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HIV-RELATED KNOWLEDGE, ATTITUDES, AND PRECAUTIONARY BEHAVIORS AMONG MICHIGAN NURSES

By

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ABSTRACT

HIV-RELATED KNOWLEDGE, ATTITUDES, AND PRECAUTIONARY BEHAVIOR AMONG MICHIGAN NURSES

By

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The current study examined knowledge, attitudes, and behaviors related to the Human Immunodeficiency Virus (HIV) among a random sample of 1,530 Registered Nurses in Michigan through the use of a mail survey. Although respondents indicated a high level of knowledge of the viable routes of HIV transmission, many misconceptions surrounding nonviable transmission routes were reported. Nurses were actively involved in situations with potential risk of exposure to HIV, however, many nurses were not consistently utilizing universal precautions. While the majority of respondents indicated that they would be willing and comfortable in caring for persons infected with HIV, perceived risk of infection through occupational exposure to HIV remains a critical issue. The current study identified several significant relationships between perceived risk and the other variables along with factors that predict level of comfort and use of universal precautions. The results of this study have important implications for research, training, and policy.

As of the end of 1990, over 100,000 Americans had died of AIDS. This work is dedicated to the families, lovers, and friends who miss them.

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CHAPTER I

Introduction

As of the end of 1990, 161,073 cases of Acquired Immunodeficiency Syndrome (AIDS) had been reported in the United States. Of these cases, 100,813 have resulted in death (Centers for Disease Control, 1991a). While drugs and therapies that are effective in treating and managing HIV infection and AIDS have been developed, neither a cure or vaccine are predicted for the immediate future. It is currently estimated that one million Americans are already infected with the AIDS virus and that the number of cases of AIDS will continue to increase over the next four years (Centers for Disease Control, 1990). Experts warn that the impact of AIDS on mortality through the next decade will depend on present efforts directed towards prevention and treatment (Centers for Disease Control, 1991b).

Extensive epidemiological studies have confirmed that the Human Immunodeficiency Virus (HIV) is a blood-borne virus that is transmitted through sexual contact in which there is an exchange of body fluids, the exchange of blood or blood products including the sharing of needles among intravenous drug users, and perinatal transmission in which an infected mother passes the virus onto her child either

during pregnancy or labor, at birth, or during breast feeding (Friedland & Klein, 1987).

In the United States, reported cases of AIDS have been largely accounted for by the following modes of transmission: 1) male homosexual/bisexual contact (59%); 2) intravenous drug (IV) use (female and heterosexual male) (22%); 3) male homosexual/bisexual contact and IV drug use (7%); and 4) heterosexual contact (5%). In addition, 2,786 children born to mothers with/at risk for HIV infection, have been diagnosed with AIDS (Centers for Disease Control, 1991a).

Recent surveys among the American public indicate that reaction to the AIDS epidemic remains highly emotional. The public has continued to react with fear to the epidemic, as revealed in a 1987 survey in which more than 40% of American adults surveyed were concerned that they would contract AIDS (Stout, 1987). The public has also continued to express hostility towards persons infected with HIV. A review of more than 50 surveys conducted between 1983 and 1988 suggests that hostility toward individuals infected with the AIDS virus is pervasive in a large proportion of the population (Blendon & Donelan, 1988). According to this report, a substantial minority of Americans see AIDS as a deserved punishment for offensive or immoral behavior, and show signs of intolerance and hostility towards those with the disease. The report states that despite recent improvements in the public's knowledge about AIDS, 25% of

Americans would refuse to work alongside a person with AIDS, and 40% would oppose housing for persons with AIDS in their neighborhood. This reluctance to work or live near someone with AIDS does not appear to correlate with fears of acquiring the disease through casual contact, as only 11% of Americans now believe that they can be infected by working alongside an individual with AIDS, compared with 37% in 1985.

In addition, this review reveals that most Americans believe that the control of AIDS will require the loss of individual privacy and possible restrictions on civil rights. While the public overwhelmingly opposes discrimination in access to hospital care for patients with AIDS, the rights of health-care workers are held to be more important than those of the patients they treat (Blendon & Donelan, 1988). Sixty-nine percent of the general public surveyed agreed that health-care professionals should be warned if they are asked to treat someone who is infected with the virus and one-third would allow physicians to make their own choices about whether to treat patients with the disease.

HIV: The Challenge to our Health-Care System

The impact of AIDS/HIV infection within the nations' health-care systems is evident. The Public Health Service estimates that during 1992 alone, a total of 172,000 patients with AIDS/HIV infection will require medical care at a cost expected to range from $5 billion to $13 billion

(Centers for Disease Control, 1988a). Others warn that the epidemic is already straining the resources of public hospitals in some areas of the country (Andrulis, Weslowski, & Gage, 1989).

Along with the attention focused on the challenge of financing health care for persons with AIDS/HIV infection is a growing concern surrounding the impact of the epidemic on the individuals involved in the provision of this care. Health-care workers involved in the care of AIDS patients are now faced with the dilemma of responding to a disease with no known cure, that is life threatening, transmissible, and is occurring in groups of people who are largely unaccepted in our society (Lusby, 1985). The extent of these challenges is evident in a report which suggests that AIDS may actually be dissuading medical students from entering the field of internal medicine and contributing to a growing national shortage of nurses (Cotton, 1988).

While these problems associated with the care of persons infected with HIV have been experienced mainly by health-care workers in areas with high prevalence of HIV infection, Burda and Powills (1986) warn that AIDS is no longer a problem confined to hospitals in New York City and San Francisco, as every state now has an AIDS population that is expected to grow. A recent report reveals that 63% of hospitals nationwide and 45% of hospitals in communities of less than 215,00 had admitted at least one patient with AIDS by August 1990 ("63% of Hospitals," 1990). Thus

health-care professionals in all areas of the country will eventually be faced with the challenges of caring for persons infected with HIV.

Research has begun to investigate the problems health-care professionals experience in the provision of care to persons with AIDS/HIV infection. This review examines the literature that has been generated from the assessment of these issues, from the early days of the epidemic through present-day studies. Research examining stress, perceived and actual risk of occupational exposure to HIV, precautionary behaviors, attitudes, and knowledge related to the provision of health care to individuals with AIDS/HIV infection are reviewed and the implications of these findings are discussed.

Reactions of Health-Care Workers to HIV

A group of researchers observing the initial reactions among the staff at San Francisco General, a major referral and treatment center for AIDS, offer important insights into the recognition of the problem among health-care professionals (Jonsen, Cooke, & Koenig, 1986). They report that while in 1980 and 1981 there was little evidence that physicians and nurses feared AIDS as a threat to their own health, by 1982 this situation had abruptly changed. As the number of patients began to increase rapidly and epidemiologists began to assert that the disease was both infectious and lethal, health-care workers began to fear for their safety. They relay reports of staff refusing to

perform procedures requiring intimate physical contact with patients and resignations over the care of AIDS patients as evidence of these fears. Others report that in the early days of the epidemic, health-care workers fearing transmission would don masks, gloves, and gowns before even routine contact with HIV-infected individuals (Wachter, 1986).

In nonrandom interviews conducted in 1983, Jonsen et al. (1986) asked health-care workers at San Francisco General Hospital how they had responded to the AIDS epidemic. More than half stated that they had feared a risk to their own health, and that nurses and medical technicians, in more frequent and intimate physical contact with patients than physicians, were even more anxious.

More recently, research has shown that health-care professionals are continuing to react to the problems associated with the provision of health-care services to HIV-infected individuals. In a survey of physicians in four New York hospitals with large populations of HIV-infected patients, 25% indicated that they would not continue to care for AIDS patients if given a choice, and 39% reported that they would ask for a transfer if they had to care for an AIDS patient on a regular basis (Link, Feingold, Charap, Freeman, & Shelov, 1987). In a nationwide survey, three hundred and forty-six staff nurses who had been caring for AIDS patients for an average of three years indicated concern about their safety, frustration with the poor

prognoses of their patients, and a need for more information (Brennan, 1988).

HIV-Related Stress on Health-Care Workers

Research had identified stress as an important component of the problems that health-care workers experience in caring for persons with AIDS/HIV infection. The care of these patients is both medically complex and emotionally draining, and because of the fatal nature of AIDS, health-care workers often feel that they have experienced a loss of control in their ability to cure and heal (Lusby 1985). Similarly, Jonsen et al. (1986) argue that the youth of the patients, the severe infections, weaknesses, and characteristics of dementia found in many terminal AIDS patients, as well as a great deal of anger and guilt on the part of both patients and health-care providers, greatly complicates the process of care. Shulman and Mantell (1988) explain that the daily confrontations with death and "do not resuscitate" orders for young people, along with the heavy physical requirements of nursing care, has resulted in high levels of stress and exhaustion for health-care professionals.

These reports have been supported with empirical evidence that health-care workers perceive the process of providing services to HIV-infected patients as stressful. A study assessing the psychological distress associated with working with AIDS patients versus matched, non-AIDS patients, found that physicians and nurses experienced

increased anxiety, greater interference in nonwork activities, and more frequent negative ruminations (Treiber, Shaw, & Malcolm, 1987).

A survey of 237 hospital workers involved in the care of patients infected with HIV, at a major AIDS facility in Massachusetts, found that a large proportion of respondents experienced stress related to their contact with AIDS patients (Pleck, O'Donnell, O'Donnell, & Sharey, 1988). Forty-eight percent of this group identified their work with AIDS patients as one of the more stressful parts of their job. Over 35% stated that they are not comfortable with AIDS patients, and felt that their knowledge was insufficient to deal with the physical and emotional needs of their patients. This study also found that AIDS stress was significantly associated with being a licensed practical nurse, nursing assistant, or technical service worker, all of which are jobs requiring more direct physical contact with patients. Other predictors of high levels of AIDS-related stress were low scores on a measure of contact with AIDS patients and high scores on a measure of AIDS phobia.

Perceived Risk of Occupational Exposure to HIV

Health-care workers' perceived risk of HIV infection through occupational exposure remains yet another important dimension of the challenge of providing care to persons with AIDS/HIV infection. Along with the transmissible and lethal nature of AIDS that has been unparalleled in modern

medicine, there is growing concern about the occupational risks associated with caring for AIDS patients. Paul Volberding and Donald Abrams, physicians at San Francisco General Hospital, have argued that while "historically physicians have tacitly accepted an occupational risk of exposure to fatal infectious disease....the current generation of physicians trained after the development of effective antibiotics, has never confronted this potential occupational risk" (cited in Levine, 1986, p. 274).

There are social dimensions unique to AIDS that also play a role in creating and maintaining the current climate of fear. Levine (1986) argues that despite the current level of knowledge and understanding, AIDS remains so threatening because it is viewed as a risk imposed by some outside force - in the case of AIDS a socially stigmatized source. Other factors that contribute to this fear include a general distrust of authorities and daily accounts of the disease in the media that give an impression of uncertainty (Levine, 1986).

Research has revealed high levels of perceived risk of HIV infection through occupational exposures on the part of health-care workers. Nearly 80% of those surveyed in the Pleck et al. study (1988) thought that they were at some risk of contracting AIDS, although only 9% checked the highest category of risk offered by the questionnaire.

Studies among nurses only reveal that they are concerned for their safety and that their families and

friends are concerned as well. Reed, Wise, and Mann (1984), conclude from the results of a survey of 267 nurses caring for AIDS patients at a 650-bed hospital that while a majority of respondents reported having some or quite a bit of knowledge, fear of contagion was still prominent. Sixty-seven percent expressed "some" to "quite a bit" of anxiety over providing care, and 49.2% reported that their families experienced this same anxiety. Despite these high levels of reported anxiety, only 3% of respondents indicated that they had actually refused care to a patient with AIDS. Those who had refused to care, however, were significantly more anxious and more afraid of catching AIDS.

Blumenfield, Smith, Milazzo, Seropian, and Wormser (1987) conducted surveys in 1983 and 1984 of 298 nurses in a 619-bed urban teaching hospital and found that half of the respondents reported that they believe AIDS can be transmitted from patients despite precautions and indicated that they would ask to transfer to a different unit if they had to care for AIDS patients on a regular basis. This study also revealed that nurses working on the intensive care unit responded most fearfully.

More recently in a survey of 1,019 Registered Nurses practicing in California, 24.% reported that they are at high or moderate risk for HIV infection through occupational exposure (van Servellen, Lewis, & Leake, 1988). Over 75% of those surveyed by Brennan (1988) reported that they worried "sometimes" to "all the time" about getting AIDS, and over

one-third were worried that they would give AIDS to their families.

This perceived risk of occupational exposure to HIV is not unique to health-care workers in regions with high prevalence of AIDS and HIV infection. In Michigan, a state which currently ranks 17th in the number of AIDS cases nationwide (Michigan Department of Public Health, 1991), a survey reveals that 60% of emergency medical service professionals believed their chance of infection to be "very high" or "somewhat high", and almost 50% agreed that their family and friends worry about their risk of exposure (Michigan Department of Public Health, 1989a).

Research has clearly demonstrated the need to address the fears of health-care workers. Eccles (1988) examined the relationship between perceived risk and social distance in a non-medical sample and found that respondents with higher levels of perceived susceptibility to HIV infection indicated greater levels of social distancing, or hesitancy to interact with people with AIDS. The investigator argues that these findings, along with results that show that those with higher levels of perceived risk had lower levels of knowledge, support the need to target education at lowering perceived risk with the goal of reducing isolation and discrimination against people with AIDS.

Others warn, however, that the presentation of factual information about AIDS/HIV infection alone will not be sufficient in addressing the fears of health-care workers.

Meisenhelder and LaCharite (1989) outline fear of contagion as a stress response which directly influences behavior with the perception of no fear resulting in little or no use of universal precautions and the perception of a high level of fear resulting in avoidance, exaggerated barrier precautions, and verbalization of fear. The authors conclude that a healthy stress-response is in balance with actual risk, but warn that education alone does not reduce fear when the source of fear is found not in scientific evidence, but rather in the social and cultural values that surround AIDS. They argue that education must address the issues of cultural differences, value systems, sexuality, and death, and must be accompanied by efforts to decrease demands and increase resources to help health-care workers cope.

Other reports suggest that addressing the fears of health-care workers may also be a function of time. Blumenfield et al. (1987) reported a significant decrease in fear over time among nurses working on the medical/surgical unit, a decrease the author suggest may be related to both experience and education. Polan and Achmin (1987) report that staff with prior experience in treating AIDS patients were less anxious than staff without such experience, with previous professional experience with AIDS patients associated with increases in both staff knowledge and clinical comfort in treating patients. As the impact of AIDS continues to spread, increasing numbers of health-care

professionals will be expected to gain experience in caring for persons with HIV infection, and may correspondingly develop a more accurate perception of their risk.

Actual Level of Risk of Occupational Exposure to HIV

A high degree of concern for personal safety remains despite documentation that the actual level of risk of transmission among health-care workers is relatively low. Since 1983 the Centers for Disease Control has conducted a national surveillance of health-care workers exposed to blood or body fluids from persons infected with HIV. As of July 31, 1988, 1,201 health-care workers exposed to infected blood through needlesticks, sharp object cuts, contamination of mucous membranes, open wounds, or non intact skin had been examined. Results indicate that the risk of becoming infected through a needlestick is less than 1%, and even less for other methods of exposure (Marcu & the CDC Cooperative Needlestick Surveillance Group, 1988). As of April 1988, only 22 HIV-infected health-care workers with no reported nonoccupational risk factors had been reported to the Centers for Disease Control, (1988b).

In response to the potential for HIV transmission via occupational exposures, the Centers for Disease Control has issued universal precautions to be used consistently for all patients in which there is a possibility for contact with blood and body fluids (See Appendix A). Under universal precautions, blood and certain body fluids of all patients are considered potentially infections (Centers for Disease

Control, 1988c). These precautions include taking care with needles and other sharp instruments by not recapping needles and disposing of them immediately in puncture proof containers. Appropriate protective barriers, which include gloves, masks, gowns, and protective eyewear, should be used in settings where contact with blood or other body fluids may occur.

To assess actual risk of exposure to HIV among health-care workers, during 1987 the Johns Hopkins Hospitals examined blood samples from patients at their inner-city emergency center. Initial findings suggested that HIV infection was confined to patients within a narrow age range and specific medical condition (Baker, Kelen, Siverston, & Quinn, 1987). A follow-up study conducted in 1988, however, indicates that HIV infection was broadly distributed among a wide range of age and medical conditions. While both studies demonstrated the potential risks for exposure to HIV, preliminary observations reveal that health-care workers were selectively applying universal precautions to those patients known or suspected to be infected with HIV (Kelen et al., 1988).

Following these studies, Johns Hopkins initiated a series of educational programs to inform health-care workers of potential risks of occupational exposure to HIV and train staff in the use of universal precautions. In addition, guidelines outlining expected precautions were posted throughout the hospital and the necessary equipment was

available at the entrance to all rooms (Kelen et al., 1989).

These efforts were then evaluated through direct observations of potential exposures to blood or body fluids and adherence to universal precautions (Kelen et al., 1989). Results revealed an overall adherence level of 44% to the guidelines of universal precautions. Differences in the levels of adherence were dependent on the medical condition of the patients. In treating patients with profuse bleeding, adherence was only 19.5%. Adherence during minor interventions was 64.8%, while only 16.5% during major interventions. Based on these findings, the researchers conclude that health-care providers are least likely to utilize precautions in situations that call for immediate intervention and highly skilled performance.

Findings of this research also reveal differences in overall adherence rates among hospital staff. The housekeeping staff had the highest rates of adherence (91%), followed by residents (58%), nursing staff (44%), consultants (43%), attending physicians (38%), x-ray technicians (14%), and paramedics (8%). When precautions were inadequate, surgical masks were used least (22.4%) followed by eye protection (45%), gowns (49.6%), and gloves (73.7%). The most common reasons given for not adhering to universal precautions were lack of time to put on protective materials (47%) and interference in performance (33%) (Kelen et al., 1989). The investigators of these studies conclude that strategies must be undertaken within health-care

settings to maximize provider protection.

Further research is warranted to investigate the levels at which health-care workers consistently practice the use of universal precautions. A state-wide survey of emergency medical service (EMS) professionals in the state of Michigan revealed a low utilization of consistent universal precautions (Michigan Department of Public Health, 1989a). Only 36.6% of EMS professionals surveyed reported the consistent use of gloves in the treatment of bleeding patients, and of those who had used needles in the previous three months, only 21.9% reported following Centers' for Disease Control guidelines for not recapping needles. Those emergency medical service professionals with higher levels of licensure, from the southeast part of Michigan, and who had treated or transported known or suspected persons with HIV infection, had significantly higher levels of consistent use of universal precautions. A similar survey of physicians in the state of Michigan reveals that 37% of those surveyed do not take proper precautions, such as wearing gloves when coming into contact with blood/body fluids (Heald, 1988).

Health-Care Workers' Attitudes Related to HIV

Pre-existing prejudicial attitudes toward those that with AIDS/HIV infection are another important factor surrounding the delivery of health care to persons with AIDS/HIV infection. Levine (1986) states that while most people have problems dealing with sexuality, homosexuality

is even more disturbing. Thus a disease such as AIDS, that in this society has been so closely associated with homosexuality, is seen as especially threatening. The association of intravenous drug use with crime, alienation, and antisocial behavior, creates a similar perception of fear.

Because health-care professionals are part of the larger segment of the American public, it is expected that they will share many of the same attitudes toward individuals infected with AIDS that have been expressed. For health-care workers, however, the implications of these attitudes are more serious, if they are allowed to play a role in determining the quality of care AIDS patients receive. Wachter (1986) explains that for the heterosexual health-care worker, the anxiety of dealing with a critically ill patient may be intensified by the patient's sexual orientation. This anxiety may make even more difficult the tasks of obtaining sexual histories, counseling patients about risk transmission, and dealing with the patient's family and lover. Levine (1986) offers an even more dangerous scenario whereby health-care workers who let "...disapproval of the patient's lifestyle interfere with medical judgement may fail to take actions that are in the patient's medical interests, or perhaps even worse, may take actions that work against the patient's interest" (p. 274).

Attitudes related to the provision of care. Recent surveys have revealed negative attitudes on the part of health-care workers related to the provision of services to HIV-infected individuals. Many health-care professionals have expressed reluctance to care for AIDS patients, and have argued for their rights to refuse care and be informed of a patients' HIV antibody status. A large number of respondents in the Pleck et al. (1988) survey, stated that a hospital worker should not be required to work with AIDS patients (42%). The survey by Brennan (1988) indicates that nearly half (47%) feel they have the right to refuse care to AIDS patients, although only 7% report actually refusing to care for someone with HIV infection.

Nearly a quarter (23.1%) of Registered Nurses surveyed by van Servellen et al. (1988) indicated that they would absolutely not accept a job caring for patients with AIDS. Only one in eight RNs indicated that they would accept this job without hesitancy. In addition, over half (53.6%) of the respondents indicated that nurses should be given the option to refuse to take care of patients with AIDS or those suspected to have AIDS-related symptoms.

These attitudes appear to generalize beyond practicing nurses, as revealed in a survey among a group of student nurses at Loyola University of Chicago (Wiley, Heath, & Acklin, 1988). Of 142 respondents surveyed, 53% agreed that nurses should be permitted to refuse an assignment to a patient with HIV infection, and 36% stated that if given the

option, they would refuse to treat a patient with AIDS. In addition, 75% agreed that all patients should be required to have HIV antibody tests upon admission, and that these antibody test results should be available to all personnel involved in patient care (87%).

Similar attitudes have also been found among health-care workers in the state of Michigan. In the survey of EMS professionals, 25.2% agreed that they should be able to refuse services to persons with HIV infection (Michigan Department of Public Health, 1989a). Six percent reported that they had refused treatment and 5.2% knew someone else who had refused treatment to persons known or suspected to be infected with the AIDS virus. In addition, 96.7% agreed that they should be notified if they treat a patient who is later found to have AIDS, 54% agreed that there should be a separate emergency medical transport especially designed to care for someone with the AIDS virus, and 32.1% stated that every patient should be tested for the virus even if the patient does not consent to testing. In the physicians survey, fewer than 20% were reluctant to treat AIDS patients, but the majority of respondents did agree that physicians should be able to order HIV antibody test without informed (58%) or written consent (69%) (Heald, 1988).

Attitudes toward HIV-infected patients. Recent studies have also revealed negative attitudes on the part of health-care workers directed towards individuals with AIDS/HIV infection. Using a measure of staff's perception of

patient's level of behavioral difficulty, Treiber et al. (1987) found that AIDS patients were perceived as more demanding, resistant, and at times withdrawn and unresponsive, when compared to a matched comparison with non-AIDS patients. Another comparison study found that both lay people and health-care personnel evaluate AIDS patients more negatively than either cancer, cardiac, or diabetic patients (Katz et al., 1987). In this study, AIDS patients were rated lowest of any group on measures of competence and moral worth, and subjects assigned this group higher ratings of social distance, rejecting persons with AIDS even as casual friends. In addition, AIDS patients were seen as most responsible for their illness.

Pleck et al. (1988) found that a small minority of the health-care workers they surveyed reported strongly negative attitudes towards AIDS patients, with 5% agreeing that "AIDS is God's punishment for immorality", and the same proportion disagreeing that "AIDS patients have as much right to quality medical care as anyone else." A slightly larger percentage of respondents acknowledged that AIDS patients morally offend them (16%), that they begrudged the high cost of care to AIDS patients (13%), and that they would be unable to continue a relationship with an acquaintance who developed AIDS (16.9%). Among the entire group of health-care workers surveyed, 48.3% disagreed that having a co-worker with AIDS would not bother them.

Despite the strong indication of negative attitudes in

this survey, several positive attitudes related to the care of AIDS patients, were also reported (Pleck et al., 1988). Over half reported that working with AIDS patients can be a rewarding experience, and agreed that it is important to go out of your way to be helpful to a patient with AIDS. This study also revealed that level of contact was associated with the type of attitudes health-care workers had about AIDS and persons with AIDS. Staff with low contact with AIDS patients had significantly more negative attitudes than did the staff that were involved in a high degree of contact.

A survey of 2,351 employees in a 455-bed acute-care teaching hospital in Minnesota also provides evidence supporting the relationship between attitudes and contact (Henry, Campbell, & Willenbring, 1990). Results reveal that having a greater numbers of previous contacts with AIDS patients or a family member or close friend with AIDS were associated with more positive attitudes toward AIDS patients and positive behaviors when interacting with AIDS patients.

In an attempt to experimentally examine health-care worker's attitudes toward AIDS patients, Kelly, St. Lawrence, Smith, Hood, and Cook (1987a) designed a study that in addition to assessing attitudes, revealed whether the source of negative attitudes was primarily associated with the disease or with provider discomfort with the sexual preference of most AIDS victims. Using an initial sample of medical students, subjects were asked to read one of four

possible vignettes which were identical except that the patient was identified as diagnosed with either AIDS or leukemia, and as being either homosexual or heterosexual. After reading a portrayal of one of the four patients, students were then asked to complete a set of measures to assess their attitudes toward the patient portrayed in the vignette.

Results of this study indicate that medical students view AIDS patients in a highly negative manner, as they do homosexual patients, regardless of their illness. While they did not find a significant interaction between disease and sexual preference, strong main effects for these factors were evident. When compared to leukemia patients on a scale of prejudicial evaluation, AIDS patients were evaluated as being more responsible for their illness, deserving of what happened to them, experiencing pain, dangerous to others, deserving to die, deserving to lose their jobs, and deserving to be quarantined. Regardless of which disease was involved, the homosexual patients were viewed as being more responsible for their illness, more dangerous to others, and suffering less pain than the heterosexual patients.

On a measure of social interaction, medical students were much less willing to converse with an AIDS patient than a leukemia patient, attend a party where he prepared food, work in the same office, continue a past friendship, renew his apartment lease, or allow their children to visit him.

Regardless of illness, students were less willing to interact, even in a casual manner with homosexuals than with heterosexuals.

In addition, when a patient was identified as homosexual, they were rated as less appropriate, more offensive, less truthful, less likable, inferior, less assertive, less attractive, and less intelligent than the heterosexuals along an interpersonal attraction inventory.

A replication of this study among a group of physicians revealed a similar pattern of results (Kelly et al., 1987b). When the study was repeated again with a group of 166 nurses, an interaction for disease type and sexual preference was found (Kelly et al., 1988). Homosexuals diagnosed with AIDS were the most negatively evaluated group in this study, and heterosexuals diagnosed with leukemia the least negatively evaluated group along the dimensions of prejudice, social interaction, and interpersonal attraction.

Attitudes related to homosexuality. Because of the close association of attitudes related to HIV-infected individuals and homosexuality, researchers have begun to investigate the role of these attitudes in the provision of care to persons with AIDS/HIV infection. In Pleck et al. (1988), 19.5% reported that AIDS had made them less tolerant of homosexuality and over 40% of those questioned agreed that if they got AIDS, they would worry that other people would think they were homosexual. In van Servellen et al. (1988), 48.5% of RNs reported that the average nurse was

uncomfortable in discussing sexual matters with male homosexuals and 38.4% reported a great deal or moderate level of discomfort in caring for these patients.

Douglas, Kalman, and Kalman (1985) used an index of homophobia scale to measure AIDS attitudes among a group of physicians and nurses in a large urban hospital. For the purpose of this study, homophobia was defined as the "constellation of affective responses, including fear, disgust, anger, discomfort, and aversion, that individuals may experience in contacts with homosexuals". Results revealed that scores fell in the low grade homophobic range, and that while there were no significant differences between physicians and nurses, men were significantly less homophobic than women. Nurses and physicians who acknowledged having a gay friend or relative had significantly lower scores, and nurses who had worked with a gay colleague also had significantly lower scores.

When asked a set of questions about AIDS and homosexuality, 32% of these physicians and nurses agreed that patients with AIDS receive inferior care compared to patients with other illnesses. Three percent of physicians and 12% of nurses agreed with the statement that "Homosexuals who contract AIDS are getting what they deserve," and 32% of physicians and 30% of nurses agreed that they feel more negatively about homosexuality since the emergence of AIDS.

Although this study suggests an association between

attitudes related to AIDS and those related to homosexuality, it failed to draw connections between individual scores on the scale of homophobia and response patterns for the attitude items. Thus while this study identifies strong negative attitudes on the part of health-care professionals, it fails to identify them as a function of homophobia (Douglas, Kalman, & Kalman, 1985).

A more recent study involving medical, nursing, and paramedical students attempted to make this connection between homophobia and AIDS-related attitudes (Royse & Birge, 1987). This study involved the assessment of attitudes through the use of four separate scales designed to measure empathy for persons with AIDS, fear of AIDS, social distance from AIDS victims, and homophobia. Results revealed that those students who scored high on the scale of homophobia were significantly more fearful, in need of greater social distance, and less empathetic towards AIDS victims. The measure of homophobia alone accounted for more than a third of the variation in each of these findings.

Pleck et al. (1988) also examined the relationship between homophobia and attitudes towards AIDS and AIDS patients, and found that the strongest predictor of these negative attitudes (measured on a scale of AIDS phobia), was homophobia. Similarly, Henry et al. (1990) found that low scores on a measure of homophobia were significantly associated with positive attitudes and behaviors towards AIDS patients. In a survey of 208 RNs in an urban hospital

in northern California, Barrick (1988) found that nurses with more negative attitudes toward gay men and lesbians were less willing to care for patients with AIDS than nurses with more positive attitudes. In addition, 25% felt AIDS patients should be quarantined to protect public health and 9% indicated that they would refuse to provide care.

Barrick (1988) argues that the implications of these and similar findings support the need for specific training components designed to "normalize relations with homosexual patients" in order to increase the willingness of health-care workers to care for individuals with AIDS/HIV infection. Management must be aware of the role of antihomosexual bias in the relationships between patients and providers and be willing to intervene appropriately.

HIV-Related Knowledge and Education

Following the initial identification of the problems associated with providing health care to persons with AIDS/HIV infection, educational efforts were undertaken to address the needs of health-care workers and evaluations of these efforts have attempted to measure the effectiveness of these programs. Research has focused on the evaluation of the impact of education on increasing health-care workers' levels of HIV-related knowledge. AIDS research outside the field of health care has identified this as an important area of study as greater knowledge of AIDS has been associated with more positive attitudes related to AIDS and with a lower level of fear. Studies among college students

have shown that greater knowledge is associated with greater empathy towards AIDS victims, lower levels of fear, and an increased willingness to interact with HIV infected individuals (Royse, Dhooper, & Hatch, 1987; Krupka & Vener, 1988).

Similar findings have been found among health-care professionals, with higher levels of knowledge associated with more positive attitudes and behaviors towards AIDS patients (Henry et al., 1990). Similarly in a survey of 741 hospital personnel in a 750-bed teaching hospital in New York, Valenti and Anarella (1986) found that those with a high level of understanding of disease were more likely to indicate no concerns in working with patients with AIDS.

In looking at the effects of inservice education on health-care workers, O'Donnell and O'Donnell (1987) surveyed hospital workers about their knowledge, perceptions of risks, and stresses associated with AIDS in 1985 and then again in 1986 after the institution of inservice education. They found that inservice training was associated with reductions in workers' reported stress, perception of risks, and negative attitudes, and with improvements in knowledge and satisfaction with the quality of care provided. These changes occurred despite a two-fold increase in the number of HIV-infected patients seen. These changes were not experienced by those who did not attend hospital inservice programs. While the educational intervention appeared successful, however, a sizable minority continued to

indicate a significant amount of misinformation regarding modes of HIV transmission.

Wertz, Sorenson, Liebling, Kessler, and Heeren (1988), found similar results, reporting that 1,247 health-care providers attending educational programs experienced significant improvements in accuracy of knowledge and a shift toward more favorable attitudes. A one month follow-up on a subgroup of this sample found that these changes had remained significant.

Turner, Gauthier, Ellison, and Greiner (1988) report the results of an evaluation of a 5-hour seminar designed to increase knowledge of AIDS and universal precautions and resolve attitudes. Nurses in both the experimental (attended seminar) and control (did not attend seminar) groups increased from pre-test to post-test on knowledge and attitudes, with the experimental group scoring slightly higher and improving again on 30 day post test. In both groups there was a positive correlation between knowledge and attitudes and confidence in caring.

The researchers theorize that the improvement in the control group may have been due to a raised consciousness and willingness to learn after the administration of the pre-test. If survey methods prove to motivate learning, the investigators suggest the use of self-contained modualized lessons with pretest post-test format.

In a similar pre-test/post-test evaluation of an educational component Lawerence and Lawerence (1989) found

that RNs with master and doctoral degrees were more knowledgeable and had more positive attitudes than nurses with entry level positions and that RNs with more knowledge indicated more positive attitudes. Based on the findings of this evaluation, the researchers conclude that lectures and small group discussion will be effective in both increasing knowledge and changing attitudes.

Assessments of knowledge levels will be an important component in the effort to alleviate the problems related to AIDS care. While the survey of EMS professionals in Michigan revealed high average scores on measure of knowledge, less than one in three agreed that training in this area was sufficient (Michigan Department of Public Health, 1989a).

Implications

Research thus far has revealed a need to assess levels of knowledge, attitudes, and precautionary behaviors related to the care of people with AIDS/HIV infection among health-care workers. Because of their level of contact with patients, nurses are a particularly important target group for these efforts. Nurses, who engage in more direct physical contact and spend the most time with patients will increasingly encounter HIV-infected individuals as the spread of AIDS continues. It is necessary to assess nurses' attitudes related to AIDS to determine the extent to which negative attitudes may play a role in the development of their relationships with patients, the quality of their

interactions, and the psychological comfort of both nurses and patients. Negative attitudes on the part of nurses would highlight the need for specific training to address the sources of these attitudes.

Nurses must also have an appropriate perception of their risk to ensure high levels of care and consistent practice of appropriate precautions. The assessment of HIV-related knowledge and the use of precautionary behavior will identify barriers to the provision of services to individuals with HIV, and areas in which education is needed. This process will assist in ensuring quality levels of care to persons with AIDS/HIV infection and environments that provide support and resources to health-care workers.

While past research has focused on health-care workers in areas with high prevalence of HIV infection and on those actively involved in the care of AIDS patients, research has yet to examine the impact of AIDS among health-care workers in areas with low prevalence of HIV infection or among those with little or no contact with AIDS patients. Previous research has identified a need to ensure that nurses in all areas of the country and practicing in different clinical areas and employment settings are adequately prepared to provide quality care and apply universal precautions.

Present Study

The present study assesses HIV-related knowledge, attitudes, and precautionary behavior among a large random sample of Registered Nurses in the state of Michigan,

allowing for the examination of HIV-related issues among nurses with a wide range of experiences, exposure, and backgrounds related to AIDS/HIV infection. As of March 1, 1991, 2,120 cases of AIDS in Michigan had been reported (Michigan Department of Public Health, 1991).

Along with contributing to the development of reliable measurement instruments and the replication of previous findings, this study is also important in that it assesses multiple dimensions of the impact of AIDS/HIV infection on health-care workers. This allows for the study of the processes involved in the interaction of HIV-related variables and in the prediction of critical aspects of the problems related to AIDS currently affecting health-care workers. Understanding how these dimensions interact with one another will be essential in the design of interventions aimed at alleviating the negative implications of AIDS on the health-care system.

While no previous studies have been conducted among RNs in Michigan on a large scale, similar studies among physicians and emergency medical service professionals in Michigan have revealed a pattern of knowledge, attitudes, and behavior similar to that found in other studies involving health-care workers (Heald, 1988; Michigan Department of Public Health, 1989a).

The level at which universal precautions are consistently utilized is assessed along with barriers to the use of precautions. This is especially important in view of

the current information indicating low levels of consistent use of precautions among health-care workers.

This study also assesses Registered Nurses' current level of knowledge related to AIDS/HIV infection. This assessment serves as a baseline measurement of knowledge among nurses in Michigan and identifies important areas in which further education is needed. HIV-related training is assessed to evaluate the need for future interventions.

The current study also assesses attitudes related to the care of persons with AIDS. Nurses were questioned about their attitudes related to level of comfort in providing services to persons with AIDS/HIV infection and their perception of risk for occupational exposure to HIV infection. In addition, level of actual risk of potential exposure to HIV, along with level of personal and professional contact with persons with HIV infection is assessed.

In addition, demographic and employment information is collected to examine the relationships between age, level of training, medical specialty, and current employment position and the other variables assessed.

Finally, the current study includes an exploration of the processes involved in the provision of care to patients infected with HIV. This research built upon previous findings, which has identified many of the relationships between HIV-related variables, to construct and test a model of the processes involved in predicting level of comfort in

providing care and use of universal precautions.

Hypotheses

Based on the relationships among HIV-related variables revealed in previous research, the following hypotheses were tested:

1. Higher levels of knowledge are associated with lower levels of perceived risk.

2. Higher levels of personal and professional contact with people with HIV-infection are associated with higher levels of knowledge and lower levels of perceived risk.

3. Higher levels of training are associated with higher levels of knowledge and lower levels of perceived risk.

In addition to these hypotheses, the utility of each of these constructs in predicting the criterion variables of precautionary behaviors and level of comfort in providing care to persons with AIDS/HIV infection were assessed. All possible predictive paths were tested. Predicted relationships about a subset of these paths included the following:

4. Higher levels of knowledge, personal and professional contact, and training and lower levels of perceived risk predict a higher level of comfort in providing care to persons with HIV infection.

5. Higher levels of knowledge, professional contact, and training predict higher levels of utilization of universal precautions.

Finally, the relationships between the demographic and employment variables and all other variables were explored along with their utility in predicting the outcome variables of level of comfort and use of universal precautions.

CHAPTER II

Method

Sampling Procedures

Registered Nurses, currently licensed and living in the state of Michigan, served as the data source for this study. Michigan had 80,289 licensed RNs in Fall, 1988 (Michigan Department of Management and Budget, 1989).

A random sample of 3,468 Registered Nurses was selected by office personnel of the Michigan Nurses Association. Names and addresses were obtained from the Department of Licensing and Regulation's 1988 registry of licensed RNs in Michigan.

Survey Procedures

Surveys were distributed in two separate mailings to each member of the sample. The first mailing was sent in August, 1989. The cover letter accompanying the first mailing identified the Michigan Department of Public Health and the Michigan Nurses Association as the source of the survey and explained the purpose of the study. Respondents were assured that their participation was voluntary and that all information would remain anonymous. A self-addressed stamped envelope accompanied the survey and respondents were

provided with instructions on how to return the completed questionnaire.

The second round of questionnaires were sent two weeks after the initial mailing. This mailing included a different cover letter that encouraged the participation of nonresponders and asked those who had already responded to ignore and discard the second mailing.

Of the 3,468 questionnaires which were mailed, 1,777 were returned by October, 1989. Three hundred twenty-one questionnaires were nondeliverable and returned unopened, and 153 incomplete questionnaires were returned stating that the addressee was retired, no longer employed as a nurse, or deceased. When the original sample of 3,486 was reduced to 3,083 after excluding the unopened and incomplete surveys, the final sample of 1,777 respondents represents a response rate of 58%.

Of 1,777 completed questionnaires which were received, 22 were excluded because the participant reported working outside of Michigan or because the questionnaire bore an out-of-state postmark. In addition, respondents that reported no longer being active in the nursing profession were excluded from the analyses, resulting in a final sample size of 1,530. Sample sizes for the different analyses varied due to incomplete surveys and are clarified for all reported analyses.

Sample Characteristics and Representativeness

The Michigan Department of Management and Budget (1989) analyzed survey information received from RNs whose licenses were up for renewal in 1988, in combination with data maintained by the Department of Licensing and Regulation, to estimate the current RN supply in Michigan (See Appendix B for a complete description of methodology used to estimate current RN supply). This information, which describes the population of RNs at the time of data collection for the current study, was used to assess sample representativeness.

Comparative data for survey and population RNs along the demographic and employment variables of age, degree, and hours worked/week are presented in Table 1. An observation of the between-group differences among percentages of respondents in each category reveal that the sample RNs closely matched the population in terms of number of hours worked/week and highest degree obtained. Sample RNs differed slightly from the population along the characteristic of age, with Registered Nurses from the youngest and the oldest age categories under-represented in the sample.

In this study's sample the average age of the respondents was 41 years (SD=9.97). Almost all of the respondents were female (97%) and the great majority were white (94%). While respondents reported performing nursing duties in 69 of Michigan's 83 counties, nearly 40% reported performing duties in the greater Detroit area (Wayne,

Table 1

Comparison Statistics for Licensing RNs and Survey RNs

Variable	Licensing RNs	Survey RNs
Hours Worked/Week		
Full Time*	42,341 (65%)	974 (64%)
Part Time	22,708 (35%)	584 (36%)
Degree		
Nursing Diploma	12,399 (36%)	512 (37%)
Associate Diploma	12,225 (35%)	413 (30%)
Baccalaureate Nursing	8,846 (25%)	394 (28%)
M.A./Ph.D. Nursing	1,358 (4%)	67 (5%)
Age		
0-29	12,419 (15%)	171 (11%)
30-39	27,957 (35%)	592 (39%)
40-49	19,177 (24%)	436 (29%)
50 and older	20,697 (26%)	317 (21%)

* Full-time status for licensing RNs was defined as 35 or more hours/week and for survey RNs as 30 or more hours/week.

Oakland, and Macomb counties). An analysis of employment characteristics revealed that over half of the respondents (64%) reported working full-time, as defined as 30 or more hours worked/week, in a wide range of clinical areas of practice. The majority of RNs reported working in direct patient care employment settings, providing both acute (51.0%) and nonacute (25.5%) care. Nearly equal percentages of respondents reported highest degree obtained as either a Diploma in Nursing (34.2%), a Baccalaureate in Nursing or other field (29.9%), or an Associate Degree in Nursing (27.6%). Eight percent of the sample reported having obtained a Master or Doctoral degree in nursing or other field.

Statistics on the numbers of reported cases of AIDS in each Michigan county from 1981 to November 1, 1989 (Michigan Department of Public Health, 1989b) were used to categorize counties by number of AIDS cases. Each Michigan county was placed in one of six categories: 1) no reported cases; 2) 1-10 cases; 3) 11-20 cases; 4) 21-30 cases; 5) 31-50 cases; and 6) 51 to 500 cases. Each respondent was then assigned a category value for the county in which the respondent reported currently performing the majority of their nursing duties. The largest percentage of nurses (41%) reported working in counties in the highest category of numbers of reported cases of AIDS, with only 4.4% of respondents reporting employment in counties with no reported cases of AIDS.

Measures

Successive drafts of the survey instrument were developed in collaboration with the Michigan Nurses Association (MNA). Members of the MNA's Task Force on HIV Infection administered the questionnaire as a pilot test to a small group of RNs. Respondents completed the questionnaire in the presence of a task force member and were instructed to think aloud as they completed the survey by expressing their reactions to each question. Task force members noted any part of the survey which was unclear or confusing or with which respondents were uncomfortable.

Seventeen Registered Nurses participated in the pilot test. Results of the pilot test along with comments and suggestions from the MNA Task Force on HIV Infection were used to draft the final measure (See Appendix C).

Multi-item scales were developed following rational considerations regarding the primary constructs for this study. Mean item scale scores were computed for all respondents who had completed at least 67% of the scale items.

A reliability analysis was conducted for each set of items, yielding a measure of internal consistency for each scale. While the importance of assessing reliability of the constructs is evident, it is unclear which type of reliability is important. For scales which include items that must be assessed for multiple situations, items may not be expected to be internally consistent. Additional efforts

at estimating reliability were taken for these measures which include the scales of knowledge, actual risk, and universal precautions. Parallel forms of each of these three measures were constructed by splitting items while controlling for the primary underlying dimensions of difficulty of knowledge items, intensity of risk of potential exposure, and frequency of use of precautions. Split-half coefficients were then computed for these three measures.

The variables of HIV-related knowledge, training, perceived and actual risk of exposure to HIV, barriers to the use of universal precautions, and professional and personal contact with persons infected with HIV were designated as mediating variables. These variables have been identified by previous research as important dimensions in how health-care workers deal with the issues surrounding HIV infection/AIDS.

Mediating measures. The scale of HIV-related knowledge included 12 items assessing knowledge of risk of transmission, transmission modes, and policy. Respondents were asked to indicate their level of risk of becoming infected with HIV from a needlestick, feeding a patient, changing sheets on a patient's bed, being coughed or sneezed on, large amounts of blood splashed on open sores, large amounts of blood splashed in the eye, performing mouth-to-mouth resuscitation with a protective device, and direct skin-to-skin contact. This scale also included items which

asked if it is possible to become infected with HIV by being bitten by a mosquito or other insect, if in Michigan it is possible to receive a free test for HIV infection without giving your name, if premarital testing for sexually transmitted diseases and HIV is required, and whether or not an individual must receive counseling on sexually transmitted diseases, including HIV, to obtain a marriage license.

Responses for items assessing knowledge of risk of HIV transmission were recoded. For items representing situations in which there was a potential risk of HIV transmission, responses indicating some degree of risk were scored as correct answers. For items representing situations in which there was no potential risk for transmission, responses indicating no risk were scored as correct answers. "Don't know" responses were recoded as incorrect answers. A reliability analysis for scale items of HIV-related knowledge revealed a Guttman split-half coefficient of .54 and an internal consistency coefficient (alpha) of .51. The different dimensions of HIV-related knowledge (risk of transmission, transmission modes, and policy) that are assessed within this scale, may have contributed to this marginal level of internal consistency.

The scale of HIV-related training included 4 items assessing previous training in the areas of clinical and emotional needs, use of universal precautions, and working effectively with family and friends of patients infected

with HIV. A reliability analysis for these items revealed satisfactory internal consistency (alpha =.76).

An index of perceived risk for HIV infection through occupational exposures was calculated from responses to the two items which asked participants what they believe their chances are of becoming infected with HIV as a result of their nursing duties and if they believe the precautions they take while working are adequate to protect them from infection. These two items were significantly correlated (r=.32), and (because of the low number of items) had marginal internal consistency (alpha=.47). Marginal internal consistency between these items may reflect that the perceived adequacy of precautions is only one of many factors that contributes to the perception of risk for HIV infection. This would explain why when most respondents agreed that the precautions they take while working are adequate to prevent them from becoming infected, there was a great deal of variance in responses to the item assessing chances for infection resulting from their nursing duties.

Four items designed to assess occupational exposures with potential for HIV infection were used to develop a scale of actual risk of exposure to HIV infection. A series of questions asked participants whether or not they had used needles when caring for a patient, had accidently stuck themselves with a needle which had been used on a patient, handled blood or body fluids or cared for a bleeding patient, or attempted to resuscitate a patient, within the

previous three months. A reliability analysis for these items yielded a Guttman split half coefficient of .31 and an internal consistency (alpha) of .25. Low internal consistency among these items may reflect a specialization of labor within health-care settings. For example, nurses trained in intravenous therapy may have been most likely to report using needles, but may not have been involved in handling blood or body fluids, or caring for a bleeding patient.

Four items assessing difficulties in the use of protective measures were used to compute an index of barriers to the use of universal precautions. Respondents were asked to indicate which physical barriers prevented them from consistently utilizing precautions. A reliability analysis for these items yielded marginal internal consistency (alpha=.61).

Respondents were asked to indicate how many times, in the past three months, they have cared for a patient whom they knew or suspected to be infected with HIV. This question (Care for PWH) served as a single item measure of professional contact. Respondents were also asked if they knew someone infected with HIV personally. This question (Know PWH) served as a single item measure of personal contact.

Outcome measures. Four items assessed level of comfort in caring for persons infected with HIV. Participants were asked to indicate their level of agreement with the

following statements: 1) I would be willing to provide the routine services which are my responsibility to a patient infected with HIV; 2) I would feel comfortable caring for a male homosexual patient; 3) I would feel comfortable caring for an intravenous drug user; and 4) I would feel comfortable caring for an infant infected with HIV. A reliability analysis yielded good internal consistency (alpha =.82).

Responses to 7 items assessing the use of universal precautions during situations involving potential exposure to HIV infection were used to compute an index of use of universal precautions. Respondents indicated which precautions they had used and how frequently they had used them following the use of a needle, the handling of blood or body fluids or care of a bleeding patient, or resuscitating a patient. Responses were receded as either "precaution used" or "precaution not used". A reliability analysis for this scale yielded a Guttman split-half reliability coefficient of .53 and an internal consistency coefficient (alpha) of .47. Again, this marginal index of internal consistency may reflect that the large range of job situations in which nurses might use precautions are not highly related.

CHAPTER III

Results

Data Analysis Strategy

Descriptive statistics were computed for items and multi-item scales in order to examine frequencies and measures of central tendencies including means, median, modes and standard deviations. Frequencies for item responses are reported in Appendix C. Pearson correlations tested the strength and direction of the predicted relationships among the mediating variables of knowledge, training, perceived risk, actual risk, barriers, Care for PWH, and Know PWH.

A hierarchical multiple regression program was conducted to examine the predictive associations between demographic, employment, and mediating variables and the outcome variables of universal precautions and level of comfort.

Two sets of analyses were conducted to explore a theoretical model of causal processes involved in predicting the outcome measures of universal precautions and level of comfort. A path analysis using the methods of hierarchical regression was conducted to explore a theoretical model of causal processes involved in predicting these outcome

variables. A multivariate analysis of covariance was conducted to analyze variance accounted for by the employment variables of clinical area and employment setting, within the path model. Additional regression and path analyses were conducted after revising the model, based on the results revealed in the original analyses. A significance level of $p < .01$ was adopted for all analyses.

Descriptive Analyses

RNs' knowledge of HIV. Correct responses to items assessing knowledge of the risk of HIV transmission are available in Table 2. Overall, respondents demonstrated a high level of knowledge of viable routes of HIV transmission. When asked to consider their risk of HIV-infection when caring for someone infected with the virus, the majority of participants indicated correctly that HIV can be transmitted via needlestick (99.5%), from large amounts of blood splashed on open sores (99.7%) and from large amounts of blood splashed in the eyes (97.4%).

While nurses were overwhelmingly aware of the viable routes of HIV transmission, and their subsequent risk for HIV infection through these exposures, there was less agreement concerning risk for HIV infection from activities that represent nonviable routes of HIV transmission. Substantial percentages of respondents incorrectly indicated that they were at risk for HIV infection when engaged in the following activities: 1) feeding a patient (43.2%); 2) changing sheets on a patients bed (55.9%); 3) being coughed

Table 2

Responses to Items Assessing HIV-Related Knowledge

	Response		
HIV Knowledge Item	RISK	NO RISK	DON'T KNOW
Viable Routes of HIV Transmission			
Needlestick	1518 (99%)	4 (.3%)	3 (.2%)
Large amounts of blood splashed on open sores	1519 (99%)	2 (.1%)	3(.2%)
Large amounts of blood splashed in the eye	1462 (97%)	12 (.8%)	27 (2%)
Nonviable Routes of HIV Transmission			
Coughed or sneezed on	1217 (80%)	266 (18%)	24 (2%)
Mouth-to-mouth resuscitation with a protective device	505 (74%)	359 (24%)	28 (2%)
Changing sheets on a patient's bed	834 (55%)	664 (44%)	8 (.5%)
Feeding a patient	639 (43%)	858 (57%)	9 (.6%)
Skin-to skin contact intact skin	439 (29%)	1055 (70%)	17 (1%)

	Responses		
HIV Knowledge Item	AGREE	DISAGREE	DON'T KNOW
HIV-Transmission Modes and Policy			
HIV acquired from an insect bite	205 (13%)	877 (58%)	439 (29%)
HIV counseling mandatory in Michigan to receive a marriage license	965 (63%)	298 (20%)	261 (17%)
Premarital testing for STD's (incl. HIV) required in Michigan	538 (35%)	773 (51%)	205 (13%)
Possible to receive free and anonymous HIV test in Michigan	773 (51%)	199 (13%)	554 (36%)
Pregnant woman can infect unborn child	1504 (99%)	4 (.3%)	19 (1%)

or sneezed on (82.3%); 4) resuscitating a patient with a protective device (75.9%); and 5) from skin-to-skin contact (30.2%).

With respect to modes of HIV transmission and HIV-related policy (See Table 2), almost all respondents (98.5%) indicated correctly that a pregnant woman infected with HIV can give it to her baby. Only 57.7%, however, correctly disagreed with the statement that it is possible to become infected with HIV from an insect bite. Over 6 out of 10 (63.3%) participants correctly reported that counseling on sexually transmitted disease, including HIV is mandatory in Michigan in order to receive a marriage license. Only half (51.0%) of the respondents, however, were aware that free anonymous testing is available in Michigan.

Knowledge scale scores for each respondent were computed. A score of 0.00 represents all incorrect answers while a score of 1.00 represents all correct answers. The knowledge scale scores had a normal distribution (skewness =.03), and the sample mean was M=.60 (range= 0.00 to 1.00, n=1,524) with a standard deviation SD= 0.15.

HIV-related education and training of RNs. Many participants reported that they had received training and education related to AIDS and HIV infection. Over 69% of respondents reported that AIDS education had been offered at their workplace and of this group, 86.9% indicated that they had attended at least one of these programs in the past 3months. The most frequently reported topics that were

covered in these programs were universal precautions and an overview of AIDS which generally included information on transmission, etiology, and prevention.

Overall, the sample reported that they had spent an average of 3.81 hours (SD=5.04) in HIV education programs in the last three months. When examining other sources of information about HIV infection used in the past three months, the most commonly reported sources were the general news media (81.2%), professional journals (67.3%), and other health-care professionals (46.2%).

Items assessing past and future training needs reveal that the majority of respondents had previous training in the use of universal precautions (89.6%), with 35.7% of participants indicating that they feel they need training or further training in this area. Fewer respondents indicated, however, that they had received training in addressing the clinical (39.1%) and emotional needs (31.5%) of persons infected with HIV, and less than 20% (19.3%) reported having received training for dealing with the family and friends of these patients. Three-quarters of respondents indicated that they believe they need training or further training in these areas.

Training scale scores for each respondent were computed. A score of 0.00 represents no training received in any of the four areas while a score of 1.00 represents training received in all four areas. The training scale scores had a normal distribution (skewness=.64), and the

sample mean was M=.45 (range = 0.00 to 1.00, n=1,398) with a standard deviation SD= 0.32.

Perceived risk of occupational exposure to HIV. Overall, nearly one-fourth of the respondents perceived their chances of becoming infected with HIV as a result of their nursing duties as "medium" (22.9%), with 10.2% responding "high" and 8.7% responding "none". The majority of respondents reported their risk as "low" (58.3%). The majority of respondents agreed or strongly agreed that the precautions they used were adequate to protect them from HIV infection (84.7%), however, 42.3% indicated that their family and friends were very worried that they may become infected with HIV as a result of their work as a nurse.

Perceived risk scale scores for each respondent were computed. A score of 1.00 represents low perceived risk of HIV infection while a score of 4.00 represents high perceived risk of HIV infection. The perceived risk scale scores had a normal distribution (skewness=.40), and the sample mean was M=2.15 (range = 1.00 to 4.00, n=1413) with a standard deviation SD= 0.56.

Potential exposures to HIV infection. Reported exposures to biologic materials with potential for HIV infection were examined to determine individual levels of actual risk for exposure to the AIDS virus during the three months prior to the completion of the survey. The most commonly reported exposure was the use of a needle (85.6%) and of these nurses, 12.7% reported sticking themselves with

a needle that had been used on a patient. The second most commonly reported exposure involved the handling of blood or body fluids or care of a bleeding patient (82.6%) Only 22.5% reported performing mouth-to-mouth resuscitation. Forty-one respondents (2.7%) reported that they had requested HIV antibody testing because they believed they had been accidentally exposed to HIV on the job.

Actual risk scale scores for each respondent were computed. A score of 0.00 represents no potential exposures while a score of 1.00 represents all potential exposures. The actual risk scale scores has a normal distribution (skewness=-.55), and the sample mean was M=.51 (range = 0.00 to 1.00, n=1,522) with a standard deviation SD= 0.24.

Contact with persons with HIV. The impact of AIDS on the nursing profession is evident in that nearly half of all respondents indicated caring for at least one patient infected with HIV in the three months previous to the survey. In response to the question that assessed professional contact (Care for PWH), 37.8% of respondents reported caring for 1-5 patients infected with HIV, and an additional 6.3% reported caring for 6 or more patients known or suspected to be infected with HIV, within the previous three months. Over half (56.0%) indicated that they had not cared for a patient known or suspected to be infected with HIV in the three months prior to the completion of the survey. Overall, 16.6% reported that they personally knew someone (Know PWH) infected with HIV.

Respondents who indicated caring for at least one patient infected with HIV responded to a series of follow-up questions assessing the nature and level of their contacts with these patients. Substantial numbers of these respondents reported that they had discussed medical (36.3%) and social/psychological (26.2%) concerns related to HIV with these patients more than once within a three month period. These RNs also reported discussing medical (22.8%) and social/psychological (18.7%) concerns related to HIV with the families and friends of these patients more than once within the same three month period.

RN's attitudes toward caring for persons with HIV. Attitudes related to the care of persons with HIV infection/AIDS are reported in Table 3. Overall, most respondents indicated favorable attitudes with 98.6% indicating that individuals infected with HIV deserve the same quality of medical treatment as other individuals and 97.0% agreeing that persons known or suspected to be infected with HIV should be treated with compassion regardless of how they became infected. RNs did indicate, however, that they were not comfortable working with coworkers infected with HIV, with over four out of 10 respondents (41.3%) disagreeing with the statement than an infected coworker would not bother them and 35.5% agreed that they should have the right to select the patients they care for.

The majority of respondents agreed or strongly agreed

Table 3

Attitudes Related to the Provision of Medical Services to Individuals Infected with HIV

Attitudinal Statements	Responses			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Willing to provide services which are my responsibility to a patient with HIV	491 (33%)	897 (60%)	109 (7%)	7 (.5%)
Would feel comfortable caring for male homosexual patient with HIV	330 (22%)	871 (58%)	255 (17%)	53 (3%)
Would feel comfortable caring for IVDU with HIV	280 (19%)	804 (53%)	370 (25%)	49 (3%)
Would feel comfortable caring for infant with HIV	395 (26%)	800 (53%)	269 (18%)	39 (3%)
A coworker with HIV would not bother me	197 (13%)	682 (45%)	518 (35%)	101 (7%)
Persons with HIV should be viewed with compassion regardless of how infected	694 (46%)	776 (51%)	43 (3%)	2 (.1%)
Individuals infected with HIV deserve same quality of treatment as others	726 (48%)	764 (51%)	20 (1%)	1 (.1%)

that they would be willing to provide routine care to a patient infected with HIV (92.2%), and would feel comfortable caring for the following patients infected with HIV: a gay male (79.6%), an intravenous drug user (72.1%) and an infant (79.5%). Only 1.7% reported that they had refused care to a patient because that patient was known or suspected to be infected with HIV (n=26), however 248 respondents (16.4%) reported that they were aware of others who had refused care. In both cases, the most commonly cited reasons for refusal to care were pregnancy and fear of exposure, and to a lesser extent attitudes toward persons with AIDS and lack of precautions.

Level of comfort scale scores for each respondent were computed. A score of 1.00 represents a low level of comfort in providing care while a score of 4.00 represents a high level of comfort in providing care. Level of comfort scales scores had a normal distribution (skewness=-.13), and the sample mean was $\underline{M}$= 3.38 (range = 1.00 to 4.00, n=1517) with a standard deviation $\underline{SD}$= 0.47.

Use of universal precautions. Nursing professionals reported precautionary measures utilized during each of the three exposures potentially capable of leading to HIV infection. Of those who either handled blood or body fluids or cared for a bleeding patient, the most frequently and consistently used precautions were the use of gloves and puncture resistant containers. A majority of respondents (70.9%) reported using gloves and puncture resistant

containers (89.5%) "almost always". Over a quarter of these respondents, however, reported using gloves only "sometimes" and 6% reported using gloves "almost never". Respondents were less likely to report the use of bleach or disinfectant (58.9%), protective eyewear (35.4%) or gowns (40.9%).

Of those who used needles when treating patients, only 38.7% reported the use of the Centers' for Disease Control recommended safe procedure of not recapping needles. Those who reported recapping a needle were significantly more likely to have reported accidently sticking themselves with a needle (χ^2=20.56, p <.001). One out of ten respondents who reported recapping a needle also reported a needlestick while only 3% of those who did not report recapping a needle reported accidently sticking themselves with a needle. Of those who reported performing mouth-to-mouth rescusitation, 5.9% reported performing this procedure without a protective device.

Universal precaution scale scores for each respondent were computed. A score of 0.00 represents no precautions utilized during potential exposures while a score of 1.00 represents all precautions utilized during potential exposures. Precaution scales scores had a normal distribution (skewness=-.15), and sample mean was M=.62 (range = 0.00 to 1.00, n=1,262) with a standard deviation SD= 0.22.

Barrier scale scores for each respondent were also computed. A score of 0.00 represents no barriers reported

while a score of 1.00 represents all barriers reported. Barrier scale scores had a normal distribution (skewness=.37), and the sample mean was M=.36 (range =0.00 to 1.00, n=1467) with a standard deviation of SD=.31. Among those responding to these items, 14.2% indicated that gloves and other protective equipment were not readily available, with much larger percentages of respondents indicating that gloves and other protective equipment were awkward (53.8%) or poorly constructed (41.8%), and that gloves were not the right size (33.7%). Other barriers cited by respondents were lack of time in emergency situations and that use of precautions makes the performance of nursing duties difficult, such as when starting IVs. Overall 79.1% said that they were required to wear gloves and of these, 97.6% agreed with this policy.

Relationships Among HIV-Related Variables

Correlational analyses were conducted to test the strength and direction of the relationships between the mediating variables of knowledge, training, perceived risk, actual risk, barriers, Care for PWH, and Know PWH. Pearson correlations were computed for the predicted relationships between these variables as outlined in the hypotheses (See page 34) and are presented in Table 4. In addition to these predicted correlations, all other relationships between these variables were tested for significance. A significance level of $p < .01$ was adopted.

Perceived risk showed the greatest number of strong,

Table 4

Pearson Correlations Among HIV-Related Variables (n=1003)

	2	3	4	5	6	7
1 Perceived Risk	.30*	-.24*	-.11*	.17*	-.04	.22*
2 Actual Risk	---	-.07*	-.07*	.36*	-.00	.15*
3 Knowledge		---	.12*	-.04	.04	-.10*
4 Training			___	.14*	.15*	-.07*
5 Care for PWH				___	.16*	.12*
6 Know PWH					___	.03
7 Barriers						---

*p < .01

significant relationships to the other variables. As predicted, higher levels of perceived risk were associated with lower levels of knowledge (r=-.24) and lower levels of training (r=-.11). Opposite to the prediction, higher levels of perceived risk were associated with higher levels of professional contact with PWH (r=.17). In addition higher levels of perceived risk were also associated with higher levels of actual risk (r=.30) and with higher levels of reported barriers to the use of universal precautions (r=.22). Support for a correlation between personal contact and perceived risk was not evident.

As predicted, higher levels of HIV-related knowledge were associated with higher levels of training (r=.12) and in addition were found to be associated with lower levels of

reported barriers to the use of precautions (r=-.10).

Actual risk for potential exposure to HIV was strongly correlated with Caring for PWH (r=.36) and barriers to the use of universal precautions (r=.15). A higher level of actual risk was also associated with lower levels of knowledge (r=-.07) and training (r=-.07).

Higher levels of training were positively correlated with care for PWH (r=.14) and know PWH (r=.15), and were negatively correlated with barriers to the use of universal precautions (r=-.07).

Finally, caring for a greater number of individuals with HIV infection was positively correlated with personally knowing someone infected with HIV (r=.16) and with a higher level of reported barriers to the use of universal precautions (r=.12). Contrary to predictions, neither professional or personal contact correlated significantly with knowledge.

Exploratory Causal Pathways Among HIV-Related Variables

Multiple regression, path analysis, and multiple analysis of covariance were conducted to analyze variance accounted for by each of the variables in predicting outcome measures of universal precautions and level of comfort and to explore a theoretical model of causal processes.

Hierarchical regression analyses were conducted to examine the amount of variance in the outcome measures accounted for by the demographic, employment, and mediating variables. Two-step regression equations were computed for

the two criterion variables, universal precautions and level of comfort. See Table 5 for a summary of results. The first variables entered were the demographic and employment variables. At the second step the mediating variables of knowledge, training, Care for PWH, Know PWH, barriers, perceived risk and actual risk were entered into the regression equation. The demographic and employment variables accounted for little variance in the outcome measures. The mediating variables, while contributing to significant changes in R^2, accounted for only marginal levels of variance. The final regression equation accounted for only 7% percent of the precaution variance (F (11,955) = 6.61, $p < .001$) and 20% of level of comfort variance (F

Table 5

Hierarchical Regressions Predicting Use of Universal Precautions and Level of Comfort (n=967)

	Universal Precautions		Level of Comfort	
Step Predictor Variables	R^2 Change	F	R^2 Change	F
1 Demographic /Employment: Age, Degree, County, Hours Worked/Week	.01	2.68	.03	6.65*
2 Mediating Variables: Perceived Risk, Care for PWH, Actual Risk, Training, Knowledge, Barriers, Know PWH	.06	8.77*	.17	29.03*

* $p < .01$

(11,955)=21.39, $p < .001$).

A path analysis was conducted to explore a theoretical model of causal processes involved in predicting the outcome variables of use of universal precautions and level of comfort in caring for patients infected with HIV. Many of the relationships between the HIV-related variables had been identified in the previous research. This analysis was an initial attempt to construct and test a model of these variables and the processes involved in predicting the use of precautions and level of comfort. Hierarchical regression analyses utilizing SPSS-X was chosen to test the predictions of the path model due to the exploratory nature of the analysis.

The proposed model to be tested predicted the following relationships:

1. Higher levels of knowledge, personal and professional contact, and training, and lower levels of perceived risk predict a higher level of comfort in providing care to persons with HIV infection.
2. Higher levels of knowledge, training and professional contact predict higher levels of use of universal precautions.

Finally, this model proposed the exploration of the relationships between the demographic and employment variables and all other variables were explored along with their utility in predicting the outcome variables of level

of comfort and universal precautions. Because the testing of this model was exploratory in nature, all possible relationships between variables (complete path model) were tested.

In the first set of equations, the mediating characteristics (knowledge, training, Care for PWH, Know PWH, barriers, perceived risk, and actual risk) served as criterion (endogenous) variables and the demographic and employment variables were the predictor (exogenous) variables. In the second set of equations, the two outcome variables (universal precautions and level of comfort) were the criterion variables and both the background variables and the mediating variables were the predictors.

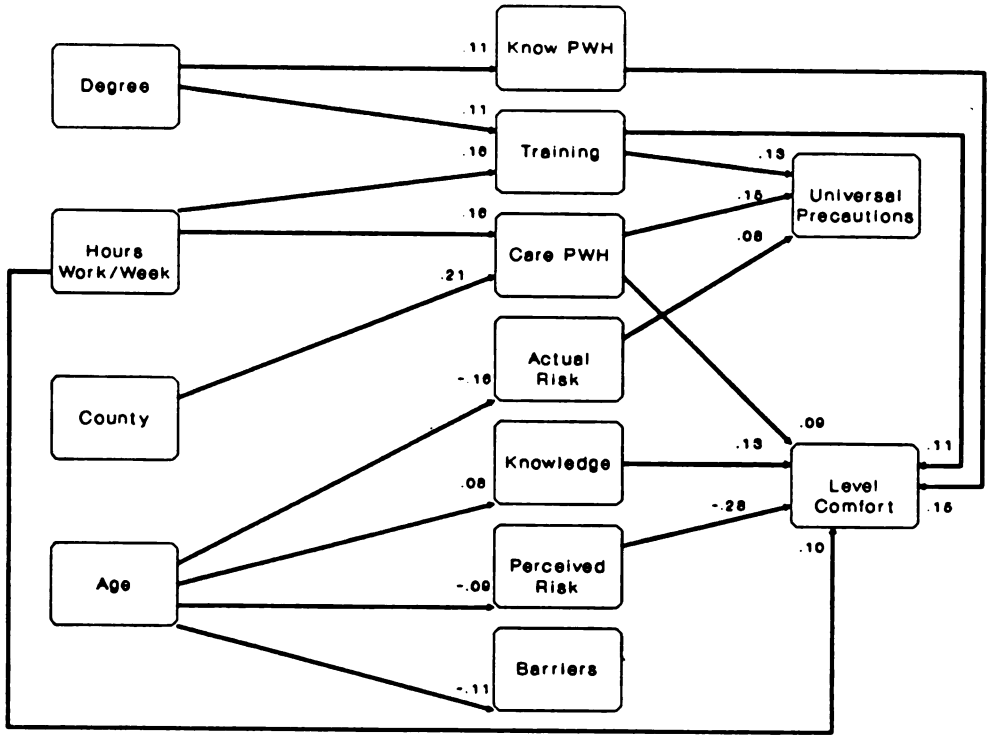
Statistically significant coefficients ($p < .01$) are reported in Figure 1. Final results of the path analyses revealed several statistically significant relationships between the demographic/employment variables and the other variables.

These relationships were as follows:

1. Working more hours/week was associated with a higher level of contact to patients infected with HIV and a higher level of HIV-related training, and a higher level of comfort in caring for persons with HIV.
2. Working in counties with higher numbers of reported AIDS cases was associated with caring for more patients infected with HIV.

Figure 1.

Original Path Model n=967 ($p < .01$)



3. Having obtained an advanced degree was associated with a higher level of HIV-related training. RNs with an advanced degree were also more likely to report personally knowing someone infected with HIV.
4. Being younger was associated with a lower level of knowledge, a higher level of perceived risk of HIVinfection, and a higher level of actual risk, and more reported barriers to the use of universal precautions.

The statistically significant relationships between the mediating variables and the outcome variables are as follows:

1. Personally knowing someone with HIV infection and higher levels of Care for PWH, training, knowledge, and perceived risk were associated with more favorable attitudes indicating comfort in caring for persons with HIV.
2. Higher levels of Care for PWH, training and actual risk were associated with a higher level of use of universal precautions.

Two employment variables that were originally proposed to be included in the regression and path analysis were analyzed separately through a multiple analysis of covariance. The categories for the variables of employment setting and clinical area had greatly unequal sample sizes, with kurtosis and skewness values indicating gross

violations of normality. Because of these unequal sample sizes, tolerance levels were exceeded in the regression analysis, and the dummy coded variables representing the categories with the largest number of respondents could not be entered into the regression equations.

Because these variables were thought to be important predictors, a multiple analysis of covariance was conducted to examine the relationships between employment setting and clinical area and the other variables in the path model. The multiple analysis of covariance was designed to analyze the differences that these two variables accounted for in an approach parallel to how the variables would have been entered in the original multiple regression and path analyses.

The association of clinical area of practice with the mediating variables and with the outcome variables was examined in two separate MANCOVAS. The first MANCOVA examined between-group differences among the clinical area groups and the dependent variables of training, Care for PWH, Know PWH, barriers, knowledge, perceived risk, and actual risk with the effects of county, age, employment setting, degree, and hours worked/week covaried out. Means and standard deviations for each cell are reported in Table 6. The multivariate test was significant (Pillais V=.23; est. F (56,7546)=4.66, p<.001). Clinical area accounts for significant variance among the mediating variables after controlling for variance contributed by the other employment

Table 6

Means (and Standard Deviations) for HIV-Related Variables for Different Areas of Nursing Practice

Dependent Variable	Area of Nursing Practice					
	Education	Medical/ Surgical	Gerontology	Community Health	Maternal/ Child	Psychiatric/ Mental Health
	n=104	n=399	n=61	n=86	n=162	n=56
Knowledge	.66 (.16)	.58 (.14)	.56 (.16)	.65 (.16)	.60 (.14)	.62 (.17)
Care PWH	1.30 (.52)	1.66 (.63)	1.10 (.30)	1.37 (.55)	1.38 (.56)	1.43 (.53)
Perceived Risk	1.96 (.55)	2.25 (.58)	1.99 (.41)	1.99 (.48)	2.21 (.48)	1.87 (.57)
Actual Risk	.31 (.28)	.58 (.19)	.45 (.22)	.42 (.20)	.53 (.18)	.39 (.18)
Training	1.49 (.34)	1.43 (.31)	1.36 (.28)	1.61 (.37)	1.38 (.28)	1.56 (.33)
Barriers	.33 (.31)	.40 (.31)	.35 (.29)	.30 (.29)	.39 (.30)	.26 (.29)
Know PWH	1.17 (.38)	1.14 (.35)	1.13 (.34)	1.26 (.44)	1.11 (.31)	1.21 (.41)

Table Continues.

Table 6 (cont'd.)

Dependent Variable	Area of Nursing Practice: Emergency n=83	Doctor's Office n=62	Intensive Care n=79	Sample n=1092	F df=(8,1078)	Eta
Knowledge	.57 (.16)	.67 (.13)	.57 (.15)	.60 (.15)	4.64*	.03
Care for PWH	1.95 (.64)	1.43 (.59)	1.67 (.59)	1.53 (.62)	9.23*	.06
Perceived Risk	2.39 (.56)	2.10 (.55)	2.30 (.51)	2.17 (.56)	3.25*	.02
Actual Risk	.71 (.16)	.53 (.17)	.68 (.16)	.53 (.22)	14.68*	.10
Training	1.41 (.29)	1.35 (.33)	1.43 (.27)	1.44 (.32)	4.36*	.03
Barriers	.49 (.29)	.28 (.26)	.38 (.29)	.37 (.30)	1.59	.01
Know PWH	1.20 (.41)	1.18 (.38)	1.11 (.32)	1.16 (.36)	2.88*	.02

*$p < .01$

and demographic variables.

The results of post-hoc univariate tests are presented in Table 6. The following results were significant at $p < .01$:

1. RNs practicing in the areas of gerontology, emergency, medical/surgical and intensive care had lower mean knowledge scores. RNs practicing in doctors' offices had the highest mean scores.
2. RNs in the clinical areas of emergency, medical/surgical and intensive care had the highest mean scores which indicates that they were caring for the greatest number of HIV infected patients.
3. RNs in the clinical areas of medical/surgical, emergency, intensive care and maternal child health had higher mean scores on the scale of perceived risk.
4. RNs in the clinical areas of emergency, intensive care, and medical/surgical had the highest mean actual risk scores.
5. RNs in the clinical areas of education and community health had the highest mean training scores.
6. RNs in the clinical areas of emergency, community health, and psychiatric mental health were more likely to personally know someone infected with HIV.

The second MANCOVA examined between-group differences among the clinical area groups and the outcome variables of level of comfort and universal precautions with the effects of all other variables in the model covaried out. Means and standard deviations for each cell are reported in Table 7. The multivariate test was significant (Pillais V=.07: est. F (16,1818)=4.34, p<.001). Clinical area accounts for significant variance among the outcome variables after controlling for variance contributed by dependent, employment and demographic variables. Post-hoc univariate test results are presented in Table 7. RNs in the clinical areas of intensive care, emergency, and medical/surgical had the highest mean scores on the scale of universal precautions.

The association of employment setting with the mediating variables and with the outcome variables was also examined in two separate MANCOVAS. The first MANCOVA examined between-group differences among the employment setting groups and the dependent variables of training, Care for PWH, Know PWH, barriers, knowledge, perceived risk, and actual risk with the effects of county, age, clinical area, degree, and hours worked/week covaried out. Means and standard deviations for each cell are reported in Table 8. The multivariate test was significant (Pillais V=.25; est. F (21,3153)=13.64, p < .001). Employment setting accounts for significant variance among the dependent variables after controlling for variance contributed by the other employment

Table 7

Means (and Standard Deviations) for Outcome Variables for Different Areas of Nursing Practice

Dependent Variable	Area of Nursing Practice					
	Education	Medical/ Surgical	Gerontology	Community Health	Maternal/ Child	Psychiatric/ Mental Health
	n=53	n=372	n=46	n=61	n=147	n=35
Universal Precautions	.63 (.23)	.64 (.21)	.56 (.21)	.51 (.21)	.62 (.22)	.49 (.20)
Level of Comfort	3.11 (.63)	3.02 (.52)	3.03 (.61)	3.15 (.61)	2.91 (.60)	3.11 (.54)

Table Continues.

Table 7 (cont'd.)

Dependent Variable	Area of Nursing Practice					
	Emergency	Doctor's Office	Intensive Care	Sample	F	Eta
	n=82	n=57	n=77	n=930	df=(8,909)	
Universal Precautions	.65 (.20)	.47 (.23)	.68 (.19)	.61 (.22)	8.20*	.07
Level of Comfort	3.06 (.56)	3.01 (.55)	2.97 (.49)	3.02 (.56)	.74	.01

*p < .01

Table 8

Means (and Standard Deviations) for HIV-Related Variables for Different Employment Settings

Dependent Variable	Employment Setting						
	Direct/ Acute	Direct/ Nonacute	Indirect/ Admin.	Indirect/ Education	Sample	F	Eta
	n=605	n=307	n=116	n=36	n=1064	df=(3,1055)	
Knowledge	.57 (.15)	.63 (.15)	.63 (.16)	.64 (.16)	.60 (.15)	10.51*	.03
Care for PWH	1.70 (.63)	1.35 (.55)	1.30 (.51)	1.22 (.42)	1.54 (.62)	24.85*	.07
Perceived Risk	2.30 (.55)	2.08 (.54)	1.86 (.45)	1.93 (.54)	2.17 (.56)	22.19*	.06
Actual Risk	.62 (.17)	.48 (.19)	.33 (.26)	.27 (.27)	.54 (.22)	71.83*	.17
Training	1.42 (.29)	1.41 (.33)	1.55 (.36)	1.54 (.36)	1.54 (.35)	5.21*	.01
Barriers	.42 (.30)	.31 (.29)	.32 (.29)	.37 (.35)	.37 (.30)	7.92*	.02
Know PWH	1.14 (.35)	1.19 (.39)	1.15 (.36)	1.19 (.40)	1.16 (.36)	1.08	.00

*$p < .01$

and demographic variables.

Post-hoc univariate test results are presented in Table 8. The following results were significant at $p < .01$:

1. RNs employed in direct/acute care had the lowest mean knowledge scores.
2. RNs employed in direct/acute care had the highest mean Care for PWH scores which indicates that were caring for the greatest number of HIV infected patients.
3. RNs employed in direct/acute care had the highest mean scores on the scale of perceived risk.
4. RNs employed in direct/acute care had the highest mean scores on the scale of actual risk.
5. RNs employed in indirect care, in administrative and the scale of training.
6. RNs employed in direct/acute employment settings reported more barriers to the use of universal precautions.

The second MANCOVA examined between-group differences among the employment setting groups and the outcome variables of level of comfort and universal precautions with the effects of all other variables in the model covaried out. Means and standard deviations for each cell are reported in Table 9. The multivariate test was significant (Pillais V=.05: est. F (6,1800)=8.19, $p<.001$). Employment setting accounts for significant variance among the outcome variables after controlling for variance contributed by the

Table 9

Means (and Standard Deviations) for Outcome Variables for Different Employment Settings

Dependent Variable	Employment Setting: Direct/ Acute	Direct/ Nonacute	Indirect/ Admin.	Indirect/ Education	Sample	F	Eta
	n=578	n=258	n=62	n=18	n=916	df=(3,900)	
Universal Precautions	.65 (.21)	.52 (.21)	.65 (.21)	.69 (.18)	.61 (.22)	16.05*	.05
Level of Comfort	2.99 (.54)	3.01 (.58)	3.21 (.55)	3.29 (.63)	3.02 (.56)	.82	.00

*$p < .01$

dependent, employment and demographic variables.

Post-hoc univariate test results are presented in Table 9. RNs employed in direct/nonacute settings reported lower levels of use of universal precautions, while RNs employed in other areas reported nearly equal levels of use.

Follow-up Multivariate Analyses

After conducting the regression and path analysis, the original model was revised to allow for additional exploratory analyses of the relationships between all variables and the causal processes operating to predict the outcome measures of universal precautions and level of comfort. From the original analyses it was evident that the variable of perceived risk had the greatest number of strong relationships with the other variables. The strongest, significant path coefficient identified in the original path analysis was between perceived risk and level of comfort. It was predicted that this model would identify additional significant relationships between the mediating variables and perceived risk, allowing for an examination of both direct and indirect relationships to the outcome variables.

The model was expanded taking into account the causal principle of temporal precedence. Perceived risk was placed after the mediating variables and preceding the outcome variables. This new model accounts for the principle of temporal precedence by proposing that the variables of knowledge, Care for PWH, Know PWH, training, actual risk, and barriers initially operate to influence perceived risk

which in turn influences the outcome variables.

Three-step regression equations were computed for the precaution index and level of comfort scale. See Table 10 for a summary of results. The first variables entered were the demographic and employment variables. At the second step, the mediating variables of knowledge, Care PWH, Know PWH, training, actual risk, Know PWH, and barriers were entered. At the third step, perceived risk was entered. The variable of perceived risk alone accounted for 7% of level of comfort variance. The complete regression equations accounted for 7% percent of the precaution variance (F (11,955) =6.61, $p < .001$) and 20 percent of

Table 10

Hierarchical Regressions Predicting Use of Universal Precautions and Level of Comfort (n=967)

	Universal Precautions		Level of Comfort	
Step Predictor Variables	R^2 Change	F	R^2 Change	F
1 Demographic /Employment: Age, Degree, County, Hours Worked/Week	.01	2.68	.03	6.65*
2 Mediating Variables: Care for PWH, Actual Risk, Training, Knowledge, Barriers, Know PWH	.06	10.18*	.10	18.48*
3 Mediating Variable: Perceived Risk	.00	.33	.07	82.83*

* $p < .01$

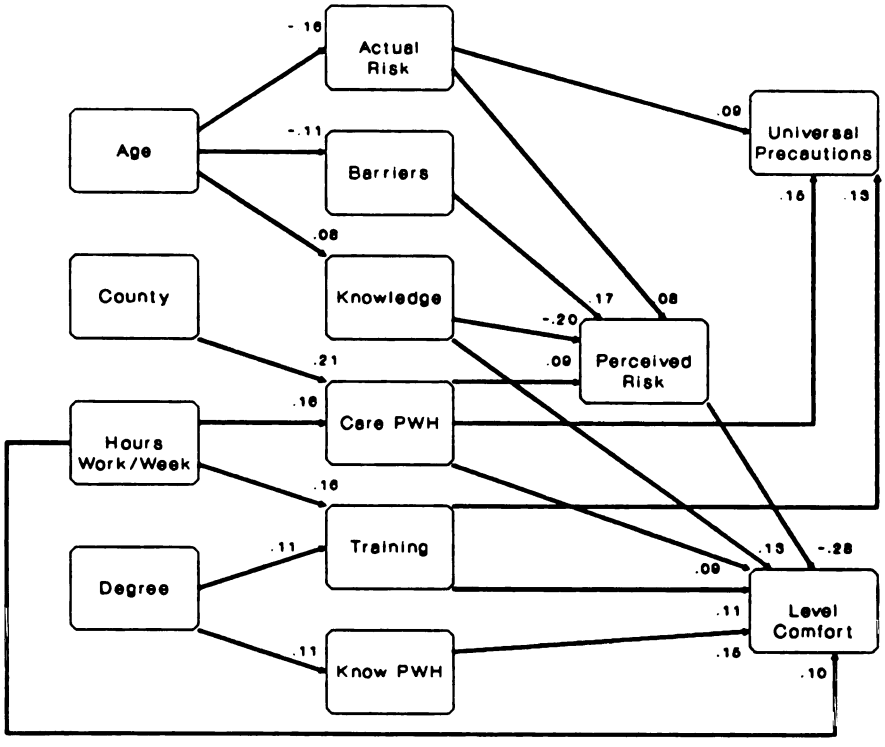
level of comfort variance (F (11,955) = 21.39, p < .001).In the follow-up path analysis, the mediating variables (knowledge, training, Care for PWH, actual risk, Know PWH, and barriers) served as criterion (endogenous) variables and the demographic and employment variables were the predictor (exogenous) variables in the first set of equations. In the second set of equations, perceived risk served as the criterion variable and both the background variables and the mediating variables were the predictors. In the third set of equations, willingness and universal precautions were the endogenous variables and all previous variables were the exogenous variables.

Statistically significant coefficients (p < .01) are reported in Figure 2. Final results of the path analyses revealed several statistically significant relationships between the demographic/employment variables and the other variables. These relationships were as follows (p<.01):

1. Having obtained an advanced degree was associated with a higher level of training and a higher level of professional contact.
2. Being younger (age) was associated with more reported barriers to the use of universal precautions, a higher level of actual risk, and a lower level of knowledge.
3. Working in counties with more reported cases of AIDS was associated with caring for a higher

Figure 2.

Revised Path Model n=967 ($p < .01$)



number of patients with HIV (Care for PWH).

4. Working more hours/week was associated with a higher level of training, caring for a higher number of patients with HIV, and higher level of comfort.

The statistically significant relationships between the demographic/ employment and mediating variables and the variable of perceived risk and the outcome variables of universal precautions and willingness were as follows:

1. A higher level of actual risk was related to a higher level of perceived risk and a higher level of use of universal precautions.
2. Reporting a greater number of barriers was associated with a higher perceived risk.
3. Lower levels of knowledge were associated with higher perceived risk and a lower level of comfort.
4. Caring for a greater number of patients with HIV (Care for PWH) was associated with a higher level of perceived risk and higher level of use of universal precautions and comfort in caring for persons with AIDS/HIV infection.
5. Higher levels of training were related to higher levels of use of universal precautions and comfort.
6. Personally knowing someone with HIV (Know PWH) was associated with a higher level of comfort.

7. A higher level of perceived risk was associated with less comfort in caring for persons with AIDS/HIV infection.

CHAPTER IV

Discussion

Health-care professionals in all areas of the country are currently experiencing the growing impact of AIDS and HIV infection. As the epidemic of AIDS progresses, it can be predicted that an increasing number of Registered Nurses, along with other health-care workers, will come into contact with patients with AIDS/HIV infection. Efforts must be taken now to address the related behaviors and concerns of all health-care professionals.

Use of Universal Precautions

Results of this research identify a critical need to address the issues surrounding precautionary behaviors. Findings which include: 1) nearly all of the RNs surveyed indicated exposure to biologic materials which have potential for HIV transmission; 2) over 40% of RNs had recapped a needle; 3) 12% of RNs had stuck themselves with a needle which had been used on a patient; and 4) 30% of RNs reported the inconsistent use of gloves, illustrate an acute need to ensure that nurses are aware of the risk of potential exposure to HIV and are properly applying universal precautions.

While many RNs were not consistently applying

precautions, it is important to note that the level of utilization was dramatically higher when compared to emergency medical service (EMS) professionals surveyed in 1989 (Michigan Department of Public Health, 1989a). Among EMS professionals, who are medically trained to treat and transport emergency patients from a field to a hospital setting, only 36% reported the consistent use of gloves, compared to 70% of RNs in the current study who reported using gloves "almost always". Only 20% of EMS professionals had followed Centers' for Disease Control guidelines for not recapping needles, compared to a 40% compliance rate among RNs. The nature of emergency situations that call for immediate intervention and highly skilled performance, situations in which Kelen et al. (1989) observed that health-care providers are least likely to utilize precautions, may explain why EMS professionals reported lower rates of utilization of precautions.

The importance of addressing barriers to the use of universal precautions was evident in the results of this study. While the majority of respondents were aware of and in agreement with policy regarding universal precautions in their work place, many respondents indicated barriers which prevented the use of precautions. Similar to health-care professionals at Johns Hopkins Hospitals (Kelen et al., 1989), respondent RNs cited lack of time and interference in performance as significant barriers to the use of precautions.

Comfort with Providing Care to HIV-Infected Persons

This study also investigated the concerns of health-care workers related to the provision of care to persons infected with HIV. Over 90% of respondents indicated that they would be willing to care to patients infected with HIV and over 70% of respondents reported that they would feel comfortable in providing this care. This level of comfort appears to be higher than cited in previous studies. For example, 35% of health-care workers in Pleck et al. (1988) reported that they were uncomfortable in caring for persons infected with HIV and Link et al. (1987) identified 25% who would not continue to care for AIDS patients if given a choice and 39% who would ask for a transfer in they had to care for an AIDS patient on a regular basis.

These differences may represent a shift in attitudes among health-care workers. Efforts to educate and train health-care professionals, during the period marked by initial research efforts to the time of the current study, may have influenced levels of comfort and willingness. The current study identified both training and knowledge as predictors of comfort. These findings support the predicted associations based on previous research which identified a relationship between higher levels of training and comfort (O'Donnell & O'Donnell, 1987; Wertz et al., 1988) and higher levels of knowledge and comfort (Royse and Birge, 1987; Krupka and Vener, 1988; Turner et al., 1988; Lawerence & Lawerence, 1989). These findings support the possibility

that the level of willingness and comfort among RNs in the current study may have been influenced by training and education.

While it is encouraging to note that most respondent RNs reported favorable attitudes, it is important to recognize the need to address the concerns of a significant number of nurses who indicated that they would not feel comfortable or willing to care for patients infected with HIV. In the current study, 35% of RNs indicated that they should have the right to select the patients they care for. While this question was not specific to patients with AIDS, responses were consistent with previous findings which illustrate that health-care professionals believe that they have the right to refuse care (Brennan, 1988; Michigan Department of Public Health, 1989a) or should not be required to care for persons with AIDS/HIV infections (Pleck et al., 1988; van Servellen et al., 1988).

Despite the numbers indicating that they have the right to select the patients they care for, only 1.7% of respondents reported that they had refused to care for a patient they knew or suspected to be infected with HIV. A much larger number of participants (16%), however, reported that they had known another nurse who had refused to care. The percent of respondents refusing to care in the current study is less than in previous research in which 6-7% of respondents reported refusing to care (Brennan, 1988; Michigan Department of Public Health, 1989).

It is also interesting to note that over 42% of RNs indicated that it would bother them to work with an infected coworker. This is a much higher percentage than that identified by Blendon and Donelan (1988) in which 25% of the general public indicated that they would refuse to work alongside a person with AIDS, but similar to Pleck et al. (1988) in which 48% reported that a coworker with AIDS would bother them. While this expressed reluctance may be a part of the larger issues surrounding negative attitudes toward people with AIDS, it may also reflect a concern that infected coworkers pose a risk for HIV infection to their patients or coworkers. Future research should examine the source of this reluctance to work with someone infected with HIV.

All of these concerns have direct implications for the quality of care provided to persons with AIDS/HIV infection. Future efforts to examine and address the source of these attitudes must be undertaken to determine the extent of the role that attitudes play in the development of health-care workers' relationships with patients, the quality their interactions, and their psychological comfort. These efforts will be vital in ensuring high levels of care to infected persons and the well-being of health-care professionals.

Perceptions of Risk

In addition to examining issues surrounding the HIV-related behaviors and concerns among RNs, the current study

identified variables that play a role in predicting the use of universal precautions and level of comfort. The perceived risk of HIV infection through occupational exposure was identified as a critical factor in relation to these and other variables. Results of this study support previous findings that the fear of contagion is a critical issue among health-care professionals (Reed et al., 1984; Pleck et al., 1988; van Servellen et al., 1988). While the majority of respondents perceived their risk to be low, significant numbers of RNs perceived their risk to be "medium" (23%) or "high" (10%). Level of perceived risk appears to be much lower in the current study, however, when compared to the 1989 survey of EMS professionals in which 60% of respondents perceived their risk to be "very high" or "somewhat high" (Michigan Department of Public Health, 1989a).

Knowledge and perceived risk. HIV-related knowledge was strongly associated with perceived risk. Results supported the hypothesis and previous research findings which identified a significant relationship between higher levels of perceived risk and lower levels of knowledge (Valenti & Anarella, 1986; Royse and Birge, 1987; Krupka and Vener, 1988). Similarly, results supported the predicted relationship and prior research which demonstrated that higher levels of training are associated with lower levels of perceived risk (O'Donnell & O'Donnell, 1987). These findings highlight the need for training and education to

impact perceived risk as it is evident that those RNs who had received more training and had higher levels of knowledge had a lower perceived risk.

Contact with HIV-infected patients and perceived risk. The current research did not support the hypothesis that predicted that a high level of contact is associated with a low level of perceived risk as identified in Blumenfield et al. (1987), Polan and Achmin (1987), and Pleck et al. (1988). In the current study, RNs with the highest level of contact with patients with AIDS/HIV infection reported the highest levels of perceived risk.

It is important to note that there was no significant relationship to support the hypothesis which predicted that a high level of contact is associated with a high level of knowledge. In this study, RNs who had cared for the greatest number of HIV-infected patients did not have significantly higher knowledge scores. It appears that "first-hand" knowledge gained from contact with infected persons did not translate into higher scores on the measure of HIV-related knowledge. The relationship between contact and perceived risk identified in the current study suggests that RNs who were most active in caring for persons with HIV infection may have responded out of anxiety and fear to the items assessing knowledge, a response which would have lowered, rather than increased, knowledge scores.

These findings identify the need for continued training and education for nurses who are actively caring for

patients infected with HIV. Efforts must be taken to increase knowledge and ensure that these nurses have an accurate perception of their risk. In addition, continued assessment will be necessary to observe any changes in these relationships over time. Polan and Achmin (1987) conclude that both experience and education assist in ensuring that health-care professionals have an accurate perception of their risk. Future research is necessary to examine changes in perceived risk that correspond to increases in the numbers of nurses and other health-care professionals who come into contact with persons with HIV infection.

Universal precautions and perceived risk. While several relationships between perceived risk and other HIV-related variables were identified, it is important to note that actual risk, rather than perceived risk, was identified as a significant predictor of universal precautions. Those RNs reporting the highest number of exposures to biologic materials with potential for HIV infection reported the highest levels of use of precautions. This finding suggests that actual risk of potential exposure may be a stronger predictor of use of universal precautions than perceived risk.

Comfort and perceived risk. Results of this study clearly identify perceived risk as a major predictive component of level of comfort. This finding supports the prediction based on previous research which identified a relationship between a low level of perceived risk and a

high level of comfort (Eccles, 1988). From this relationship, it appears that any attempt to increase the level of comfort and willingness among health-care workers must include efforts to address the perception of risk of occupational exposure to HIV.

Results of this survey reveal a number of significant relationships between perceived risk and the other HIV-related variables and identify perceived risk as a pivotal factor in the prediction of level of comfort. Based on these findings, an exploratory analysis was conducted to identify the variables that predict perceived risk. Within the path model, several variables were identified as significant predictors of perceived risk. Higher levels of actual risk, contact, and barriers and lower levels of training and knowledge predicted higher levels of perceived risk. Many of these variables were also significant predictors of use of precautions or comfort with caring for infected persons. What follows is a discussion of this study's findings surrounding these variables.

Knowledge About AIDS/HIV Infection Of the variables predicting perceived risk, knowledge was identified as the strongest of these predictors. An assessment of knowledge in the current study revealed that while most of the respondent RNs were able to correctly identify the major routes of HIV transmission, many misconceptions about nonviable means of HIV transmission were reported. Along with these misconceptions, there also appears to be a fairly

high level of misunderstanding surrounding Michigan policies and laws related to HIV.

Some of the information surrounding current policies and laws related to HIV resulted from state-wide legislation enacted in 1988. The current levels of misconceptions among RNs concerning requirements for premarital testing and obtaining a marriage license may reflect inadequate dissemination of this information at the time of the survey.

Misconceptions surrounding the risk of transmission may reflect a lack of correct knowledge or understanding of nonviable transmission routes. The strong association between knowledge and perceived risk identified in the current study alternatively suggests that fear for personal safety may have contributed to the current level of misconceptions.

The importance of addressing these misconceptions is apparent from the results of this study. As discussed previously, higher levels of knowledge are directly related to comfort in caring for persons infected with HIV. Knowledge is also indirectly related to comfort in that higher levels of knowledge predicted lower levels of perceived risk which in turn predicted higher levels of comfort in providing care. Efforts to increase knowledge must be undertaken to ensure that nurses, along with other health-care professionals, are comfortable and willing in providing care to persons with AIDS/HIV infection.

HIV-Related Training

The current study identifies AIDS-related training as a critical factor in addressing the concerns and behaviors of health-care workers. Results support the hypothesis that higher levels of training are correlated with higher levels of knowledge. While the current research did not assess changes in knowledge as a result of training, the nature of the relationship is consistent with the research that identified increases in knowledge following participation in HIV-related training (O'Donnell & O'Donnell, 1987, Wertz et al., 1988).

The importance of training is apparent in the findings that relate training to both level of comfort and use of precautions. As discussed previously, higher levels of training predict a higher level of comfort. Results also supported the prediction based on previous research that identifies training as a predictor of use of precautions (Michigan Department of Public Health, 1989a). From this study it is evident that those with higher levels of training were more likely to use precautions.

Contact with Infected Persons

Contact with persons known or suspected to be infected with HIV was also identified as an important factor related to behaviors and attitudes. Results supported the prediction based on previous research that identified professional contact with patients with HIV infection as a predictor of comfort (Polan and Achmin, 1987; Pleck et al.,

1988; Henry et al., 1990). In addition, this study supported the previous research that identified personal contact with someone with HIV as a predictor of comfort (Henry et al., 1990).

Results also supported the prediction based on previous research which identified professional contact as a predictor of use of precautions (Michigan Department of Public Health, 1989a). Those RNs who were caring for the greatest number of patients infected with HIV reported the highest levels of use of precautions. It appears from this finding that RNs with the greatest need for precautions were utilizing precautions most frequently. While it is encouraging to observe high rates of utilization among this group of RNs, it is imperative that all nurses apply precautions universally when involved in situations that involve potential exposure to HIV.

The current study reveals additional differences among RNs who reported caring for the greatest numbers of patients infected with HIV. Nurses in direct/acute settings and in the clinical areas of emergency, medical/surgical, and intensive care reported caring for the greatest number of patients infected with HIV. These RNs, who were working in settings with a higher frequency of medical procedures and interventions that involve potential for exposure to HIV, had lower mean knowledge scores and reported both higher levels of perceived and actual risk.

These nurses appear to have been most heavily impacted

by the issues that surround AIDS/HIV infection in the health-care setting. Surprisingly these RNs did not have the highest training scores. This finding suggests that a sufficient level of training has not been directed towards those RNs with the highest level of need. While all nurses need basic information and training related to AIDS/HIV infection, these results support the need for intensified and specialized efforts to address the concerns of RNs in specific clinical areas and employment settings.

Methodological Concerns

Concerns which threaten the external validity of results may limit their generalizability. In this study, confidence in the ability to generalize findings is supported by a response rate of 58%, which is satisfactory for anonymous surveys of large populations, and by the comparison of the sample to the population that reveals that it is representative. Generalizability of the results of this survey, however, are limited to nurses who are actively employed.

Threats to internal validity in the current study include measurement error resulting from the limitations of using self-report questionnaires. The present study utilized the method of self-report to ask RNs about their knowledge, perceptions, attitudes, and experiences related to AIDS/HIV infection. The sensitive and controversial nature of these questions contributes to the possibility of response bias. While reliance on self-report data may

account for possible reliability problems, however, this would account for lower, not higher correlations.

Steps were taken to reduce this source of error. The measure was developed in collaboration with the Michigan Nurses Association and was piloted among a group of nurses. Results of the pilot test along with comments and suggestions from the MNA Task Force on HIV Infection were used to develop a clear and concise measure.

Follow-up measures that include multiple methods of assessment of HIV-related knowledge, attitudes and behaviors will be necessary to establish the reliability of the current study's findings. Suggestions for strengthening the methodology of the assessment of HIV-related variables include the measurement of attitudes as indicated by changed behavioral intention rather than positive or negative attitudes or beliefs (Turner et al., 1988).

Behavioral observations used in conjunction with self-report measures would serve to increase the reliability of measures that assess the use of precautions. In addition, an accurate measure of the utilization of universal precautions must include an assessment of which precautions are required in a specific situation and a determination of whether or not those precautions were used. Results of this study that reveal the inconsistent utilization of additional precautions (i.e. use of gowns, eyewear, bleach or disinfectant.....) are limited in their interpretation as this survey did not assess the appropriateness of each

precaution to the specific situations involving potential exposure to HIV. For example, respondents with low precaution scale scores may still have been following the guidelines of universal precautions if they were involved in situations in which the use of protective eyewear or gowns were not necessary. Likewise, respondents with high precaution scale scores may have been utilizing precautions that were unnecessary given the potential for exposure in a particular situation.

Additional limitations of the current study result from measures being taken at one point in time, limiting the ability to make causal statements or draw strong conclusions about causality. Longitudinal research will be critical in addressing this limitation and will allow for an observation of the changes over time as the AIDS epidemic unfolds.

Finally, many of the effect sizes in the current study are small and caution must be exerted in the conclusions that are drawn. Small effect sizes in this study may have resulted from the diversity among sample respondents. This study examined HIV-related variables among RNs representing a wide range of ages, degrees, levels of education, and different clinical and employment settings in different areas of the state. The heterogeneity of the sample may have significantly lowered effect sizes.

Implications for Research, Training and Policy

The current study had several important implications for the continued research investigating the issues that

surround health-care professionals and AIDS/HIV infection. Research must examine the specific components of HIV-related attitudes including fear, anger, prejudice and homophobia and identify the role that these factors play in determining the quality of care provided to persons infected with HIV and the psychological well-being of health-care workers. While the current study did not assess attitudes related to homosexuality and the role of homophobia in the provision of care to persons with AIDS/HIV infection, previous research had identified this as an important component of AIDS-related attitudes (Douglas et al., 1985; Royse & Birge, 1987; Barrick, 1988; Pleck et al., 1988; van Servellen et al., 1988; Henry et al., 1990).

The current study also identifies a need for additional research to assess the appropriate utilization of universal precautions. Future research will be necessary to assess accurate rates of utilization and examine the conditions under which adherence changes. In addition, continued investigation into the use of universal precautions must investigate the role that perceived risk plays, if any, in influencing precautionary behaviors.

Results of the current study strongly support a need for continued experimental evaluations of HIV-related education and training programs. These investigations will be instrumental in identifying the components of training and education that are successful in influencing knowledge, perceived risk, comfort and use of precautions, in

understanding the processes by which these changes occur, and in the identification of causal relationships between these outcomes.

Finally, future research should continue to explore how health-care workers are differentially impacted by AIDS/HIV infection in the health-care setting. These efforts will be critical in identifying the differential and specialized needs of specific groups of health-care professionals and in ensuring that these needs are met.

The results obtained also have several implications for continued training and education to address the concerns and behaviors of health-care professionals. Based on the findings of this study, it can be predicted that efforts to increase knowledge will ensure that RNs have an accurate perception of their risk and serve to increase their level of comfort.

Results of this study suggest the need for further training to address the current misconceptions and misinformation regarding HIV. Registered Nurses in the current study recognized this need for education and appear to be motivated to increase their level of HIV-related training and education as respondents overwhelmingly indicated a desire for training that covers the entire continuum of care for persons infected with HIV.

Nurses must be updated with the most current information regarding laws and policies related to HIV. Nurses represent an important source of information within

the health-care system and must be able to provide accurate and up-to-date information concerning HIV testing and counseling to their clients. In addition, van Servellen et al. (1988) argue that continued efforts must be directed to ensure that all nurses have accurate epidemiological and scientific information about AIDS, along with a background in the psychosocial and physical aspects of the disease. This education and training will allow nurses to take necessary precautions, to screen patients with AIDS or those at risk for HIV infection, to counsel for risk reduction, and to guide themselves and others in the delivering high-quality care (van Servellen et al., 1988).

Training programs that present information about transmission, etiology, and prevention, will not be adequate, however, in addressing the current misconceptions surrounding risk of transmission. The relationship between knowledge and perceived risk in the current study highlights the need for programs that address health-care workers' perceived risk of HIV infection through occupational exposure. Educators must look at the role that these fears play in the interpretation and assimilation of information about AIDS and HIV infection.

The relationship between perceived risk and comfort in providing care in the current study underscores the importance of addressing these fears. While nurses need to be aware of the potential risk for exposure, results illustrate that unrealistic fears have the potential to

interfere with the provision of quality care and the well-being of the health-care provider. Weygman (1989) warns that hospitals and employees must develop strategies to deal with the fear of AIDS and argues that education has often not been successful because of the fatal nature of the disease and the hysteria that surrounds AIDS. Weygman suggests that the critical components of effective education include the presentation of exact information, repetition, and the development of an environment in which people feel free to express their fears and anxieties.

The relationship between contact and comfort identified in the present study also suggests possible implications for intervention. Contact with infected persons through panels or seminars may facilitate increased comfort and willingness. These opportunities must be directed to help nurses identify with people with AIDS through sensitivity training and education about alternative lifestyles. Similarly, Turner et al. (1988) proposes changes in health-care professionals' attitudes through their involvement in the process of attitude resolution toward issues surrounding human sexuality and drug use.

The current study also identified important implications for continued efforts to ensure that health-care professionals are engaging in appropriate precautionary behaviors. Efforts to increase the use of universal precautions among nurses and other health-care professionals must address the issues that surround these barriers. In

addition, health-care institutions must implement policies and procedures for accidental exposures with potential for HIV infection. While only a small number of RNs in the current study had requested antibody testing following a potential exposure to HIV, health-care institutions must be prepared to handle these situations when they do occur.

Technological advancements in protective equipment and supplies are likely to increase the level of protection available to health-care workers. In the meantime, increased efforts are needed to monitor infection control behaviors. Cotton (1988) warns, however, that infection control behavior will be difficult to change, arguing that many health-care workers find it less threatening to deny they are at risk and therefore take no precautions or to overstate their risk and refuse to care. Cotton (1988) proposes that appropriate precautionary behavior will result when health-care professionals accept the definite (although relatively low) risk and work to lower this risk even further through compliance with infection control guidelines.

Continued efforts to train health-care professionals in the use of universal precautions are vital. While it is encouraging to note that RNs who more frequently encounter situations which require the use of universal precautions report the highest levels of utilization, it is imperative that all nurses are aware of the guidelines for the use of precautions. With the HIV antibody status of the majority

of patients in the nation's health-care systems unknown, it is not sufficient for nurses to apply precautions only when they know or suspect that someone is infected with HIV. Guidelines for precautions must be universally applied by all nurses in all settings.

The current research provides strong support for continued behavioral research into the issues surrounding nurses and the provision of care to persons with AIDS/HIV infection. The findings of the present study along with previous research justify the need for continued and increased efforts to address the needs of all health-care professionals. The spread of the AIDS epidemic and the growing longetivity of its impact, highlights the urgency involved in addressing these needs. These efforts will be vital in ensuring quality levels of care to persons at all stages of HIV infection and environments that will provide the necessary levels of support and resources to health-care workers.

APPENDIX A

Universal Precautions to Prevent Transmission of HIV to Health-Care Workers

Universal Precautions to Prevent Transmission of HIV to Health-Care Workers U.S. Public Health Service

1. All health-care workers should routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other body fluids of any patient is anticipated. Gloves would be work for touching blood and body fluids, soiled with blood or body fluids, and for performing venipuncture and other vascular access procedures. Gloves should be changed after contact with each patient. Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes. Gown and aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.

2 Hands and other skin surface should be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands should be washed immediately after gloves are removed.

3. All health-care workers should take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices during procedures; when cleaning used instruments; during disposal of used needles; and when handling sharp instruments after procedures. To prevent needlestick injuries, needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. After they are used, disposable syringes and needles, scalpel blades, and other sharp items should be placed in puncture-resistant containers for disposal; the puncture-resistant containers should be located as close as practical to the use area. Large-bore reusable needles should be placed in a puncture-resistant container for transport to the reprocessing area.

4. Although saliva has not been implicated in HIV transmissions, to minimize the need for emergency mouth-to-mouth resuscitation, mouthpieces, resuscitation bags, or other ventilation devices should be available for use in areas in which the need for resuscitation is predictable.

5. Health-care workers who have exudative lesions or

weeping dermatitis should refrain from all direct patient-care and from handling patient-care equipment until the condition resolves.

6. Pregnant health-care workers are not known to be at greater risk of contracting HIV infection than health-care workers who are not pregnant; however, if a health-care worker develops HIV infection during pregnancy, the infant is at risk of infection resulting from perinatal transmission. Because of this risk, pregnant health-care workers should be especially familiar with and strictly adhere to precautions to minimize the risk of HIV transmission.

Implementations of universal blood and body-fluid precautions for all patients eliminate the need for use of the isolation category of "Blood and Body Fluid Precautions" previously recommended by CDC for patients known or suspected to be infected with blood-borne pathogens. Isolation precautions (e.g., enteric, AFB) should be used as necessary if associated conditions, such as infectious diarrhea or tuberculosis, are diagnosed or suspected.

Source: Centers for Disease Control. Recommendations for prevention of HIV transmission in health-care settings. MMWR 1987:36 (suppl no. 2S):5S-6S.

APPENDIX B

Methodology for Estimating Current RN Supply

Methodology for Estimating Current RN Supply

Approach. The estimate of the current RN supply that is reported here attempts to answer the question: "If all Michigan RNs were to respond to a license renewal survey in October, 1988, how many of them would report that they are active in the profession?" When the question is asked in this way, one of the first things that becomes obvious is that some of the licenses that are in effect today would not be renewed due to retirement, death, migration out of Michigan, or other reasons. Thus, one of the preliminary steps in determining Michigan's nurse supply is to estimate how many nurses would actually have renewed their licenses if a renewal had been required in October, 1988. It is then a simple matter to apply the age-specific activity rates derived from the 1988 licensure survey to the current nurse population.

Assumptions. The assumptions used in making the estimate can be summarized as follows:

a. The proportion of Michigan nurses in each age group who will fail to participate in their next license renewal is assumed to be the same as the proportion observed for that age group in the 1986-88 licensure cycle. This attrition from the nurse population between license renewal dates is assumed to take place at a uniform rate.

b. Age-specific activity rates are assumed to be the same for respondents and non-respondents.

c. It is assumed that age-specific activity rates did not change between the 1988 license renewal (which took place primarily in the first quarter of 1988) and October, 1988.

d. It is assumed that each nurse is located in the state indicated by the address on file with the Department of Licensing and Regulation. (Reporting of address changes is required by law.)

e. It is assumed that all active nurses renew their licenses.

Process. The methodology consists of the following steps:

1. Data from the licensure surveys was merged with data maintained by the Department of Licensing and Regulation on birth date, county, state, zip code, license expiration year, and license status as of October, 1988. Corrections were made where necessary to reconcile discrepancies among state, county, and zip

code.

2. RNs with active licenses and Michigan addresses were tabulated by their license expiration year and by their age on 9/30/88. They included 42,134 nurses with licenses expiring in 1989, 38,099 nurses with licenses expiring in 1990, and 58 nurses employed by the federal government.

3. Tabulations were made of RNs covered by the 1986 survey who had Michigan zip codes at the time of their 1986 license renewal. The proportion of these nurses who failed to renew their licenses in 1988 was tabulated according to their age on 12/31/87. This included nurses who failed to renew their license due to death, retirement, leaving the state, or any other reason. These proportions were then use on a pro-rata basis to adjust each subset of the RN supply described in step 2 above, based on the number of months that had elapsed since the previous license renewal. (For the purposes of this calculation, federal nurses were grouped with nurses whose licenses expire in 1990.) These calculations served as an adjustment for nurses who had, in fact, dropped out of Michigan's nurse population since their last renewal, but whose licenses had not yet expired.

4. Age specific activity rates at the time of license renewal were calculated for respondents to the 1988 survey based on their age on 12/31/87. These rates were then applied to the adjusted supply of RN's described in step 3 above.

Source: Michigan Department of Management and Budget, (1989). OMHA NEWS, 1. (Available from Michigan Department of Management and Budget, Lansing, Michigan)

APPENDIX C

Survey Instrument

HIV-RELATED KNOWLEDGE, ATTITUDES AND PRECAUTIONARY BEHAVIOR
AMONG NURSES LICENSED IN MICHIGAN - 1989
MICHIGAN DEPARTMENT OF PUBLIC HEALTH
AND
THE MICHIGAN NURSES ASSOCIATION

All parts of this questionnaire are completely voluntary. Please be assured that this questionnaire is anonymous and can in no way be traced back to you. Your honesty in answering the questions below will be greatly appreciated.

PART I: The following statements about HIV (Human Immunodeficiency Virus) may or may not be in agreement with current medical opinion or Michigan law. We are interested in what *you* believe.

Suppose you are caring for someone infected with HIV. What do you consider to be your level of risk of becoming infected with HIV from the following activities?

	Check one box per statement				
	High	Medium	Low	None	Don't Know
1. A needlestick	82.9%	11.1%	5.2%	.3%	.2%
2. Feeding a patient	1.1%	5.8%	35.2%	56.1%	.6%
3. Changing sheets on a patient's bed	2.7%	10.3%	41.5%	43.4%	.5%
4. Being coughed or sneezed on	13.1%	23.0%	43.5%	17.4%	1.6%
5. Large amounts of blood splashed on open sores	92.7%	4.8%	1.8%	.1%	.2%
6. Large amounts of blood splashed in the eye	73.6%	14.7%	7.1%	.8%	1.8%
7. Performing mouth-to-mouth resuscitation with a protective device	10.1%	18.6%	43.6%	23.5%	1.8%
8. Direct skin-to-skin contact (assume neither individual has open sores or dermatitis)	1.6%	3.3%	23.8%	69.0%	1.1%

Do you agree or disagree with the following statements?

	Check one box per statement		
	Agree	Disagree	Don't Know
9. It is possible to become infected with HIV by being bitten by a mosquito or other insect which has recently bitten someone infected with HIV	13.4%	57.3%	28.7%
10. A pregnant women infected with HIV can give it to her baby	98.3%	.3%	1.2%
11. Premarital testing for sexually transmitted diseases and HIV infection is required in Michigan	35.2%	50.5%	13.4%
12. In Michigan, it is possible to receive a free test for HIV infection without giving your name	50.5%	13.0%	35.6%
13. To obtain a marriage license in Michigan, an individual must receive counseling on sexually transmitted diseases including HIV	63.1%	19.5%	17.1%

PART II: We are interested in identifying past training and perceived future training needs related to HIV. For each area identified below, please indicate whether or not you have received training and whether or not you feel *you* need training or further training.

Area of practice:	Had Training?		Need Training?	
	No	Yes	No	Yes
14. Clinical needs of patients infected with HIV	57.3%	36.7%	18.6%	61.8%
15. Emotional needs of patients infected with HIV	62.6%	28.8%	19.3%	64.9%
16. Working effectively with family and friends of patients infected with HIV	72.0%	17.3%	16.0%	70.3%
17. The use of universal precautions	10.2%	87.9%	46.1%	25.6%

	Yes	No	Don't Know
18. Have any education programs about HIV infection been offered where you work?	68.9%	23.3%	7.1%

If you answered "No" to question 18, please go on to question 21

	Yes	No	Don't Know
19. If you answered "Yes" to question 18 above, have you attended at least one of these programs?	57.6%	8.7%	.2%

20. If you answered "Yes" to question 19 above, what topic areas have these programs covered?

Universal Precautions 49.6%

AIDS 101 28.5%

Care PWA 13.4%

Law & Ethics 4.6%

Counseling & Testing 3.2%

21. Which of the following sources of information about HIV infection have you used in the PAST 3 MONTHS? (check all that apply)

81.2% ☐ General news media (TV, radio, newspapers, magazines, etc.)
2.2% ☐ AIDS hotline intended for use by the general public
2.3% ☐ AIDS hotline for health care workers provided by the Michigan State Medical Society
3.1% ☐ Cancer Society of America film on HIV for nurses
67.3% ☐ Professional journals
46.2% ☐ Other health care professionals
99.7% ☐ Special HIV training designed for nursing professionals
8.4% ☐ Programs or lectures about HIV designed for general public
☐ Other (please describe): _____

22. In the PAST 3 MONTHS, about how many hours have you spent in HIV education programs? _____

PART III: The following questions are intended to address your own experience in performing your nursing duties.

	Yes	No
23. In the PAST 3 MONTHS, have you used a needle when caring for a patient?	85.2%	14.3%

If you answered "No" to question 23, please go on to question 26.

When you used a needle in the PAST 3 MONTHS, did you ever:

	Yes	No
24. Stick yourself accidentally with a needle which had been used on a patient?	10.9%	75.2%
25. Put a plastic cover back on the needle after it had been used on a patient?	52.6%	33.3%

	Yes	No
26. In the PAST 3 MONTHS, have you handled any blood or body fluids or cared for a bleeding patient?	82.6%	17.1%

If you answered "No" to question 26, please go on to question 32.

When you were engaged in these activities how often did you:	Check one box per statement		
	Almost Always	Sometimes	Almost Never
27. Wear protective gloves?	59.2%	19.4%	4.9%
28. Wear a protective gown?	6.7%	27.3%	49.0%
29. Wear a protective face shield or eyeware?	15.4%	13.9%	53.5%
30. Use a bleach or disinfectant solution to clean yourself or any exposed surfaces after exposure to blood or semen	37.6%	10.5%	33.6%
31. Use puncture resistant containers?	73.3%	4.2%	4.4%

	0 times	1-5 times	6 or more times
32. In the PAST 3 MONTHS, approximately how many times have you attempted to resuscitate a patient?	76.9%	19.2%	3.1%

If you answered "0 times" to question 32, please go on to question 34.

	0 times	1-5 times	6 or more times
33. Of the times you attempted resuscitation in the PAST 3 MONTHS, how many times did you perform mouth-to-mouth resuscitation without using a protective device?	25.0%	1.4%	.2%

	0 times	1-5 times	6 or more times
34. In the PAST 3 MONTHS, how many times have you cared for a patient whom you knew or suspected to be infected with HIV?	54.2%	36.6%	6.1%

If you answered "0 times" to question 34, please go on to question 39.

	0 times	1-5 times	6 or more times
35. How many times have you discussed medical concerns related to HIV with these patients?	28.3%	17.2%	1.4%
36. How many times have you discussed social and psychological concerns related to HIV with these patients?	32.8%	12.2%	1.5%
37. How many times have you discussed medical concerns related to HIV with the families/friends of these patients?	34.3%	10.6%	1.5%
38. How many times have you discussed social and psychological concerns related to HIV with the families/friends of these patients?	36.4%	8.7%	1.4%

Which of the following make it more difficult for you to use protective measures which will prevent exposure to HIV infection?	Check one box per statement		
	True	False	Don't Know
39. Gloves and other protective equipment are not readily available.	13.9%	82.5%	1.5%
40. Gloves and other protective equipment are cumbersome and awkward	52.7%	43.5%	1.8%
41. The available gloves are not the right size for me	32.9%	63.3%	1.4%
42. Gloves and other protective equipment are poorly constructed	39.4%	51.0%	3.9%

43. Other (please describe):_____

	Yes	No
44. In my work setting, I am required to wear gloves when handling blood or body fluids	77.5%	20.5%
45. If "Yes", do you agree with this policy?	76.6%	1.9%

	Yes	No
46. In the PAST 3 MONTHS, have you ever refused to care for a patient because you knew or suspected that patient was infected with HIV?	1.7%	96.9%

47. If "Yes", why? _____

	Yes	No
48. Do you personally know any other nursing professional who has, in the PAST 3 MONTHS, refused to care for a patient because that patient was known or suspected to be infected with HIV?	16.2%	82.4%

49. If "Yes", why? _____

	Yes	No
50. In the PAST 3 MONTHS, have you requested HIV antibody testing because you believed that you were exposed to a patient that you knew or suspected to be infected with HIV?	2.7%	95.9%

51. What do you believe your chances are of becoming infected with HIV as a result of your nursing duties?

High	Medium	Low	None	Don't Know
9.5%	21.4%	54.5%	8.1%	6.5%

	Yes	No
52. Do you personally know a person infected with HIV?	16.5%	82.7%

PART IV: **The following questions are intended to address your personal feelings about caring for persons infected with HIV in the course of your nursing duties.**

Do you agree or disagree with the following statement?	Check one box per statement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
53. The precautions I take while working are adequate to prevent me from becoming infected with HIV	19.1%	64.2%	14.1%	.1%
54. Persons who are known or suspected to be infected with HIV should be viewed with compassion regardless of how they became infected	45.4%	50.7%	2.8%	.1%
55. I would be willing to provide the routine services which are my responsibility to a patient infected with HIV	32.1%	58.6%	7.1%	.5%
56. My family/friends are very worried that I may become infected with HIV as a result of my work as a nurse	11.8%	29.8%	50.3%	6.6%
57. Having a coworker who is infected with HIV would not bother me	12.9%	44.6%	33.9%	6.6%
58. I should have the right to select those patients for whom I will care	6.3%	28.0%	50.3%	12.2%
59. I would feel comfortable caring for a male homosexual patient	21.6%	56.9%	16.7%	3.5%
60. Individuals infected with HIV deserve the same quality of medical treatment as other individuals	47.5%	49.9%	1.3%	.1%
61. I would feel comfortable caring for an intravenous drug user	18.3%	52.5%	24.2%	3.2%
62. I would feel comfortable caring for an infant infected with HIV	25.8%	52.3%	17.6%	2.5%

PART V: Once again, all surveys are anonymous. The following information will assist us in directing education programs to those who most want and need them.

63. What is your age?_____

64. What is your sex? Male Female

65. What is your race?

93.3% White 2.0% Asian/Pacific Islander .2% Hispanic
3.5% Black .2% Native American (Indian) .1% Other (please describe):_____

66. In which Michigan county do you currently perform most of your nursing duties? (Please list only one county):_____

67. In the PAST 3 MONTHS, how many hours per week on the average have you worked as a nurse?

2.7% 0 hours 29.0% 10-30 hours
4.2% less than 10 hours 63.7% more than 30 hours

68. What is the highest degree you have obtained?

35.5% Diploma in Nursing 27.0% Associate Degree in Nursing
25.8% Baccalaureate in Nursing 4.3% Masters Degree in Nursing
.1% Doctorate in Nursing 3.5% Baccalaureate in other field
3.2% Masters in other field .6% Doctorate in other field

69. How would you describe your primary clinical area of nursing practice?

7.8% education/administration 7.7% community health
29.8% medical/surgical 13.0% maternal/child health
5.5% gerontology 5.0% psychiatric/mental health
28.3% other (please describe):_____

70. In what setting are you currently employed as a nurse (the majority of your time)?

Direct patient care

51.0% acute
25.5% non-acute

Indirect patient care

9.7% administration
4.3% education

9.5% Other (please describe):
_____

Not currently employed as a nurse

-THANK YOU FOR YOUR PARTICIPATION-

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