (CPR) on a known HIV infected patient.
3. giving an intramuscular injection to a known HIV infected patient.

4. emptying a urinary catheter drainage bag for a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

5. bathing a known HIV infected patient who is incontinent of stool.
9. assisting a known HIV infected patient in the

production of a sputum specimen.

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
8. putting pressure on an arterial line site on a known HIV infected patient.

7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
1. taking part in a full code (CPR) on a known HIV infected patient.

3. giving an intramuscular injection to a known HIV infected patient.
4. emptying a urinary catheter drainage bag for a known HIV infected patient.

2. establishing an intravenous infusion on a known HIV infected patient.
5. bathing a known HIV infected patient who is incontinent of stool.

9. assisting a known HIV infected patient in the production of a sputum specimen.
6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

8. putting pressure on an arterial line site on a known HIV infected patient.
7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

1. taking part in a full code (CPR) on a known HIV infected patient.
4. emptying a urinary catheter drainage bag for a known HIV infected patient.

5. bathing a known HIV infected patient who is incontinent of stool.
3. giving an intramuscular injection to a known HIV infected patient.

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
2. establishing an intravenous infusion on a known HIV infected patient.

7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
9. assisting a known HIV infected patient in the production of a sputum specimen.

8. putting pressure on an arterial line site on a known HIV infected patient.
1. taking part in a full code (CPR) on a known HIV infected patient.

4. emptying a urinary catheter drainage bag for a known HIV infected patient.
5. bathing a known HIV infected patient who is incontinent of stool.

3. giving an intramuscular injection to a known HIV infected patient.
6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

2. establishing an intravenous infusion on a known HIV infected patient.
7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

9. assisting a known HIV infected patient in the production of a sputum specimen.

8. putting pressure on an arterial line site on a known HIV infected patient.

1. taking part in a full code (CPR) on a known HIV infected patient.
5. bathing a known HIV infected patient who is incontinent of stool.

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
4. emptying a urinary catheter drainage bag for a known HIV infected patient.

7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
3. giving an intramuscular injection to a known HIV infected patient.

8. putting pressure on an arterial line site on a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

9. assisting a known HIV infected patient in the production of a sputum specimen.
1. taking part in a full code (CPR) on a known HIV infected patient.

5. bathing a known HIV infected patient who is incontinent of stool.
6. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

4. emptying a urinary catheter drainage bag for a known HIV infected patient.
7. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

3. giving an intramuscular injection to a known HIV infected patient.
8. putting pressure on an arterial line site on a known HIV infected patient.

2. establishing an intravenous infusion on a known HIV infected patient.
9. assisting a known HIV infected patient in the production of a sputum specimen.

# Appendix D

## Perceived Risk of HIV Infection Questionnaire

INSTRUCTIONS: Please read all the questions and answer them as directed in each section. Your response to all the of the questions is very valuable. The survey will take 15 minutes of your time.

I. CHECK ONLY ONE RESPONSE FOR EACH QUESTION.

1) How many HIV infected patients have you worked with?
_____None
_____1-4
_____5-9
_____10 or more

2) My present level of concern about acquiring HIV infection from the workplace is.....
_____No concern
_____Mildly concerned
_____Moderately concerned
_____Very concerned

3) How often do you think about your risk (if any) of catching HIV infection while you are at work?
_____Daily
_____Weekly
_____Monthly
_____Less than monthly
_____Never

4) The chance that a nurse will become infected with HIV after mucous membrane exposure to blood or body fluids from an HIV infected patient is...
_____less than 1/2%
_____1/2 to 1%
_____2 to 5%
_____6 to 10%
_____11 to 25%
_____26 to 50%
_____over 50%

5) The chance that a nurse will become infected with HIV after a needlestick from an HIV infected patient is...
_____less than 1/2%
_____1/2 to 1%
_____2 to 5%
_____6 to 10%
_____11 to 25%
_____26 to 50%
_____over 50%

6) Which of the following sources of HIV information have you used in the past 12 months? CIRCLE A NUMBER BESIDE EACH SOURCE.
Never = 1, Seldom = 2, Occasionally = 3, Frequently = 4, Always = 5

| | | | | | |
|---|---|---|---|---|---|
| ____ Education programs outside of work? | 1 | 2 | 3 | 4 | 5 |
| ____ Education programs during work? | 1 | 2 | 3 | 4 | 5 |
| ____ Lay Magazines (Time, etc) | 1 | 2 | 3 | 4 | 5 |
| ____ Newspapers | 1 | 2 | 3 | 4 | 5 |
| ____ Television | 1 | 2 | 3 | 4 | 5 |
| ____ Professional Journals | 1 | 2 | 3 | 4 | 5 |
| ____ Friends and colleagues | 1 | 2 | 3 | 4 | 5 |

II. A. How often have you.....?

1. participated in a full code (CPR) on a known HIV infected patient?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

2. established an intravenous infusion on a known HIV infected patient?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

3. put pressure on an arterial line site on a known HIV infected patient?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

4. emptied a urinary catheter drainage bag for a known HIV infected patient?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

5. bathed a known HIV infected patient who is incontinent of stool?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

6. held a kidney basin for a known HIV infected patient when he/she is vomiting?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

7. changed a dressing for a known HIV infected patient where the drainage has
seeped through the gauze?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

8. given an intramuscular injection to a known HIV infected patient?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

9. assisted a known HIV infected patient in the production of a sputum specimen?
Never 1 2 3 4 5 6 7 8 9 10 more than 10

II. B. If you have cared for an HIV infected patient in the past, how frequently have you worn gloves when....?

OR

If you have never cared for an HIV infected patient, how frequently would you wear gloves when....?

1. taking part in a full code (CPR) on a known HIV infected patient?
Never___ Seldom___ Sometimes___ Usually___ Always___

2. establishing an intravenous infusion on a known HIV infected patient?
Never___ Seldom___ Sometimes___ Usually___ Always___

3. putting pressure on an arterial line site on a known HIV infected patient?
Never___ Seldom___ Sometimes___ Usually___ Always___

4. emptying a urinary catheter drainage bag for a known HIV infected patient?
Never___ Seldom___ Sometimes___ Usually___ Always___

5. bathing a known HIV infected patient who is incontinent of stool?
Never___ Seldom___ Sometimes___ Usually___ Always___

6. holding a kidney basin for a known HIV infected patient when he/she is vomiting?
Never___ Seldom___ Sometimes___ Usually___ Always___

7. changing a dressing for a known HIV infected patient where the drainage has
seeped through the gauze?
Never___ Seldom___ Sometimes___ Usually___ Always___

8. giving an intramuscular injection to a known HIV infected patient?
Never___ Seldom___ Sometimes___ Usually___ Always___

9. assisting a known HIV infected patient in the production of a sputum specimen?
Never___ Seldom___ Sometimes___ Usually___ Always___

III. From each of the following pairs circle the one that you view as placing you at the most risk of acquiring HIV infection.

1. taking part in a full code (CPR) on a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

1. putting pressure on an arterial line site on a known HIV infected patient.
2. assisting a known HIV infected patient in the production of a sputum specimen.

1. emptying a urinary catheter drainage bag for a known HIV infected patient.
2. giving an intramuscular injection to a known HIV infected patient.

1. bathing a known HIV infected patient who is incontinent of stool.
2. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

1. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
2. taking part in a full code (CPR) on a known HIV infected patient.

1. establishing an intravenous infusion on a known HIV infected patient.
2. putting pressure on an arterial line site on a known HIV infected patient.

1. assisting a known HIV infected patient in the production of a sputum specimen.
2. emptying a urinary catheter drainage bag for a known HIV infected patient.

1. giving an intramuscular injection to a known HIV infected patient.
2. bathing a known HIV infected patient who is incontinent of stool.

1. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
2. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

1. taking part in a full code (CPR) on a known HIV infected patient.
2. putting pressure on an arterial line site on a known HIV infected patient.

1. emptying a urinary catheter drainage bag for a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

1. bathing a known HIV infected patient who is incontinent of stool.
2. assisting a known HIV infected patient in the production of a sputum specimen.

1. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
2. giving an intramuscular injection to a known HIV infected patient.

1. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
2. taking part in a full code (CPR) on a known HIV infected patient.

1. putting pressure on an arterial line site on a known HIV infected patient.
2. emptying a urinary catheter drainage bag for a known HIV infected patient.

1. establishing an intravenous infusion on a known HIV infected patient.
2. bathing a known HIV infected patient who is incontinent of stool.

1. assisting a known HIV infected patient in the production of a sputum specimen.
2. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

1. giving an intramuscular injection to a known HIV infected patient.
2. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

1. taking part in a full code (CPR) on a known HIV infected patient.
2. emptying a urinary catheter drainage bag for a known HIV infected patient.

1. bathing a known HIV infected patient who is incontinent of stool.
2. putting pressure on an arterial line site on a known HIV infected patient.

1. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
2. establishing an intravenous infusion on a known HIV infected patient.

1. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
2. assisting a known HIV infected patient in the production of a sputum specimen.

1. giving an intramuscular injection to a known HIV infected patient.
2. taking part in a full code (CPR) on a known HIV infected patient.

1. emptying a urinary catheter drainage bag for a known HIV infected patient.
2. bathing a known HIV infected patient who is incontinent of stool.

1. putting pressure on an arterial line site on a known HIV infected patient.
2. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

1. establishing an intravenous infusion on a known HIV infected patient.
2. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

1. assisting a known HIV infected patient in the production of a sputum specimen.
2. giving an intramuscular injection to a known HIV infected patient.

1. taking part in a full code (CPR) on a known HIV infected patient.
2. bathing a known HIV infected patient who is incontinent of stool.

1. holding a kidney basin for a known HIV infected patient when he/she is vomiting.
2. emptying a urinary catheter drainage bag for a known HIV infected patient.

1. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.
2. putting pressure on an arterial line site on a known HIV infected patient.

1. giving an intramuscular injection to a known HIV infected patient.
2. establishing an intravenous infusion on a known HIV infected patient.

1. assisting a known HIV infected patient in the production of a sputum specimen.
2. taking part in a full code (CPR) on a known HIV infected patient.

1. bathing a known HIV infected patient who is incontinent of stool.
2. holding a kidney basin for a known HIV infected patient when he/she is vomiting.

1. emptying a urinary catheter drainage bag for a known HIV infected patient.
2. changing a dressing for a known HIV infected patient where the drainage has seeped through the gauze.

1. putting pressure on an arterial line site on a known HIV infected patient.
2. giving an intramuscular injection to a known HIV infected patient.

1. establishing an intravenous infusion on a known HIV infected patient.
2. assisting a known HIV infected patient in the production of a sputum specimen.

# Appendix E

## Consent Form

You are invited to participate in a research study of nurses' perceptions of the risk of acquiring HIV infection from a patient with HIV infection. Shirley Paton, a graduate student in nursing, University of Manitoba, is conducting this research study as the basis for her thesis. Dr. Lesley Degner is the thesis supervisor. From this study we hope to learn more about the nursing activities that nurses feel place them at risk of acquiring HIV infection. The results of this study will be useful in identifying and providing relevant HIV and AIDS information for nurses. Nurses who work on the medical and surgical units at St. Boniface General Hospital and 20 HIV experts will be asked to participate in this study.

If you decide to participate, you will be asked to complete a questionnaire designed to evaluate your view of the risks of caring for an HIV infected patient. The questionnaire will take no more than 15 minutes to complete. The first part of the questionnaire will ask about the experience you have had with HIV infection and HIV infected patients. The remainder of the questionnaire will ask you to identify a number of nursing activities that you feel increases the risk of acquiring HIV infection. While it is possible that you might feel like the questionnaire is a test of your knowledge of HIV transmission, that is neither the intent nor the focus of the study. The questionnaires will not be evaluated in terms of right or wrong answers. At no point will an individual questionnaire be isolated for analysis.

All information obtained as a result of the questionnaire, will be kept in a locked cabinet to which only the investigator will have access. To assure anonymity, the questionnaire has no personal identification information of any kind. The consent form will also be kept separate from the questionnaire. The results of this study may be submitted for publication in a nursing or other professional journal, as is the case for all analysis no individual questionnaire will be identified or discussed.

Your decision whether or not to participate will not prejudice your future relations with St. Boniface General Hospital. If you decide to participate, you may refuse to answer any of the questions.

If you have any questions now, please feel free to ask. If you have any questions at a later date, again please ask. My name is Shirley Paton and I can be contacted through the School of Nursing at the University of Manitoba. My telephone number is (204) 474-9131. If you wish, a summary of the results will be made available to you upon request. You may also keep a copy of this consent form.

---

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate. You may refuse to answer any or all of the questions after signing this form with out prejudice.

| | |
|---|---|
| --- | --- |
| Signature | Date |
| --- | --- |
| Signature of Investigator | Date |

# Appendix F

## Abstract of Study

### Bedside Nurses' Perceptions of the Risk of HIV Infection from Nursing Activities that Involve Exposure to Blood and Body Fluids

This study will be conducted by Shirley Paton, graduate student in Nursing, University of Manitoba. The thesis supervisor is Dr. Lesley Degner; committee members are Ms. Annette Gupton (nursing researcher) and Dr. Lindsay Nicolle (physician, Infectious Diseases).

The purpose of this survey is to rank nine common nursing activities that bedside nurses believe place them at risk of HIV infection. Two hundred medical and surgical nurses, actively practicing at the bedside, will be asked to spend 15 minutes completing a questionnaire designed by the researcher. The questionnaire will identify nurses' level of concern about HIV exposure in the workplace and their perception of risk of HIV infection while performing nursing activities that involve exposure to blood or body fluids of HIV infected patients. HIV experts will be asked to complete an identical questionnaire. Based on the answers to the questionnaire, lists ranking the 9 nursing activities from the least to the most risky will be developed. Lists from the nurses and the HIV experts will be compared. Differences will be examined with respect to the degree of concern about HIV infection in the workplace; the number of HIV infected patients cared for; the sources of HIV information; the use of gloves when engaging in the nine activities; and an assessment of the risk of seroconversion if exposed to infected blood or body

fluids. Results of this study could be used to identify HIV educational needs of bedside nurses. In addition, these findings could form the basis of an investigation into nurses' acceptance and application of Universal Precaution protocols in hospitals.

# Appendix G

Plan of Action: Administration of Questionnaire to Nurse Subjects

STEP 1 Obtain formal access from the Nursing Research Department at St. Boniface General Hospital.

STEP 2 Meet with the all the head nurses of the medical and surgical units to explain the intent and methodology of the study. Ms P. Hosang, Director of Medical Nursing and Acting Director of Surgical Nursing, has invited me to present the research proposal at the weekly meetings she holds with the head nurses.

STEP 3 Approach staff nurses on specific wards to participate in the study by:

a) Introducing myself to the nurse in charge of the shift and requesting the opportunity to approach the nurses working that shift.

b) If possible, introducing myself to the staff nurses after shift report. At this time I will circulate copies of the proposal abstract. I will invite nurses to participate and arrange times to return to the ward to administer the questionnaire(s) (ie. at coffee, after lunch etc).

STEP 4 Obtain written consent from the potential participants and ensure each participant has a copy of the study abstract.

STEP 5 Administer the questionnaire.

STEP 6 When the nurses have completed the questionnaire, they will place them in sealed envelopes put them in a designated place on the ward. When the questionnaires are collected by the investigator, she will identify the envelope with an "M" or "S" to indicate medical or surgical nursing unit. At a later time this designation will be transferred to the front of the questionnaire.

# Appendix H

Plan of Action: Administration of Questionnaire to HIV Experts

STEP 1 Compile list of potential HIV experts

a) From the Faculty of Infectious Diseases, University of Manitoba, Winnipeg:
Dr. R. Brunham, Dr. F. Aoki, Dr. L. Nicolle, Dr. G. Harding, Dr. E. Bow, Dr. D. Holton, Dr. W. Thomson, Dr. A. Patttulo, Dr. M. Silverman.

b) Infection Control Nurses, Health Science Center, Winnipeg:
Ms. J. Ross, Ms. L. Romance, Ms. B. Dyck, Ms. J. McLeod.

c) Clinical Nurse Specialists-AIDS:
Ms. T. Hildebrandt, St. Boniface General Hospital.
Ms. I. Goldstone, St. Paul's Hospital, Vancouver, B.C.
Ms. I. Kahler, Foothills Hospital, Calgary Alberta.

d) National AIDS Advisory Committee:
Dr. W. Schleck, Dalhousie University, Halifax, N.S.
Dr. C. Hankins, McGill University, Montreal, Que.
Dr. S. Reid, Hospital for Sick Children, Toronto.
Dr. N. LaPointe, Hospital St. Justine, Montreal.
Dr. M. Fanning, Toronto General Hospital, Toronto.
Dr. M. Schecter, University of British Columbia, B.C.

e) Physicians and Nurses working in AIDS care:
Ms. M. Thompson, Faculty of Medical Microbiology, University of Manitoba.
Nurse at Village Health Clinic, Winnipeg.
Dr. R. Smith, Village Health Clinic, Winnipeg.
Ms. L. Newton, University of Manitoba, Winnipeg.
Dr. M. Chateauvert, Montreal, Que.
Dr. J. Robert, Hospital St. Luc, Montreal.
Dr. B. Willoughby, Vancouver, B.C.
Dr. B. LaPointe, Ottawa, Ontario.

STEP 2 Formally approach HIV experts

a) Winnipeg Residents
I have contacted each potential subject and informally asked if they would consider

participation (Appendix K, an initial response). Once ethical approval is obtained I will formally approach each person by mail. This mail out will include a covering letter (Appendix I), a copy of the abstract (Appendix F), a copy of the Questionnaire (Appendix D), and a stamped, addressed envelope.

b) Other Experts
Again, I have already contacted many of these people informally by phone or letter. Once ethical approval is obtained, I will formally approach each person by mail. This mail out will include a covering letter (Appendix I), a copy of the abstract (Appendix F), a copy of the Questionnaire (Appendix D), and a stamped, addressed envelope.

STEP 3 Document return of questionnaire.

Names of participants will be crossed off a master list (Appendix H) as the questionnaires are returned. When the questionnaire is received, the investigator will identify the it with an "H" to indicate HIV expert. Consent forms and questionnaires will be stored separately. After six weeks those that have not returned the questionnaire will receive a second mail out. If this is not returned they will be identified as non-participants.

# Appendix I

## Letter to HIV Experts

Dear "Name of HIV Expert,"

I am conducting a study entitled Nurses' Perceptions of the Risk of HIV as the basis for my graduate thesis. Little has been done to evaluate nurses' application or acceptance of universal precaution protocols since their introduction in Canadian hospitals. Until we can understand the nurses' perception of risk we cannot effectively do this evaluation.

I am Shirley Paton, a graduate student in the Masters of Nursing program at the University of Manitoba. My thesis supervisor, Dr. Lesley Degner (NAC/AIDS) suggested your name. I plan to survey 100 medical and surgical nurses in Winnipeg and compare the responses to a group of 20 physicians and nurses known to be expert in the clinical care of HIV infected individuals. I am asking you to participate as an HIV expert. This project has received the approval of the Nursing Ethical Review Committee, of the University of Manitoba.

Enclosed is an abstract of the study, a copy of the Perceived Risk of HIV Infection questionnaire, and a stamped, addressed envelope. The questionnaire will take 15 minutes. Please complete and mail the questionnaire as soon as possible. The return of the completed questionnaire will indicate your consent to participate in this study.

Yours sincerely

Shirley Paton

Dr. Lesley Degner
(thesis supervisor)

# Appendix J

## Request for Nurse Researcher Access

Dr. E. Adaskin
Director
Department of Nursing Research
St. Boniface Hospital
Winnipeg, Manitoba

Dear Dr. Adaskin

I am writing to request permission to collect data from nursing staff working full-time or part-time on the medical or surgical units of St. Boniface General Hospital. The purpose of this research study is to explore nurses' perceptions of risk of HIV infection when caring for HIV infected patients.

I am a graduate nursing student at the School of Nursing, University of Manitoba. This study will be the basis of my thesis. My thesis committee members are Dr. Lesley Degner (chair), Ms. Annette Gupton and Dr. Lindsay Nicolle.

Nurses will be asked to complete a self administered questionnaire that will take 15 minutes of their time. All participants will be volunteers and will be fully apprised of their rights as human subjects. The proposal will be submitted to the University of Manitoba, School of Nursing, Nursing Ethics Committee for review. Data collection will not begin until approval has been received.
I have spoken to Ms. P. Hosang, Director of Medical Nursing and Acting Director of Surgical Nursing, as you suggested. Her response was enthusiastic and will be contacting you by letter. She suggested that I come to discuss my study, at the weekly meetings she holds with the head nurses, as soon access is granted.

I have enclosed a copy of the consent form, the questionnaire, an abstract and a five page summary of my proposal, as the application stipulated. If you require additional information, I will be pleased to provide it. Thank you for your consideration.

Yours sincerely

Shirley Paton

Hôpital Général - St. Boniface - General Hospital
409 Tache Avenue,
WINNIPEG, MANITOBA R2H 2A6
(204) 233-8563

February 26, 1990

Ms. Shirley Paton
R 1031-2

**Re: Research Access Approval**

Dear Ms. Paton:

This is to confirm our verbal permission for you to access SBGH nurses for the project entitled:

**Nurses' perception of risk of HIV infections from activities that involve handling of blood and body fluids**

Your research topic is timely and valuable.

As stated earlier, you are welcome to locate yourself on site in the Nursing Research space while conducting the project. Let us know if we can be of help as you progress.

Sincerely,

Eleanor J. Adaskin, RN, PhD
Director of Nursing Research

EA/mj

THE UNIVERSITY OF MANITOBA

# Inter-Departmental Correspondence

**DATE:** March 5, 1990

**TO:** Shirley Paton, Graduate Student

**FROM:** Jenniece Larsen, R.N., Ph.D., Professor and Director

**SUBJECT:**

In response to our discussion and your letter, you have permission to seek the participation of students in the Baccalaureate Program for Registered Nurses as potential participants in your study. The conditions are as outlined in your letter: participation is voluntary; that permission of the course leader will be obtained to distribute the questionnaire, and that the data analysis will not identify individual students.

I wish you well with your project.

JL:jb

c.c. C. Gow

Appendix K

Letter from Potential HIV Experts


820 Sherbrook Street
Winnipeg, Manitoba R3A 1R9
Dial Direct (204) -

January 16, 1990

Shirley Paton

RE: NURSES PERCEPTIONS OF RISK OF ACQUISITION OF HIV INFECTION

Dear Shirley:

Your thesis project studying nurses' perceptions of their risk of acquisition of HIV infection is an exciting and important proposal. The Infection Control Practitioners at the Health Sciences Centre and myself will be happy to assist with any aspect of the proposed you feel relevant, including serving as expert authorities.

Good luck with the proposal and thank you for including us in your study.

Sincerely,,

Dr. L.E. Nicolle
Director, Infection Control Unit

LEN/bmk

# Appendix L

## Medical Nurses' Matrices

### Frequency Matrix for Medical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 38.5 | 38.0 | 37.0 | 27.0 | 28.0 | 22.0 | 9.0 | 6.0 | 8.0 |
| IV | 39.0 | 38.5 | 38.0 | 6.0 | 20.0 | 11.0 | 8.0 | 11.0 | 5.0 |
| ART | 40.0 | 39.0 | 38.5 | 27.0 | 20.0 | 14.0 | 13.0 | 15.0 | 11.0 |
| IM | 50.0 | 71.0 | 50.0 | 38.5 | 38.0 | 23.0 | 24.0 | 25.0 | 25.0 |
| DRS | 49.0 | 57.0 | 57.0 | 39.0 | 38.5 | 18.0 | 14.0 | 15.0 | 10.0 |
| EME | 55.0 | 66.0 | 63.0 | 54.0 | 59.0 | 38.5 | 24.0 | 35.0 | 27.0 |
| SPT | 68.0 | 69.0 | 64.0 | 53.0 | 63.0 | 53.0 | 38.5 | 35.0 | 34.0 |
| STL | 71.0 | 66.0 | 62.0 | 52.0 | 62.0 | 42.0 | 42.0 | 38.5 | 31.0 |
| URN | 69.0 | 72.0 | 66.0 | 52.0 | 67.0 | 50.0 | 43.0 | 46.0 | 38.5 |

### Proportion Matrix for Medical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.5000 | 0.4935 | 0.4805 | 0.3506 | 0.3636 | 0.2857 | 0.1169 | 0.0779 | 0.1039 |
| IV | 0.5065 | 0.5000 | 0.4935 | 0.0779 | 0.2597 | 0.1429 | 0.1039 | 0.1429 | 0.0649 |
| ART | 0.5195 | 0.5065 | 0.5000 | 0.3506 | 0.2597 | 0.1818 | 0.1688 | 0.1948 | 0.1429 |
| IM | 0.6494 | 0.9221 | 0.6494 | 0.5000 | 0.4935 | 0.2987 | 0.3117 | 0.3247 | 0.3247 |
| DRS | 0.6364 | 0.7403 | 0.7403 | 0.5065 | 0.5000 | 0.2338 | 0.1818 | 0.1948 | 0.1299 |
| EME | 0.7143 | 0.8571 | 0.8182 | 0.7013 | 0.7662 | 0.5000 | 0.3117 | 0.4545 | 0.3506 |
| SPT | 0.8831 | 0.8961 | 0.8312 | 0.6883 | 0.8182 | 0.6883 | 0.5000 | 0.4545 | 0.4416 |
| STL | 0.9221 | 0.8571 | 0.8052 | 0.6753 | 0.8052 | 0.5455 | 0.5455 | 0.5000 | 0.4026 |
| URN | 0.8961 | 0.9351 | 0.8571 | 0.6753 | 0.8701 | 0.6494 | 0.5584 | 0.5974 | 0.5000 |
| Sum | 2.8117 | 3.1623 | 2.8636 | 1.7857 | 1.8766 | 1.1429 | 0.8831 | 0.9351 | 0.7662 |

### "Z" Score Matrix for Medical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.0000 | -0.0163 | -0.0489 | -0.3837 | -0.3489 | -0.5660 | -1.1906 | -1.4193 | -1.2596 |
| IV | 0.0163 | 0.0000 | -0.0163 | -1.4939 | -0.6443 | -1.0674 | -1.2596 | -1.0674 | -1.5149 |
| ART | 0.0489 | 0.0163 | 0.0000 | -0.3837 | -0.6443 | -0.9085 | -0.9581 | -0.8603 | -1.0674 |
| IM | 0.3837 | 1.4939 | 0.3837 | 0.0000 | -0.0163 | -0.5281 | -0.4910 | -0.4546 | -0.4546 |
| DRS | 0.3489 | 0.6443 | 0.6443 | 0.0163 | 0.0000 | -0.7264 | -0.9085 | -0.8603 | -1.1269 |
| EME | 0.5660 | 1.0674 | 0.9085 | 0.5281 | 0.7264 | 0.0000 | -0.4910 | -0.1143 | -0.3837 |
| SPT | 1.1906 | 1.2596 | 0.9581 | 0.4910 | 0.9085 | 0.4910 | 0.0000 | -0.1143 | -0.1469 |
| STL | 1.4193 | 1.0674 | 0.8603 | 0.4546 | 0.8603 | 0.1143 | 0.1143 | 0.0000 | -0.2466 |
| URN | 1.2596 | 1.5149 | 1.0674 | 0.4546 | 1.1269 | 0.3837 | 0.1469 | 0.2466 | 0.0000 |
| Sum | 5.2333 | 7.0475 | 4.7571 | -0.3166 | 1.9685 | -2.8074 | -5.0377 | -4.6440 | -6.2006 |
| Mean | 0.5815 | 0.7831 | 0.5286 | -0.0352 | 0.2187 | -0.3119 | -0.5597 | -0.5160 | -0.6890 |
| Zero | 1.2704 | 1.4720 | 1.2175 | 0.6537 | 0.9076 | 0.3770 | 0.1292 | 0.1729 | 0.0000 |

# Appendix L

## Matrices for BN/RN Nurses

### Frequency Matrix for BN/RN Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 38.5 | 37.0 | 33.0 | 24.0 | 30.0 | 14.0 | 5.0 | 5.0 | 10.0 |
| IV | 40.0 | 38.5 | 38.0 | 7.0 | 28.0 | 7.0 | 9.0 | 8.0 | 8.0 |
| ART | 44.0 | 39.0 | 38.5 | 20.0 | 21.0 | 11.0 | 11.0 | 9.0 | 6.0 |
| IM | 53.0 | 70.0 | 57.0 | 28.5 | 48.0 | 25.0 | 22.0 | 24.0 | 28.0 |
| DRS | 47.0 | 49.0 | 56.0 | 29.0 | 38.5 | 16.0 | 16.0 | 11.0 | 8.0 |
| EME | 63.0 | 70.0 | 66.0 | 52.0 | 61.0 | 38.5 | 38.0 | 29.0 | 22.0 |
| SPT | 68.0 | 68.0 | 66.0 | 55.0 | 61.0 | 39.0 | 38.5 | 35.0 | 35.0 |
| STL | 72.0 | 69.0 | 68.0 | 53.0 | 66.0 | 48.0 | 42.0 | 38.5 | 29.0 |
| URN | 67.0 | 69.0 | 71.0 | 49.0 | 69.0 | 55.0 | 42.0 | 48.0 | 38.5 |

### Proportion Matrix for BN/RN Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.5000 | 0.4805 | 0.4286 | 0.3117 | 0.3896 | 0.1818 | 0.0649 | 0.0649 | 0.1299 |
| IV | 0.5195 | 0.5000 | 0.4935 | 0.0909 | 0.3636 | 0.0909 | 0.1169 | 0.1039 | 0.1039 |
| ART | 0.5714 | 0.5065 | 0.5000 | 0.2597 | 0.2727 | 0.1429 | 0.1429 | 0.1169 | 0.0779 |
| IM | 0.6883 | 0.9091 | 0.7403 | 0.5000 | 0.6234 | 0.3247 | 0.2857 | 0.3117 | 0.3636 |
| DRS | 0.6104 | 0.6364 | 0.7273 | 0.3766 | 0.5000 | 0.2078 | 0.2078 | 0.1429 | 0.1039 |
| EME | 0.8182 | 0.9091 | 0.8571 | 0.6753 | 0.7922 | 0.5000 | 0.4935 | 0.3766 | 0.2857 |
| SPT | 0.8831 | 0.8831 | 0.8571 | 0.7143 | 0.7922 | 0.5065 | 0.5000 | 0.4545 | 0.4545 |
| STL | 0.9351 | 0.8961 | 0.8831 | 0.6883 | 0.8571 | 0.6234 | 0.5455 | 0.5000 | 0.3766 |
| URN | 0.8701 | 0.8961 | 0.9221 | 0.6364 | 0.8961 | 0.7143 | 0.5455 | 0.6234 | 0.5000 |
| Sum | 6.3961 | 6.6169 | 6.4091 | 4.2532 | 5.4870 | 3.2922 | 2.9026 | 2.6948 | 2.3961 |

### "Z" Score Matrix for BN/RN Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.0000 | -0.0477 | -0.1800 | -0.4910 | -0.2803 | -0.9078 | -1.1907 | -1.5150 | -1.1270 |
| IV | 0.0477 | 0.0000 | -0.0160 | -1.3350 | -0.3490 | -1.3350 | -1.1907 | -1.2597 | -1.2597 |
| ART | 0.1800 | 0.0163 | 0.0000 | -0.6440 | -0.6046 | -1.0676 | -1.0676 | -1.1830 | -1.4192 |
| IM | 0.4910 | 1.3350 | 0.6440 | 0.0000 | 0.3144 | -0.4550 | -0.5660 | -0.4910 | -0.3490 |
| DRS | 0.2803 | 0.3488 | 0.6050 | -0.3144 | 0.0000 | -0.8141 | -0.8141 | -1.0676 | -1.2597 |
| EME | 0.9078 | 1.3350 | 1.0680 | 0.4550 | 0.8141 | 0.0000 | -0.0163 | -0.3144 | -0.5660 |
| SPT | 1.1910 | 1.1910 | 1.0676 | 0.5660 | 0.8141 | 0.0160 | 0.0000 | -0.1130 | -0.1142 |
| STL | 1.5150 | 1.2597 | 1.1830 | 0.4910 | 1.0650 | 0.3144 | 0.1130 | 0.0000 | -0.3144 |
| URN | 1.1270 | 1.2596 | 1.4190 | 0.3490 | 1.2597 | 0.5660 | 0.1142 | 0.3144 | 0.0000 |
| Sum | 5.7398 | 6.6977 | 5.7906 | -0.9234 | 3.0333 | -3.6832 | -4.6181 | -5.6293 | -6.4091 |
| Mean | 0.6378 | 0.7442 | 0.6434 | -0.1026 | 0.3370 | -0.4092 | -0.5131 | -0.6255 | -0.7121 |
| Zero | 1.3499 | 1.4563 | 1.3555 | 0.6095 | 1.0492 | 0.3029 | 0.1990 | 0.0866 | 0.0000 |

# Appendix L

## Surgical Nurses' Matrices

### Frequency Matrix for Surgical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 38.5 | 53.0 | 45.0 | 35.0 | 34.0 | 14.0 | 7.0 | 10.0 | 7.0 |
| IV | 24.0 | 38.5 | 25.0 | 5.0 | 16.0 | 6.0 | 4.0 | 4.0 | 4.0 |
| ART | 32.0 | 52.0 | 38.5 | 25.0 | 27.0 | 10.0 | 9.0 | 10.0 | 10.0 |
| IM | 42.0 | 72.0 | 52.0 | 38.5 | 42.0 | 16.0 | 11.0 | 17.0 | 15.0 |
| DRS | 43.0 | 61.0 | 50.0 | 35.0 | 38.5 | 12.0 | 14.0 | 8.0 | 5.0 |
| EME | 63.0 | 71.0 | 67.0 | 61.0 | 65.0 | 7.6 | 32.0 | 32.0 | 23.0 |
| SPT | 70.0 | 73.0 | 68.0 | 66.0 | 63.0 | 45.0 | 38.5 | 39.0 | 32.0 |
| STL | 67.0 | 73.0 | 67.0 | 60.0 | 69.0 | 45.0 | 38.0 | 38.5 | 31.0 |
| URN | 70.0 | 73.0 | 67.0 | 62.0 | 72.0 | 54.0 | 45.0 | 46.0 | 38.5 |

### Proportion Matrix for Surgical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.5000 | 0.6883 | 0.5844 | 0.4545 | 0.4416 | 0.1818 | 0.0909 | 0.1299 | 0.0909 |
| IV | 0.3117 | 0.5000 | 0.3247 | 0.0649 | 0.2078 | 0.0779 | 0.0519 | 0.0519 | 0.0519 |
| ART | 0.4156 | 0.6753 | 0.5000 | 0.3247 | 0.3506 | 0.1299 | 0.1169 | 0.1299 | 0.1299 |
| IM | 0.5455 | 0.9351 | 0.6753 | 0.5000 | 0.5455 | 0.2078 | 0.1429 | 0.2208 | 0.1948 |
| DRS | 0.5584 | 0.7922 | 0.6494 | 0.4545 | 0.5000 | 0.1558 | 0.1818 | 0.1039 | 0.0649 |
| EME | 0.8182 | 0.9221 | 0.8701 | 0.7922 | 0.8442 | 0.5000 | 0.4156 | 0.4156 | 0.2987 |
| SPT | 0.9091 | 0.9481 | 0.8831 | 0.8571 | 0.8182 | 0.5844 | 0.5000 | 0.5065 | 0.4156 |
| STL | 0.8701 | 0.9481 | 0.8701 | 0.7792 | 0.8961 | 0.5844 | 0.4935 | 0.5000 | 0.4026 |
| URN | 0.9091 | 0.9481 | 0.8701 | 0.8052 | 0.9351 | 0.7013 | 0.5844 | 0.5974 | 0.5000 |
| Sum | 4.0584 | 5.4610 | 4.4870 | 3.4481 | 3.7078 | 1.8377 | 1.5000 | 1.5584 | 1.2468 |

### "Z" Score Matrix for Surgical Nurses

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.0000 | 0.4911 | 0.2121 | -0.1330 | -0.1459 | -0.9078 | -1.3460 | -1.1264 | -1.3346 |
| IV | -0.4911 | 0.0000 | -0.4538 | -1.5141 | -0.8134 | -1.4187 | -1.6258 | -1.6258 | -1.6258 |
| ART | -0.2121 | 0.4538 | 0.0000 | -0.4538 | -0.3818 | -1.1264 | -1.1901 | -1.1264 | -1.1264 |
| IM | 0.1330 | 1.5141 | 0.4538 | 0.0000 | 0.1130 | -0.8134 | -1.0669 | -0.7688 | -0.8596 |
| DRS | 0.1459 | 0.8134 | 0.3818 | -0.1130 | 0.0000 | -1.0110 | -0.9078 | -1.2591 | -1.5141 |
| EME | 0.9078 | 1.4187 | 1.1264 | 0.8134 | 1.0110 | 0.0000 | -0.2121 | -0.2121 | -0.5273 |
| SPT | 1.3460 | 1.6258 | 1.1901 | 1.0669 | 0.9078 | 0.2121 | 0.0000 | -0.0151 | 0.2121 |
| STL | 1.1264 | 1.6258 | 1.1264 | 0.7688 | 1.2591 | 0.2121 | 0.0151 | 0.0000 | -0.2456 |
| URN | 1.3346 | 1.6258 | 1.1264 | 0.8596 | 1.5141 | 0.5273 | -0.2121 | 0.2456 | 0.0000 |
| Sum | 1.8295 | 6.3168 | 2.9105 | -0.3336 | 0.6908 | -5.0651 | -6.3488 | -6.1337 | -6.7757 |
| Mean | 0.2614 | 0.9024 | 0.4158 | -0.0477 | 0.0987 | -0.7236 | -0.9070 | -0.8762 | -0.9680 |
| Zero | 1.2293 | 1.8703 | 1.3837 | 0.9203 | 1.0666 | 0.2444 | 0.0610 | 0.0917 | 0.0000 |

# Appendix M

## Experts' Matrices

### Frequency Matrix for Experts

| | CPR | IV | ART | URN | STL | EME | DRS | IM | SPT |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 13 | 5 | 6 | 0 | 0 | 0 | 5 | 4 | 0 |
| IV | 21 | 13 | 10 | 0 | 0 | 0 | 2 | 4 | 1 |
| ART | 20 | 16 | 13 | 0 | 1 | 1 | 3 | 15 | 1 |
| URN | 26 | 26 | 26 | 13 | 21 | 22 | 25 | 23 | 16 |
| STL | 26 | 26 | 25 | 5 | 13 | 17 | 24 | 25 | 15 |
| EME | 26 | 26 | 25 | 4 | 9 | 13 | 25 | 25 | 13 |
| DRS | 21 | 24 | 23 | 1 | 2 | 1 | 13 | 20 | 1 |
| IM | 22 | 22 | 11 | 3 | 1 | 1 | 6 | 13 | 0 |
| SPT | 26 | 25 | 25 | 10 | 11 | 13 | 25 | 26 | 13 |
| Sum | 188 | 170 | 151 | 23 | 45 | 55 | 115 | 142 | 47 |

### Proportion Matrix for Experts

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.5000 | 0.1923 | 0.2308 | 0.1540 | 0.1923 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| IV | 0.8077 | 0.5000 | 0.3846 | 0.1538 | 0.0769 | 0.0000 | 0.0385 | 0.0000 | 0.0000 |
| ART | 0.7692 | 0.6154 | 0.5000 | 0.5769 | 0.1154 | 0.0385 | 0.0385 | 0.0385 | 0.0000 |
| IM | 0.8462 | 0.8462 | 0.4231 | 0.5000 | 0.2308 | 0.0385 | 0.0000 | 0.0385 | 0.1154 |
| DRS | 0.8077 | 0.9231 | 0.8846 | 0.7692 | 0.5000 | 0.0385 | 0.0385 | 0.0769 | 0.0385 |
| EME | 1.0000 | 1.0000 | 0.9615 | 0.9615 | 0.9615 | 0.5000 | 0.5000 | 0.3462 | 0.1538 |
| SPT | 1.0000 | 0.9615 | 0.9615 | 1.0000 | 0.9615 | 0.5000 | 0.5000 | 0.4231 | 0.3846 |
| STL | 1.0000 | 1.0000 | 0.9615 | 0.9615 | 0.9231 | 0.6538 | 0.5769 | 0.5000 | 0.1923 |
| URN | 1.0000 | 1.0000 | 1.0000 | 0.8846 | 0.9615 | 0.8462 | 0.6154 | 0.8077 | 0.5000 |

### "Z" Score Matrix for Experts

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| CPR | 0.0000 | -0.8700 | -0.7350 | -1.0200 | -0.8700 | | | | |
| IV | 0.8700 | 0.0000 | -0.2880 | -1.0200 | -1.4200 | | -1.7750 | | |
| ART | 0.7350 | 0.2880 | 0.0000 | 0.1950 | -1.2000 | -1.7750 | -1.7750 | -1.7750 | |
| IM | 1.0200 | 1.0200 | 0.1950 | 0.0000 | -0.7350 | -1.7750 | | -1.7750 | -1.2000 |
| DRS | 0.8700 | 1.4200 | 1.4200 | 0.7350 | 0.0000 | -1.7750 | -1.7750 | -1.4200 | -1.7750 |
| EME | | | 1.7750 | 1.7750 | 1.7750 | 0.0000 | 0.0000 | -0.3980 | -1.0200 |
| SPT | | 1.7750 | 1.7750 | | 1.7750 | 0.0000 | 0.0000 | -0.1950 | -0.2980 |
| STL | | | 1.7750 | 1.7750 | 1.4200 | 0.3980 | 0.1950 | 0.0000 | -0.8700 |
| URN | | | | 1.2000 | 1.7750 | 1.0200 | 0.2980 | 0.8700 | 0.0000 |

Succesive Differences Matrix for Experts

| | IV-CPR | ART-IV | IM-ART | DRS-IM | EME-DRS | SPT-EME | STL-SPT | URN-STL |
|---|---|---|---|---|---|---|---|---|
| CPR | -0.8700 | 0.1350 | -0.2850 | 0.1500 | | | | |
| IV | -0.8700 | -0.2880 | -0.7320 | -0.4000 | | | | |
| ART | -0.4470 | -0.2880 | 0.1950 | -1.3950 | -0.5750 | 0.0000 | 0.0000 | |
| IM | 0.0000 | -0.8250 | -0.1950 | -0.7350 | -1.0400 | | | 0.5750 |
| DRS | 0.5500 | 0.0000 | -0.6850 | -0.7350 | -1.7750 | 0.0000 | 0.3550 | -0.3550 |
| EME | | | 0.0000 | 0.0000 | -1.7750 | 0.0000 | -0.3980 | -0.6220 |
| SPT | | 0.0000 | | | -1.7750 | 0.0000 | -0.1950 | -0.1030 |
| STL | | | 0.0000 | -0.3550 | -1.0220 | -0.2030 | -0.1950 | -0.8700 |
| URN | | | | 0.5750 | -0.7550 | -0.7220 | 0.5720 | -0.8700 |
| Sum | -1.6370 | -1.2660 | -1.7020 | -2.8950 | -8.7170 | -0.9250 | 0.1390 | -2.2450 |
| Mean | -0.3274 | -0.2110 | -0.2431 | -0.3619 | -1.2453 | -0.1542 | 0.0232 | -0.3742 |

Experts' Scale Values

| | CPR | IV | ART | IM | DRS | EME | SPT | STL | URN |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0000 | -0.3270 | -0.5384 | -0.7815 | -1.1434 | -2.3887 | -2.5429 | -2.5197 | -2.8939 |
| Zero | 2.8939 | 2.5669 | 2.3555 | 2.1123 | 1.7505 | 0.5052 | 0.3510 | 0.3742 | 0.0000 |

# APPENDIX N

## Creation of Expert Scale from Successive Differences Matrix

| | | | | | | |
|---|---|---|---|---|---|---|
| CPR | = | 0.0000 | | | | |
| IV | = | 0.0000 | + | −0.3270 | = | −0.3270 |
| ART | = | −0.3270 | + | −0.2110 | = | −0.5384 |
| IM | = | −0.5384 | + | −0.2430 | = | −0.7815 |
| DRS | = | −0.7815 | + | −0.3620 | = | −1.1434 |
| EME | = | −1.1430 | + | −1.2450 | = | −2.3887 |
| SPT | = | −2.3980 | + | −0.1540 | = | −2.5429 |
| STL | = | −2.5430 | + | 0.0230 | = | −2.5197 |
| URN | = | −2.5600 | + | −0.3740 | = | −2.8939 |

# APPENDIX O

## Between Scale Differencs by CPR Scale Item

| Scale Item | Expert Mean | Group | Group mean | t value | Significance |
|---|---|---|---|---|---|
| CPR | -2.54 | Surgical Nurses | -1.25 | 8.47 | $p < .0001$ |
| | | Medical Nurses | -1.27 | 8.03 | $p < .0001$ |
| | | BN/RN Nurses | 1.34 | 7.32 | $p < .0001$ |

## Between Scale Differencs by IV Scale Item

| Scale Item | Expert Mean | Group | Group mean | t value | Significance |
|---|---|---|---|---|---|
| IV | -2.34 | Surgical Nurses | -1.84 | 2.1 | $p = .052$ |
| | | Medical Nurses | -1.47 | 3.81 | $p = .0015$ |
| | | BN/RN Nurses | -1.46 | 3.9 | $p = .001$ |

## Between Scale Differencs by ART Scale Item

| Scale Item | Expert Mean | Group | Group mean | t value | Significance |
|---|---|---|---|---|---|
| ART | -2.14 | Surgical Nurses | -1.35 | 3.39 | $p = .004$ |
| | | Medical Nurses | -1.22 | 4.02 | $p = .001$ |
| | | BN/RN Nurses | -1.35 | 3.38 | $p = .004$ |

# Appendix O

Between Scale Differencs by IM Scale Item

| Scale Item | Expert Mean | Group | Group mean | t value | Significance |
|---|---|---|---|---|---|
| IM | -1.89 | Surgical Nurses | -0.92 | 3.41 | p = .004 |
| | | Medical Nurses | -0.65 | 4.52 | p = .0003 |
| | | BN/RN Nurses | -0.61 | 4.63 | p = .0003 |

Between Scale Differencs by DRS Scale Item

| Scale Item | Expert Mean | Group | Group mean | t value | Significance |
|---|---|---|---|---|---|
| DRS | -1.57 | Surgical Nurses | -1.17 | 1.34 | p = .093 |
| | | Medical Nurses | -0.91 | 2.26 | p = .038 |
| | | BN/RN Nurses | -1.05 | 1.79 | p = .2 |

# Appendix P

## Scale Differences Matrices

### Differences between "Z" Scores for Medical Nurses

| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
|---|---|---|---|---|---|---|---|---|
| CPR | -1.2596 | -1.2433 | -1.2107 | -0.8759 | -0.9108 | -0.6936 | -0.0690 | 0.1597 |
| IV | -1.5312 | -1.5149 | -1.4986 | -0.0210 | -0.8706 | -0.4475 | -0.2553 | -0.4475 |
| ART | -1.1163 | -1.0837 | -1.0674 | -0.6837 | -0.4231 | -0.1589 | -0.1093 | -0.2070 |
| IM | -0.8383 | -1.9485 | -0.8383 | -0.4546 | -0.4383 | 0.0735 | 0.0364 | 0.0000 |
| DRS | -1.4758 | -1.7712 | -1.7712 | -1.1432 | -1.1269 | -0.4005 | -0.2184 | -0.2666 |
| EME | -0.9497 | -1.4511 | -1.2922 | -0.9118 | -1.1101 | -0.3837 | 0.1073 | -0.2694 |
| SPT | -1.3375 | -1.4065 | -1.1050 | -0.6380 | -1.0554 | -0.6380 | -0.1469 | -0.0326 |
| STL | -1.6660 | -1.3140 | -1.1070 | -0.7012 | -1.1070 | -0.3609 | -0.3609 | -0.2466 |
| URN | -1.2596 | -1.5149 | -1.0674 | -0.4546 | -1.1269 | -0.3837 | -0.1469 | -0.2466 |

### Differences between "Z" Scores for Surgical Nurses

| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
|---|---|---|---|---|---|---|---|---|
| CPR | -1.3346 | -1.8257 | -1.5467 | -1.2016 | -1.1887 | -0.4268 | 0.0114 | -0.2082 |
| IV | -1.1347 | -1.6258 | -1.1720 | -0.1117 | -0.8124 | -0.2071 | 0.0000 | 0.0000 |
| ART | -0.9143 | -1.5802 | -1.1264 | -0.6726 | -0.7446 | 0.0000 | 0.0637 | 0.0000 |
| IM | -0.9927 | -2.3737 | -1.3134 | -0.8596 | -0.9727 | -0.0462 | 0.2073 | -0.0908 |
| DRS | -1.6600 | -2.3275 | -1.8959 | -1.4011 | -1.5141 | -0.5031 | -0.6063 | -0.2550 |
| EME | -1.4351 | -1.9460 | -1.6537 | -1.3407 | -1.5383 | -0.5273 | -0.3151 | -0.3151 |
| SPT | -1.1339 | -1.4137 | -0.9780 | -0.8548 | -0.6956 | 0.0000 | 0.2121 | 0.2272 |
| STL | -1.3720 | -1.8714 | -1.3720 | -1.0144 | -1.5047 | -0.4577 | -0.2606 | -0.2456 |
| URN | -1.3346 | -1.6258 | -1.1264 | -0.8596 | -1.5141 | -0.5273 | 0.2121 | -0.2456 |

### Differences between "Z" Scores for BN/RN Nurses

| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
|---|---|---|---|---|---|---|---|---|
| CPR | -1.1270 | -1.0793 | -0.9470 | -0.6360 | -0.8467 | -0.2192 | 0.0637 | 0.3880 |
| IV | -1.3074 | -1.2597 | -1.2437 | 0.0753 | -0.9107 | 0.0753 | -0.0690 | 0.0000 |
| ART | -1.5992 | -1.4355 | -1.4192 | -0.7752 | -0.8146 | -0.3516 | -0.3516 | -0.2362 |
| IM | -0.8400 | -1.6840 | -0.9930 | -0.3490 | -0.6634 | 0.1060 | 0.2170 | 0.1420 |
| DRS | -1.5400 | -1.6085 | -1.8647 | -0.9453 | -1.2597 | -0.4456 | -0.4456 | -0.1921 |
| EME | -1.4738 | -1.9010 | -1.6340 | -1.0210 | -1.3801 | -0.5660 | -0.5497 | -0.2516 |
| SPT | -1.3052 | -1.3052 | -1.1818 | -0.6802 | -0.9283 | -0.1302 | -0.1142 | -0.0011 |
| STL | -1.8294 | -1.5740 | -1.4974 | -0.8054 | -1.3794 | -0.6287 | -0.4274 | -0.3144 |
| URN | -1.1270 | -1.2596 | -1.4190 | -0.3490 | -1.2597 | -0.5660 | -0.1142 | -0.3144 |

Differences between "Z" Scores for Experts

| | UCPR | UIV | UART | UIM | UDRS | UEME | USPT | USTL |
|---|---|---|---|---|---|---|---|---|
| CPR | -2.3300 | -1.4600 | -1.5950 | -1.3100 | -1.4600 | 0.0000 | 0.0000 | 0.0000 |
| IV | -3.2000 | -2.3300 | -2.0420 | -1.3100 | -0.9100 | 0.0000 | -0.5550 | 0.0000 |
| ART | -3.0650 | -2.6180 | -2.3300 | -2.5250 | -1.1300 | -0.5550 | -0.5550 | -0.5550 |
| IM | -2.2200 | -2.2200 | -1.3950 | -1.2000 | -0.4650 | 0.5750 | 1.1300 | 0.5750 |
| DRS | -2.6450 | -3.1950 | -3.1950 | -2.5100 | -1.7750 | 0.0000 | 0.0000 | -0.3550 |
| EME | -3.3500 | -3.3500 | -2.7950 | -2.7950 | -2.7950 | -1.0200 | -1.0200 | -0.6220 |
| SPT | -2.6280 | -2.0730 | -2.0730 | -2.6280 | -2.0730 | -0.2980 | -0.2980 | -0.1030 |
| STL | -3.2000 | -3.2000 | -2.6450 | -2.6450 | -2.2900 | -1.2680 | -1.0650 | -0.8700 |
| URN | -2.3300 | -2.3300 | -2.3300 | -1.2000 | -1.7750 | -1.0200 | -0.2980 | -0.8700 |

# Appendix Q

## Letter of Ethical Approval

The University of Manitoba

SCHOOL OF NURSING

ETHICAL REVIEW COMMITTEE

Proposal Number N#90/01

Proposal Title: Bedside Nurses' Perceptions of Risk of HIV Infection from Nursing Activities that Involve Exposure to Blood and Body Fluids.

Name and Title of Researcher(s): Shirley Paton, RN, BScN
Master of Nursing student
School of Nursing University of Manitoba

Date of Review: February 5, 1990

Decision of Committee: Approved: Feb.14/90 Not Approved: _____

Approved upon receipt of the following changes:

**APPROVED with revisions submitted on February 14, 1990.**

Date: **February 14, 1990**

Associate Professor
School of Nursing
University of Manitoba
Position

Chairperson

NOTE:

Any significant changes in the proposal should be reported to the Chairperson for the Ethical Review Committee's consideration, in advance of implementation of such changes.