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Bloodborne Pathogen Exposure and Risk Factors in Non-Hospital Based Healthcare Workers

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List of Abbreviations:

1. Guidelines: U.S. Public Health Service Guidelines
2. BBP: Bloodborne Pathogens
3. HIV: Human Immunodeficiency Virus
4. HBV: Hepatitis B
5. HCV: Hepatitis C
6. HCWs: Healthcare Workers
7. RNs; Registered Nurses
8. UP/SP: Universal Precautions/Standard Precautions
9. PEP: Post Exposure Prophylaxis

Abstract

The purpose of this three-year epidemiological study of registered nurses (RNs) employed in a wide range of non-hospital health care settings was fivefold: first, to determine the rate of blood/body fluid exposure incidents; second, to characterize and assess exposure incident risk factors; third; to compare risk factors, rates of injury (using a measure of person time as the denominator), and availability/use of safety devices between a sub-set of non-hospital and hospital based RNs with similar responsibilities; fourth, to identify barriers to the adoption of safe work practices (i.e., Standard Precautions [SP]); and fifth, to identify opportunities to reduce the risk of exposure incidents in non-hospital-based RNs.

This study was especially important for two reasons; 1) risk assessment data on blood/body fluid exposure for non-hospital based health care worker (HCW) subgroups are generally extremely sparse, including non-hospital-based RNs, even though non-hospital based HCWs represent approximately 50% of all HCWs in the U.S., and 2) information on the prevalence of effective primary and secondary prevention strategies employed in non-hospital settings is equally sparse. While we can extrapolate to some degree from the hospital HCW literature, the risk factors and barriers to protection may be very different in non-hospital based HCWs and, in fact, may vary greatly across non-hospital settings. This study addressed these knowledge gaps by surveying both hospital and non-hospital based RNs, for temporal comparisons, including non-hospital RNs from a wide range of facilities. The primary objectives of the study were as follows:

1. To estimate the occurrence (using a common denominator such as person-days) of occupational blood/body fluid exposure incidents over the previous 12 months in a cross-section of RNs employed in the following non-hospital settings: a) mental disabilities and psychiatric facilities, b) nursing homes, c) drug and alcohol treatment clinics, d) doctor's offices and clinics, e) prison healthcare facilities, f) home and hospice healthcare, g) employee health services, h) out-patient clinics, i) psychiatric centers (in-patient/out-patient), j) rehabilitation hospitals, j) student health services, k) youth detention centers, l) youth psychiatric centers, and m) hospitals.
2. To identify the independent and joint effects of risk factors and barriers associated with exposure incidents, including: a) worker-centered factors (demographics, psychosocial factors, perception and knowledge of risk, etc.); b) job/task, job/control variables (work flow, work pace, etc.); and c) organizational variables (availability and adequacy of resources, including the prevalence of safety devices and other control measures; safety climate; safety training; medical surveillance [vaccination rates]; etc.).
3. To collect data from a sample of hospital-based nurses working in similar jobs (with similar tasks) and to compare risk between the two cohorts.
4. To identify risk reduction opportunities to help facilitate compliance with OSHA-required and CDC/NIOSH-recommended practices using innovative Participatory Action Research (PAR).

To meet these specific aims, the multidisciplinary team of researchers partnered with three employee representative organizations and a prison system to facilitate recruitment of a random sample of approximately 1200 non-hospital based RNs and 200 hospital based nurses. Letters of cooperation were obtained from: 1) the New York Public Employees Federation, 2) the New York State Nurses Association, and 3) the New York State Department of Correctional Services.

In the formative stage of the study, we collected qualitative data from in-depth interviews, focus groups, and cognitive testing, and familiarized ourselves with the different study populations through intensive contact with the various groups. In the second stage, we collected quantitative data (through the self-administration of a mailed questionnaire). After data were analyzed, we organized a PAR Team in order to identify data-driven opportunities to reduce risk.

The results of this study helped us to determine the risk of bloodborne pathogen exposure and to identify risk reduction strategies for non-hospital based RNs. Hopefully these results will help to improve the safety of the estimated three to five million non-hospital based HCWs, including RNs, in the U.S.

Significant Findings

Demographics: The sample of 1156 RNs were predominately female (87%), with an average age of 49 years, and 11 years of tenure in their present position. Over a third (35%) worked for an agency that had less than 100 employees, 60% were unaffiliated with a hospital, and 73% were unaffiliated with a medical center. More than 60% of respondents reported that they had on-site access to an infection control specialist, whereas nearly 10% stated that they had no access, weather on site or at headquarters.

Exposure History: 65% (n= 875) of the respondents reported one or more needlestick injuries (mean=2.3) during their careers, with 23% (n=262) reporting at least one such injury(mean=0.9) in their present job. In the 12 month period prior to the study, 8.7% (n=101) of respondents reported at least one needlestick injury. Extrapolated out to the number of non-hospital based nurse in the U.S., that would be the equivalent of 145,000 nurses experiencing a needlestick in a one year period. Most of the exposures occurred with a device involving a hollow-bore needle (25%), or during phlebotomy procedures (25%), and at least one-fifth of the exposures would be categorized as "serious". A surprising percentage (43%) of the needlesticks involved safety devices, including retractable needles, shielded needles, safety butterflys, and safety phlebotomy sets, even though a large percentage (78%) reported that they were trained to use such devices.

Reporting of Exposures: A large percentage of needlesticks and other exposures went unreported to the administration. For example, 44% of all needlesticks went unreported, 58% of cuts with sharps, 74% of splashes to eyes and mouth (blood/body fluids), and 85% of contacts with non-intact skin went unreported.

Post-Exposure Treatment: A large percentage (40%) reported that they never filled out an incident report form, 20% were not seen by a health care provider within the recommended two hour window of time, and 10% were seen more than two hours later. *Importantly, 70% of exposed (serious exposures) RNs never received any form of follow-up care.*

Compliance with Universal Precautions/Standard Precautions (UP/SP): Many of these reported behaviors were sub-par, for example, 25% reported that they sometimes or more often recapped contaminated needles, 75% reported that they always used sharps containers for disposal, 68% always refrained from eating or drinking in potentially contaminated work areas, and only 53% always wore eye protection when needed.

HBV Vaccination History: The respondents reported high rates of vaccination, with 84% reporting that they had received a primary series of all three doses of HBV vaccine, and 3.5% reporting only one or two doses.

Correlates of Needlestick Injuries: Several individual and organizational factors were significantly associated with needlestick injuries; including: compliance with standard precautions ($p<.0001$), handling of sharps ($p<.001$), and reluctance to report ($p<.05$). The organizational factors associated with needlestick injuries were: poor safety climate ($p<.0001$), limited access to employee health care ($p<.0001$), limited training ($p<.0001$), environmental bothers ($p<.001$), not being a part of a medical system ($p<.05$), and lack of availability of safety devices ($p<.05$).

Translation of Findings

These findings were discussed at a PAR team meeting sponsored by the collaborating partners. The need for safety devices, training, access to rapid and adequate post-exposure care and access to trained infection control specialists were cited as important aspects of safety that need to be addressed for this group. The team felt strongly that the non-hospital sector has been ignored in many ways, with numerous barriers to the types of quality of interventions (e.g., safety devices) that are routinely available in hospital settings. The lack of a critical mass of employees in some of these settings (e.g., doctors offices, and free standing clinics) was seen as an obstacle to effective training programs and infection control access. The teams thought that special focus should be placed on the non-hospital settings, with a national conference held to highlight the issues they face, with an emphasis on the barriers to risk management strategies in the non-hospital setting.

Outcomes/Relevance/Impact

These findings indicate a need to address these concerns as this population of nurses clearly is at increased risk, not only because of the exposure rates which are not that different from hospital-based RNs (2.2/100 person years, vs 3.8/100 person years for hospital RNs (in our study), but because of the lack of resources to prevent these exposures and the potentially high patient prevalence rates for bloodborne infectious disease. It is essential for the health and wellbeing of the nation's more than 5 million HCWs employed in the non-hospital setting that these issues be addressed.

Scientific Report

Background

Overview: Health care industry

In 1998, the Bureau of the Census estimated that there were 11 million HCWs, representing the single largest class of employees. HCWs are employed in nearly 500,000 establishments, including hospitals, which account for only 1.6% of all health care facilities but employ nearly 50% of HCWs. The remaining 50% work in a wide variety of occupations and work settings, with doctors' and dentists' offices the most common setting. Approximately half of all HCWs have patient or patient specimen contact. **Table 1** below summarizes the distribution of employees in health services.

Table 1. Percent and Number of Employees in Health Service Establishments, 1997

Establishment Type	Percent Establishments (n = 460,000)	Number & Percent Employees
Private (and public) hospitals	1.6	4,909,000
Offices of physicians	41.8	1,853,000
Nursing & personal care facilities	4.3	1,762,000
Home healthcare services	3.3	672,000
Offices of dentists	23.8	646,000
Offices of other health practitioners	18.7	450,000
Other health and allied services	3.1	339,000
Medical and dental labs	3.4	199,000

*Source: United States Bureau of Labor Statistics website, http://www.stats.bls.gov

Non-hospital based health care workers

Approximately one-third of the non-hospital HCWs work in establishments with less than 1000 employees, and, of these, 16% are employed in establishments with fewer than five employees.[1] The seven segments that constitute the non-hospital health care industry are summarized in **Table 2**.

Table 2. Non-Hospital Segments of the Health Services Industry

Industry Segment	Types of Services	Types/Numbers of Employees
Nursing and personal care facilities	In-patient nursing, rehabilitation and health-related personal care; convalescent and assisted living care	Nursing aides and nurses
Offices and clinics of physicians, including osteopaths	Private and group practice, including clinics, free-standing emergency care centers, and outpatient facilities	Physicians, nurses, and nursing aides
Home health care services	Skilled home care, in particular elder-care, and the application of in-home medical technologies	Physicians and nurses
Offices and clinics of dentists	General and specialized dental care and dental surgery	Dentists and hygienists
Offices and clinics of other health practitioners	Non-traditional and alternative health care services; services provided are highly variable according to patients' ability to pay	Chiropractors, optometrists, podiatrists, occupational and physical therapists, psychologists, audiologists, speech-language pathologists, dietitians, and alternative medicine practitioners among others
Other health and allied services	Includes services not covered elsewhere, such as kidney dialysis centers, drug treatment clinics and rehabilitation centers, blood banks, childbirth preparation classes, etc.	Physicians, nurses, technicians, therapists, and support and ancillary staff
Medical and dental labs	Medical analytic and diagnostic services, such as analyzing blood, taking x-rays, and other clinical tests; making dentures, artificial teeth, and other orthodontic appliances	Technicians

*Source: United States Bureau of Labor Statistics website, *http://www.stats.bls.gov*

Additionally, the U.S. public service employee sector (including EMS, fire and rescue, law enforcement, and corrections) may have an opportunity for exposure. This represents a sizeable population also potentially at risk, including approximately 380,000 correctional officers, 150,000 EMS employees, and 760,000 police and law enforcement personnel.

Risk of Bloodborne Pathogens in Health Care Workers

Occupational exposure to blood and body fluids is well documented among HCWs, with annual exposure prevalence rates ranging from <10% to 40% depending on the occupational group.[2-4] Risk factors associated with exposure include: urgency of the procedure; the amount of blood loss (>200 mls); blind procedures (e.g., obstetrical suturing); duration of the procedure; use of sharps such as needles or scalpels; and the lack of compliance with safe work practices, such as Universal Precautions (UP).[5-7] Most exposures that are reported involve percutaneous injuries (e.g., needlesticks or other sharps injury), mucocutaneous exposure, (e.g., spray or splashes to the eyes or mouth), or direct contact with non-intact skin.[8] Under-reporting is still considerable, with 30-50% of exposures believed to go unreported.[9,10] Of the estimated 500,000-800,000 exposures each year, as many as 1/100 involve HIV-contaminated blood.[8] As of June 1999, the Centers for Disease Control and Prevention (CDC) reported 55 HCWs with documented HIV seroconversion following occupational

exposure and an additional 136 cases of HIV infection in HCWs that most likely resulted from occupational exposure.[11] There have also been documented reports of HIV infection in non-hospital HCWs, including lab technicians, embalmers, home health care providers, and others.[12] Infected employees are listed by occupational group in **Table 3.**

Table 3. Number of HCWs with documented and possible occupationally acquired AIDS/HIV infection, by occupation, reported through June 1999 in the U.S.

Occupation	Documented Occupational Transmission	Possible Occupational Transmission
Dental Worker, including dentist	-	6
Embalmer/morgue technician	1	2
Emergency medical technician/paramedic	-	12
Health aide/attendant	1	15
Housekeeper/maintenance worker	1	12
Laboratory technician, clinical	16	16
Laboratory technician, non-clinical	3	B
Nurse	23	34
Physician, non-surgical	6	12
Physician, surgical	-	6
Respiratory therapist	1	2
Technician, dialysis	1	3
Technician, surgical	2	2
Technician/therapist, other than those listed above	-	10
Other health care occupations	-	4
Total:	**55**	**136**

*Source, CDC Web page: http://www.cdc.gov

The risk of contracting HIV and other bloodborne pathogen infections by HCWs who experience a contaminated needlestick exposure has been estimated at 0.3-0.4% for HIV, 10-35% for hepatitis B virus (HBV) (in non-vaccinated persons), and 1.2-10% for hepatitis C virus (HCV).[5,13-17] At least 20 other bloodborne pathogens have been documented to be transmitted to HCWs.[18,19]
The risk factors commonly associated with HIV infection include percutaneous injuries with hollow-bore needles, deep wounds, devices with visible blood drawn from a vein or artery, and source patients with terminal AIDS.[8,9] Transmission of HIV has also occurred, albeit rarely, from unusual routes including contact with bloody saliva, human bites, contact with human remains (e.g., embalming procedures), and stab wounds from contaminated needles.[12,20-21]

Occupational HBV infection, while dramatically reduced in HCWs since the introduction of the HBV vaccine, is still reported by approximately 400 HCWs each year.[22,23] HBV has been occupationally transmitted to physicians, dentists, and health aides through contact with blood or saliva and through human bites.[24] Several studies have shown that HCV may be transmitted through both percutaneous and mucocutaneous routes. Rarely, HIV and HCV have been transmitted simultaneously through needlestick injuries, with unusually rapid and fatal results.[25] An employee health database from 55 hospitals, compiled and updated by the International Health Care Worker Safety Center at the University of Virginia, found that 44% of all needlestick injuries were reported by nurses after giving injections, drawing blood, or manipulating intravenous lines.[26] Several studies have also shown that compliance with safe work practices, such as UP, may be sub-optimal among HCWs, with lack of time and safety equipment, conflict of interest (providing patient care versus protecting themselves), and poor perception of safety climate (including lack of safety equipment) the most frequent reasons for non-compliance.[27-29] A recent study by Gershon et al. noted a drop of 70% in needlestick injuries in a mid-sized hospital after a safer intravenous device was introduced.[30]

Risk in non-hospital based health care occupations

HCWs in the non-hospital setting may be at increased risk of workplace injuries for a number of reasons, including a lack of appropriate risk management strategies. For instance, while roughly 16% of all HCWs work part-time, 36% of dentists' office and 20% doctors' office employees work part-time.[1] Given that many of these offices have less than five employees, this may make safety-training sessions difficult to schedule and conduct. Another problem is that the extensive control and safety resources available in hospitals are unavailable to many, if not most, non-hospital HCWs. Similarly, the lack of on-site employee health programs may limit ready access to HBV vaccines or to timely post-exposure follow-up treatment and care. At the same time, patient prevalence rates for certain bloodborne pathogens may be similar or even higher in non-hospital settings (e.g., in correctional facilities) than in community hospitals, and many non-hospital HCWs perform invasive procedures (e.g., starting intravenous lines, injections, and suturing) and, thus, face risk of needlesticks. The next few sections briefly provide an overview of the work settings we intend to target. Data, where available, are from either national or New York State sources.

Risk in mental disabilities and psychiatric facilities[1]

The number and type of HCWs in mental disabilities facilities resembles a pyramid, with psychiatrists and psychologists at the top (the smallest number of HCWs and also the ones with the least direct patient contact); psychiatric nurses, social workers, and therapists in the middle; and psychiatric aides (the largest group with 95,000 jobs nationwide in 1998), with the most direct patient contact, at the bottom. All of these HCWs face risk of injury and potential exposure from their contact with patients who may potentially be violent. Health services are delivered to clients of in-patient facilities—thereby presenting potential risk to HCWs in this setting. Information on the risk of exposure is not readily availably for these workers.

Risk in nursing homes[1]

Most nursing homes do not employ full-time physicians or physician assistants, although 12% of the 66,000 jobs held by the 34,200 certified physician assistants in 1998 were in nursing homes. Thus, the delivery of health care in nursing homes is largely in the hands of nurses (RNs), licensed practical nurses (LPNs), and nursing aides. In these settings, RNs may perform invasive procedures, such as starting IV lines, and may care for a number of patients with infectious diseases such as hepatitis and AIDS. Approximately 135,000 RNs work in nursing homes, and the fact that 25% of all RNs work part-time complicates on-the-job training efforts. Data available for LPNs reveal that 28% of 692,000 jobs held by these HCWs in 1998 were in nursing homes. The similar direct patient-care duties of RNs and LPNs potentially may expose both groups to the same hazard of infection (in some states, LPNs are permitted to start IV lines). In nursing homes, nursing aides are often the principal caregivers. In fact, half of the 1.4 million nursing aide jobs nationwide in 1998 were in nursing homes. Several factors combine to make working in nursing homes a high hazard occupation. Since 1993, the profile of patients in nursing homes has changed to reflect greater acuity, increased frailty associated with increased age, more patients suffering from cognitive disabilities, and the treatment of patients with contagious diseases such as, HIV and tuberculosis. This means that nursing needs have expanded from the traditional custodial care to include medical treatment, wound care, etc. These expanded needs have arisen in an environment where the workload is heavy due to pressures to contain costs. Cost-containment pressures may also work against efforts to improve training and supervision of workers or to purchase new safety equipment and supplies. Despite these problems the rate of reported needlesticks in a recent study was low, with less than one injury/facility/employee/year. Only 58% of the nursing homes in this study had exposure management protocols in place.[31] In a more recent (1992) survey of nursing home directors, 278 responses were obtained (a 46% response rate), and roughly half reported no needlestick injuries in the previous year. The remaining nursing homes reported a wide range of needlestick injuries (from 1 to 134) for a total of 475 needlesticks. Needlestick injuries in these employees were usually related to recapping and

were most common in RNs and LPNs. This analysis did not reveal the cause of the range of reported rates among the nursing homes, and the authors concluded that more studies are warranted.

Risk in drug treatment facilities[32]

There are 96 clinics in New York State that provide treatment, testing, and prevention services to approximately 30,000 of the state's estimated 250,000 IV drug users. More than half of these clinics operate in New York City (NYC), where in 1997, over 8% of the clients were infected with HIV. It is believed that the employment of drug treatment staff in outpatient facilities will increase as this treatment becomes more widely available, socially acceptable, and reimbursable. Unfortunately, we have very little information on the risk of exposure in these facilities; although they do offer HIV testing and many have in-house blood drawing capability. Some data are available from a 1993 study of Amsterdam drug treatment facilities. In this study, it was found that workers in addiction care have a 30-year job tenure risk of HIV infection of 0.05% and a 7% risk of HBV infection. A similar job tenure risk in general hospital clinical staff was calculated to be 0.0012-0.015% for occupational acquired HIV and 1-5% for HBV infection. It was concluded that addiction workers have a relatively high rate of occupational infection and that an active and effective infection control policy was needed.[33]

Risk in AIDS clinics[32]

In New York there are 40 state-operated AIDS clinics in 21 counties that offer free and anonymous HIV testing on a walk-in basis. The rate of HIV infection in the NYC sites was 3.8% in 1997 among 1,021 people tested. There are also 65 sexually transmitted disease (STD) clinics throughout the state, which conduct HIV tests in an additional 23,000 patients per year, 8,000 within NYC. The rate of HIV infection in this population ranged from a low of 2.7% in Queens to a high of 13% in Staten Island. AIDS clinics that offer advanced medical care and diagnosis are usually affiliated with an academic medical center and are, thus, not freestanding. However, our experience with several AIDS clinics within medical centers (i.e., affiliated with a medical school) indicates that many of these units may fall outside the reach of mainstream hospital infection control and safety departments, and this may, at least theoretically, increase the employees' risk.

Risk in doctors' offices[1]

Of the 446,000 self-employed HCWs in 1998, 70% worked in offices of physicians, dentists, etc. Most of those who work in physicians' offices and clinics are physicians and nurses and most provide clinical care; with 40% of office- or clinic-based workers providing administrative support. A survey conducted in Minnesota in 1989 of doctors' offices found that recapping was common (51%), as were needlesticks, with most of the 13 incidents reported by 141 respondents (9% rate) resulting from blood-drawing procedures. Doctors' offices frequently lacked post-exposure protocols (only 37% had such a protocol in place) and frequently disposed of medical waste in the general waste stream.[34] Anecdotal reports from nursing staff employed simultaneously in hospitals and in private practice indicate striking differences in infection control programs.

Risk in correctional facilities[1]

During prison visits to collect data on correctional HCWs for a current seroprevalence study, we have been made aware of the potential risk of bloodborne pathogen exposure faced by the nearly 385,000 correctional officers in this country working at federal, state, and private facilities. Correctional officers experience percutaneous or mucocutaneous exposure from their contact with inmates' blood (breaking up fights or tending to injured inmates in the weight room, exercise yard, or en-route to the infirmary), sputum and saliva (inmates spitting at them), and semen and feces (inmates throwing body fluids at them). Correctional officers also risk attacks by inmates with hand-made needles or "shivs" that have been contaminated with blood or by human bites and scratches.[35]

These potential sources of blood/body fluid contact are especially worrisome for these employees since the rate of confirmed AIDS in state and federal prisons is about 54/10,000 prison inmates compared to 9/10,000 persons in the non-incarcerated U.S. population.[36] HCV is also very prevalent in inmates; one study noted an intake prevalence of 38%, with a seroincidence of 1.1/100 person-years in prison.[37] In New York State prisons, the rate of HCV in inmates is currently 15%.[38] In contrast, the prevalence of HCV in the general public is roughly 0.05-1.5%, with HCV estimated to cause 25-37% of all reported cases of viral hepatitis.[5] The percentage of HBV serologic markers in inmates has been shown in several studies to range from 19% to 47%.[39,40] Finally, human T-lymphotropic virus (I/II) prevalence was found to be 0.9% for 1,932 Maryland prison entrants as compared to 0% among 5,602 consecutive volunteer blood donors in Maryland.[40]

Very little information exists on the infectious disease risk, especially bloodborne pathogen risk, in correctional officers, although employee health data we have reviewed suggest it may be significant. For example, roughly 20% of the correctional officers in a large state system reported some type of occupational exposure each year, mainly inadvertent blood contact with non-intact skin, although many of their exposures were also the result of deliberate attacks by inmates.[35] HBV vaccine compliance among correctional officers is estimated to be 70%. Correctional officers may also be at risk because there are no specific recommendations for infection control procedures, including medical surveillance and vaccination policies, tailored to their special needs.

Home health care and hospice employees

The home health care industry is the fastest growing segment of the U.S. health system, leading the entire U.S. economy in new job growth; by 2005 there will be 1.25 million home HCWs, up from 250,000 in 1989 and from 500,000 in 2000.[41,42] This enormous growth is due to many factors, including the continuing need to control hospital costs through shortened stays, the increase in Medicare coverage for home health care delivery, the increased availability of medical equipment tailored for home health care, advances in communications technology that facilitate long-distance patient monitoring, and increasing evidence that patients fare better when they return more quickly to their homes after hospitalization.[43] Of the nearly half a million hospice patients in the U.S. each year, more than 90% chose to have hospice care provided in their homes.

Unique factors associated with the home health care work environment may exacerbate the risk from well-known health care work hazards and also present additional risks. For instance, home HCWs may have difficulty accessing risk management strategies (e.g. sharps containers) and services (e.g. employee health departments) designed to limit bloodborne pathogen exposure, even though their patients may have higher than expected prevalence to certain infectious diseases.

The importance of these limitations is highlighted by Department of Labor statistics. With 474 lost workday cases per 10,000 workers in 1994, home HCWs had an approximately 50% greater injury rate than hospital-based HCWs and a 70% higher rate than all workers.[41] In 1994, of the half million working home HCWs, 18,800 injuries were reported that resulted in lost work time. Nursing aides and orderlies accounted for 66% of all injuries, while RNs experienced 14% and LPNs 6%.[44] Higher injury rates were also noted in a recently reported study of statewide worker compensation claims. Drs. Myers and Muntaner found that home HCWs had an average incidence rate of 52 injuries/1000, compared with 132/1000 and 46/1000 for nursing home and hospital HCWs, respectively, with high rates of lacerations noted.[45] Importantly, home HCWs had the highest severity rate of injuries, exceeding even those seen in the nursing home setting.

Risk Management Strategies: Overview

The health care community has nearly two decades of experience managing the risk of bloodborne pathogen exposure in the occupational setting. Early in the AIDS epidemic, safe work practices were identified and encouraged, first through the publication of numerous CDC guidelines, including the 1985 publication of UP, which were designed to reduce the risk of occupational exposure to bloodborne pathogens. These were updated in 1987 and codified as a requirement

under the Occupational Health and Safety Administration (OSHA) Bloodborne Pathogen Standard.[23, 25,46,47] UP decree that all blood and blood-tinged body fluids from all patients are to be handled as if they are infectious. UP rely heavily on barrier techniques but also include controls designed to minimize the risk of needlestick injuries, such as the requirement not to recap needles. After studies indicated that HIV contaminated needlestick injuries were the leading cause of HIV transmission among HCWs, many other strategies, such as the use of anti-needlestick devices and the elimination of "hand-to-hand" passing in the operating room, have been developed to supplement UP. Most recently, Standard Precautions (SP) have been published that call for handling all patients' fluids (except sweat) as potentially infectious.[48]

The U.S. Public Health Service (PHS) has published guidelines that outline ways to limit the risk of HIV infection after blood/body fluid exposure incidents.[49] These guidelines provide specific recommendations of policies and practices that health care organizations should follow, including making post-exposure prophylaxis readily available to employees. The guidelines, while specifically addressing HCWs, include any employee whose activities involve contact with patients or patients' blood or body fluids, such as public safety workers and EMS employees.

Compliance issues

Not long after the original OSHA regulations went into force, several studies in both hospital based and non-hospital based HCWs noted a widespread lack of compliance with even the most basic elements of the standard.[12, 50-53] In the studies we conducted, we found that compliance was associated with the following: (1) worker-centered variables (e.g., lack of knowledge, inaccurate perception of risk, maladaptive fear response, negative influence of subjective norms, risk-taking personality profile, and sociodemographic factors, such as male gender and occupation [physician]) and (2) organizational variables (e.g., lack of resources, poor safety climate, and inadequate training and educational programs).[54-61] Importantly, exposure has been repeatedly found to be related to a lack of compliance.

Engineering controls

However, even if adherence to UP and SP were optimal, these recommendations are not really designed to protect HCWs from the most serious type of exposures, namely percutaneous injuries. Needles and other sharps devices are simply inherently risky, and, thus, the most recent risk reduction strategies have appropriately emphasized safer needled devices and other engineering controls. This has resulted in sustained decreases in certain types of injuries, most notably in intravenous catheter-related needlesticks. Jagger and colleagues documented decreases in needlestick injuries related to the introduction of a needleless system ranging from 4% to 88%.[62] A recent review of the safety device literature by Porta et al., noted decreases with all categories of needled devices.[63] In a needlestick surveillance study we recently conducted, we noted a 93% decline in needlesticks following the introduction of needleless intravenous systems as part of a broader multi-factorial risk reduction program.[64] However, many other types of injuries and exposures, including wounds associated with hollow-bore needles, remain a considerable threat. For example, in our recent study, hollow-bore injuries still accounted for 68% of all exposures in a mid-sized hospital. Fortunately, new devices designed to safely inject or withdraw blood are rapidly entering the health care field and should have a significant impact on these types of injuries, although cost, worker satisfaction, and product availability currently remain obstacles to their widespread use, especially in certain settings, such as the correctional health care setting, where budgets may be severely limited.

Administrative strategies

Other risk management strategies have focused on administrative factors, such as involving front-line workers in the management of the bloodborne pathogens program. This has an important

effect because employee involvement in the safety process leads to more positive perceptions of organizational safety climate, which, in turn, leads to higher rates of adoption of safe work practices.[54-56] As we found in a recent total quality management study, bloodborne pathogen team participation was associated with a 30% reduction in exposures.[65] Another important preventive activity that can be administratively driven is a proactive HBV vaccination program, which should be just one of many important aspects of a comprehensive employee medical surveillance program. All of these are primary prevention strategies, and this approach is clearly the most beneficial and cost-effective since it can prevent exposures from occurring. However, when primary prevention fails, secondary prevention strategies, such as post-exposure prophylaxis, can still effectively prevent further adverse outcomes, such as infection. Case-control data, first published in 1995, indicated that an 80% reduction in the risk of infection could be achieved with the rapid administration of zidovudine.[9,17] It should be remembered, however, that even though these procedures are required, both employees and employers can circumvent them. Some employees fail to follow requirements to report exposures and adhere to recommended post-exposure protocols, while other HCWs request chemoprophylaxis in cases where it is unwarranted by their exposure risk and employers may not make ready access to treatment available to their employees. It is, therefore, especially important for us to identify barriers to the appropriate implementation of SP because of the potential seriousness of medical outcomes related to non-compliance, such as occupationally-acquired HIV, and because of the medical and cost-effectiveness considerations of inappropriate treatment.

There may also be administrative barriers related to a lack of safety training, of appropriate waste disposal systems, and of non-latex gloves (leading in some cases to a lack of glove use altogether). There may also be barriers related to the job itself, such as workload, scheduling, job content, co-worker support for safety programs and adherence, and certain working and environmental conditions, that may increase the risk of exposure. Very little information regarding the prevalence of certain work practices, such as recapping, hand washing, eye protection use, etc, is available for many different healthcare settings, and, in fact, the extent to which these control measures are used in many non-hospital work sites has simply not been determined.

Significance of the Study

The significance of this issue cannot be understated. **Health care worker exposure to blood and other body fluids potentially contaminated with bloodborne pathogens remains a major public health problem.** The annual cost associated with exposure is estimated to be well over $100 million each year.[66] Post-exposure prevention costs are estimated at $2,000/exposure, while the lifetime cost of care for HIV infection is now $200,000 per patient.[67] Additionally, infected employees who file lawsuits against their employers typically are rewarded multimillion-dollar settlements. A recent study by Marin *et al.* noted that post-exposure chemoprophylaxis would prevent 53 HIV seroconversions/100,000 exposures at a societal cost of $2 million per case of HIV prevented.[67] In one large tertiary care hospital, the annual post-exposure care costs in 1998 were in excess of $850,000.[67]The additional cost of human suffering among exposed and infected HCWs, is incalculable.[68] In addition, exposures may adversely affect the delivery of care and the effective operation of health systems. Given that exposures continue to occur among the nation's roughly five million HCWs with patient or patient specimen contact, including employees at risk in a wide variety of non-hospital jobs, such as public safety, and given that there are serious gaps in our knowledge regarding these groups, it is important to identify the risk, risk factors, and appropriate strategies to meet the challenge of minimizing risk across a wide variety of occupations and settings.

Methodology: Overview

The three-year, five-phase study involved the random selection of approximately 2,000 non-hospital RNs; including employees from each of the following work settings a) mental disabilities and psychiatric facilities, b) nursing homes, c) drug and alcohol treatment clinics, d) doctor's offices and

clinics, e) prison healthcare facilities, f) home and hospice healthcare, g) employee health services, h) out-patient clinics, i) psychiatric centers (in-patient/out-patient), j) rehabilitation hospitals, j) student health services, k) youth detention centers, l) youth psychiatric centers. Additionally, a sample of about 200 hospital-based RNs was randomly selected from our NYSNA partner to participate. The random selection of employees was chosen from stratified membership mailing rosters (by setting and extent of patient contact) from our collaborating agencies and organizations. The study also included an additional sample of 200 hospital-based registered nurses (RNs) to compare with RNs in the non-hospital cohort. Study participants were recruited through three pathways: 1) The New York Public Employees Federation, 2) The New York State Nurses Association, and 3) The New York Department of Correctional Services. Recruitment was facilitated through partnerships we formed with agency heads and union leadership, who also served as site liaisons.

A new study questionnaire was constructed to examine five major constructs, 1) worker-centered risk factors, 2) job/task risk factors, 3) organizational risk factors, 4) compliance rates; and 5) the outcome variable, exposure incident history over the previous 12 months of employment. Qualitative procedures were utilized in order to collect as much relevant information as possible for developing the questionnaire. The confidential questionnaires were administered by mail, with a cover letter introducing our study and co-signed by a site liaison or leadership of the organization.

Analysis of data was directed towards the identification of risk factors for exposure, especially the availability of safety engineered devices. An innovative feature of this study was the formation of a Participatory Action Research (PAR) Team in the third year. Using prepared summaries of the data, the Team, comprised of researchers and representatives of the study population, worked collaboratively to identify data-driven opportunities to reduce risk. The study plan is outlined in **Figure 1**.

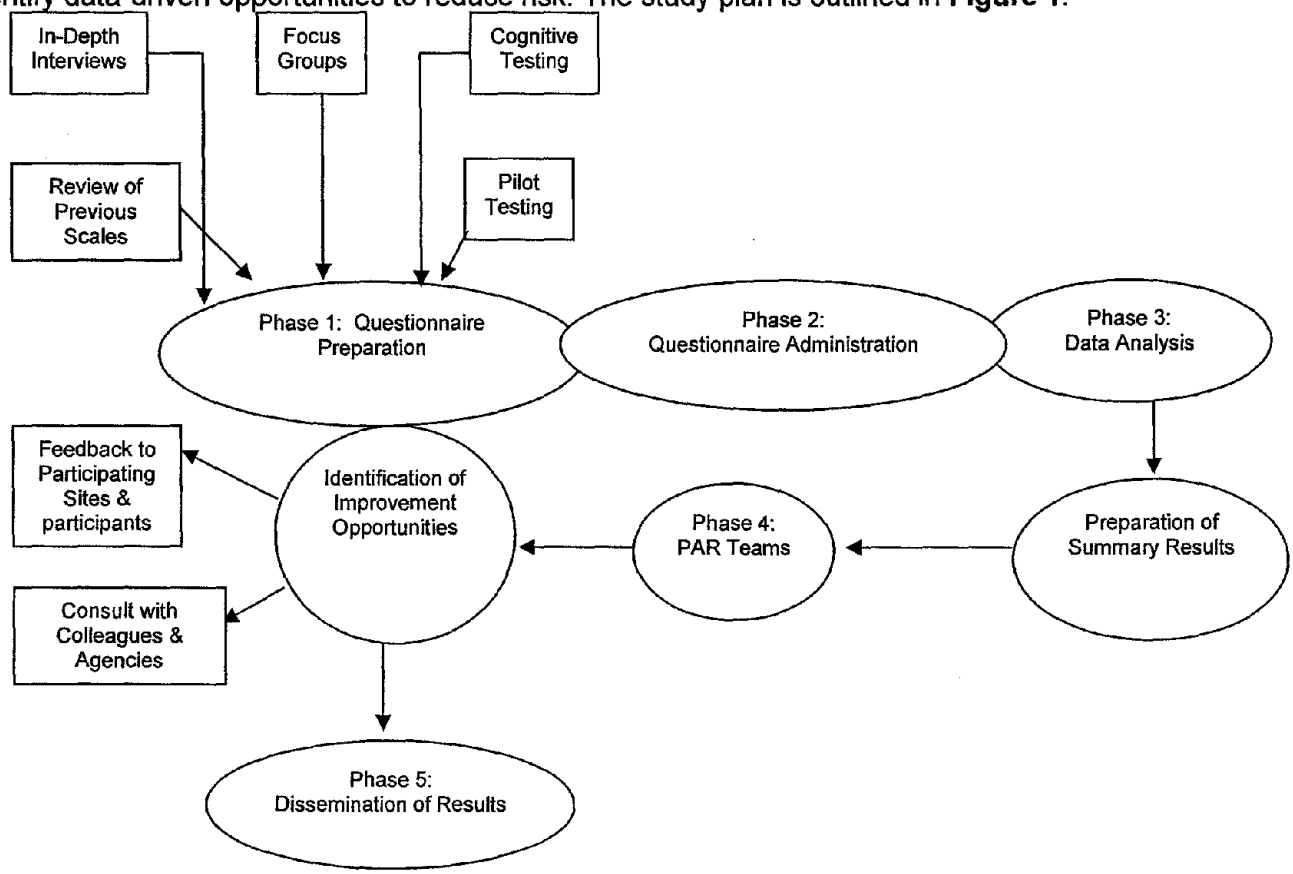


Figure 1. Study Design Overview

Study Sites

The non-hospital based HCWs will be recruited from the greater metropolitan New York area (including Manhattan, Long Island, and Nassau County). This region was chosen because it is reasonably accessible to the research team and it has the single highest AIDS rate (by state) in the U. S., with 47.9 AIDS cases/100,000 population reported in 1998, far surpassing the two next highest rated states, Florida (at 36.5/100,000) and Maryland (31.9/100,000). The District of Columbia leads the nation, with an AIDS rate of 189.1/100,000. New York also has many available facilities (e.g., AIDS clinics) that employ members of our participating agencies.

Study Populations

The New York State Public Employees Federation

This union has a total of 53,000 members, including 15,000 HCWs, of whom more than 7500 are RNs, the majority are women and minorities. Employees work in a number of settings, including the Office of Mental Health, State University of New York Health Science Centers, the Department of Correctional Services, the Office of Mental Retardation and Developmental Disabilities, the Department of Health, the Office of Alcoholism and Substance Abuse Services, Office of AIDS Prevention and AIDS clinics, and EMS services. In addition, the union represents HCWs in the Veteran's Administration nursing homes in New York State. Reflecting the fact that labor unions have a longstanding commitment to worker safety, the Federation recently advocated for state-wide legislation to ban unsafe needles and continues to promote efforts to increase the number of safety products available in state and public health care facilities.

The New York State Nurses Association

The New York State Nurses Association (NYSNA), which currently has approximately 33,000 members, is an affiliate of the American Nurses Association (ANA). About a third of the NYSNA members work in non-hospital settings, including home health care and hospice, nursing homes, correctional facilities, and physicians' or dentists' offices. More than 10,000 NYSNA members hold a bachelor's degree in nursing, and nearly 4000 have a bachelor's in another field. At least 3700 have earned an advanced degree in nursing or another field. Most NYSNA members (about 70%) are aged 40-49. The ANA reports a slightly higher than average number of Hispanic nurses in the New York region, and overall ANA membership in 1996 was 95% female.

New York State Department of Corrections

New York State has 68 correctional facilities (15 maximum, 38 medium, and 11 minimum containment levels). The prisons include four boot camps, two diagnostic/classification facilities, six alcohol and drug treatment facilities, and seven pre-release facilities in addition to 48 general adult population facilities. These sites employ approximately 31,000 workers, including 21,000 correctional officers, of whom approximately 93% are male and more than 50% belong to a minority group. The inmate/employee ratio is 3:2 (compared with a national ratio of 3:8).

Study Design: Overview

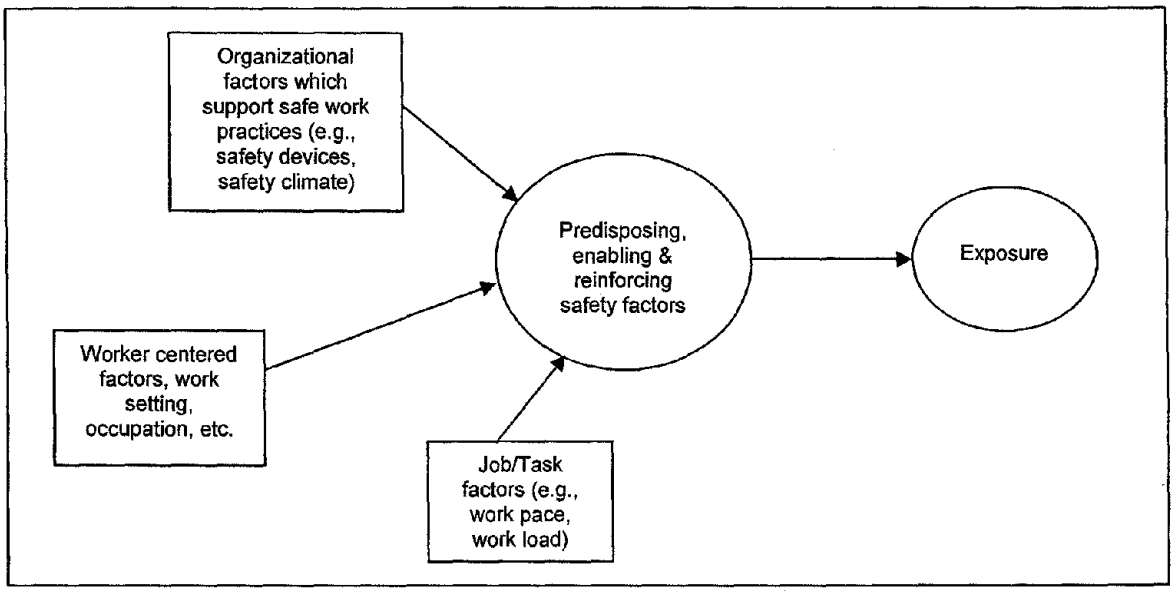
The three-year study was divided into five distinct phases in order to simplify its management. In Phase One, we developed the sample frame, collected qualitative data, designed, pilot tested, and developed the questionnaire. In Phase Two, the questionnaires were mailed to the random sample of non-hospital RN populations and to the one population sample of hospital nurses. In Phase Three, all of the analyses were performed. In Phase Four, the PAR Team identified opportunities for improvement. And finally, in Phase Five, final reports to the funding agency and research partner agencies were prepared and presented, and scientific papers were prepared and submitted for publication. Conference presentations were made on the study findings.
An overview of the study design is presented in **Table 4**.

Table 4. Outline of Study Management Plan

YEARS ONE and TWO			YEAR THREE	
Risk Assessment Stages			Risk Management Stages	
Phase One: Qualitative Data Collection	**Phase Two: Quantitative Data Collection**	**Phase Three: Analyses**	**Phase Four: PAR Teams**	**Phase Five: Dissemination**
(months 1-6)	**(months 7-12)**	**(months 13-24)**	**(months 25-30)**	**(months 31-36)**
• Sample Frame • Determination • Review of Existing Instruments • Field Internships • Volunteer Recruitment • Focus Groups • Cognitive Testing • Pilot Testing • Psychometric Analyses • Data Entry • Process Evaluation	• Administer Questionnaire • Data Entry • Data Cleaning • Process Evaluation	• Data Entry Completed • Checks of Reliability & Validity • Psychometric • Preparation of the "*Risk Grid*" • Summary Reports • Process Evaluation	• PAR Team Development of Recommendations • Consultation with Collaborators/ Agencies • Process Evaluation	• Prepare Final Reports • Presentation of Results at National Meetings • Prepare Reports for Employee • Process Evaluation

Theoretical model and study hypothesis

The theoretical model for the proposed study (**Figure 2**) was an adaptation of DeJoy's Behavioral Diagnostic Model, which itself is based upon the PRECEDE framework of Green.[69,70] This model was particularly suitable for guiding the development of the study questionnaire because it integrates both worker-centered and organizational determinants of safety behaviors and exposure, thus emphasizing the inter-connectedness between the individual and the work environment. This model indicates that a host of factors exist which relate to exposure. Worker-center variables included items related to employees' demographics, such as their work setting, job characteristics, job duties, needle use, patient contact, etc. Risk may also be affected by job/task variables as well as be organizational factors, including co-workers' attitudes (subjective norm), supervisors' support for safety in the workplace, and accessibility to safety equipment and supplies. The model that considers these factors is shown below in **Figure 2**.



Based on preliminary data from our earlier studies, we hypothesize that three sets of factors might work independently, jointly, or synergistically to increase or decrease the risk of exposure: worker-centered, job/task, and organizational factors. Accordingly, the study hypotheses were:

1. The rate of exposure will be a factor of intensity of contact to blood/body fluid, frequency and type of invasive procedures performed, and use of needles and other sharps.
2. The rate of exposure will be a function of availability of safety devices and the training in their use.
3. The incidence rate will also be related to additional risk factors, such as individual factors (occupation, knowledge about risk, knowledge of safety precautions), job task/job demands (work load, work pace, working conditions), and organization (amount of training provided, infection control expertise availability, safety climate, etc.).

Volunteer recruitment

We recruited volunteers for four key aspects of questionnaire development: in-depth interviews, focus group participation, cognitive testing, and pilot testing. Recruitment for these volunteer activities was conducted as follows: recruitment flyers were posted at the partner organizations and in employee newsletters (Please see **Appendix A** for related materials). We recruited similarly for pilot testing. The recruitment strategy for Phase One is detailed in **Table 5**. The hospital-based comparison group of RNs was recruited from the New York State Nurses Association from the same greater New York metropolitan area. Because we have extensive and recent experience with this subset of HCWs and to control expenses, we limited participation in Phase One to cognitive testing and pilot testing to those RNs who could reasonably reach the study office located in the upper west side of Manhattan.

Inclusion of women, ethnic and racial groups, and children 18-21 years of age

This application recognized the importance of the inclusion of both genders and as wide a range as possible of various ethnic and racial groups in the study; thus, therefore our sampling strategy was designed to include adequate representation of women and various ethnic/racial groups. Based on information from the site liaisons, we expected that approximately 80% of the nurses in the sample will be female and that at least 50% of the overall sample will belong to an ethnic/racial minority group. There were only a small percentage of "children" in our sample as HCW populations are, on average, 35-45 years old, and not 18-21 yrs old- the NIH definition of an adult child. Every effort was made to recruit representative minority participants for the qualitative phase of the study.

Table 5. Study Population Recruitment

Study Population	In-depth Interviews	Focus Groups	Cognitive Testing	Pilot Testing
HCWs from Non-hospital Settings	20 people	5 x 6 =30 people	20 people	10 people
Hospital-based HCW Population	—	—	5 people	10 people
Totals	20	30	25	20

Phase 1: questionnaire development

A ten-page questionnaire was developed in order to assess the five major study constructs and to meet our specific aims. The questionnaire was written at the 10th-grade reading level to facilitate its rapid completion, which generally took about 30-40 minutes to complete. Survey Pro software will be used to format the questionnaire.[71] The questionnaire was based, whenever possible, on well-defined scales as well as on qualitative data collected earlier in Phase One. Most questionnaire items had a four- or five-point Likert scale responses.[72]

Review of existing instruments and measures

Several potentially useful scales previously developed, were obtained and reviewed for their usefulness to this proposed study. Whenever possible, pre-existing and well-characterized valid and reliable measures were used. We recognized that certain variables needed additional clarification and refinement.

In-depth interviews

These extensive two- to two-and-a-half hour in-depth interviews helped us to prepare the focus group scripts. Here we became familiar with any special terminology used by the RNs in a particular setting, any special needs, problems, risk factors, etc. The interviews were conducted with 20 RNs from the different work groups. The Principal Investigator or the Project Coordinator conducted the interviews, which were held at a time convenient for the participants in a conference room on the Columbia Medical Campus.

Focus group sessions[73-76]

Five separate, setting-specific focus groups were organized in order to learn more about the study populations with respect to blood/body fluid exposures and to obtain qualitative data that informed the study questionnaire. Topics included type of exposures, exposure reporting, difficulties in reporting, risk factors, barriers to appropriate risk management, knowledge regarding their risk and risk for infection, and organizational constraints to risk management. The first six representative callers who responded to our recruitment efforts were chosen if they meet the criteria (i.e., they are employed in one of the occupations) and were available and willing to consent.

Once prospective participants were identified, we scheduled a convenient time and place to meet. Written confirmation was sent to all participants. Reminder phone calls were also made 24 hours prior to the meeting.

Focus groups followed a defined protocol, which will included the following elements:

- Each group was led by an experienced facilitator.
- Each group had at least one research assistant who took notes.
- Each group had 6-8 attendees.
- Each session was approximately two hours long.
- Each session was held in a convenient location (generally a conference room on the

Columbia University Medical campus.

- Consent procedures were followed.
- All meetings were held at convenient times.
- A meal was served at each meeting, and each participant received a small honarium.
- Facilitators used a prepared moderator's guide and followed a script. The guide included the research objectives.

Cognitive testing

This technique is used to evaluate draft survey questionnaires by performing intensive interviews that incorporate use of the talk aloud method.[77] For this phase of questionnaire development, a total of 25 volunteers representing a broad spectrum of the types of non-hospital RNs were interviewed. These interviews focused on the cognitive processes that participants use when answering the survey questions. Understanding the nature of the response process helped us to redesign and clarify the survey questions, thus allowing for a more precise interpretation of the questions while also improving the accuracy of responses. Cognitive interviews took approximately two to two-and-a-half hours each and were held at a convenient time for participants in a small, pleasant conference room on the Columbia campus.

Pilot testing

Working drafts of the questionnaires were prepared, and the questionnaire was pre-tested on a sample of 20 volunteers recruited from NYSNA and PEF. This process helped us to refine the questionnaire to its final stage of completion.

Construct Items

Based upon the literature and our preliminary studies and guided by the theoretical model, the following topics were included in the final instrument. These are described below in **Table 6**.

Table 6. Questionnaire Items

Knowledge: Several questions related to HIV and other bloodborne pathogens were included, such as routes of transmission.
Perception of Risk: Employees were asked several questions that will address their self-perception of risk of infection given an exposure.
Beliefs/Attitudes: Employees were asked about their belief in the efficacy of SP and safety devices to protect them.
Perception of organizational factors: Employees were asked about management=s commitment to safety (safety climate); availability of resources (e.g., safety needles and other equipment and supplies); training and educational programs with respect to bloodborne pathogen exposure; management=s support of exposed employees; group norms and group expectations; management's medical surveillance program, including availability of the HBV vaccine; and post-exposure programs.
Exposure history: Employees were asked to recall past exposures (past 12 months including percutaneous and mucocutaneous), routes of transmission, patient source status (i.e., HIV status), and post-exposure management care, including post-exposure prophylaxis, activity during exposure, device in use during exposure, exposure reporting, and precautions that might have prevented the exposure.
Job task: Employees were asked to describe characteristics of the job that may increase risk, such as patient load, work pace, shift work, control over job tasks, environmental conditions (e.g., noise, heat, etc.), job satisfaction, and workstress.
Self reported compliance (or intention to comply) with exposure reporting guidelines: Employees were be asked to self-report their adherence to SP in the previous 12 months as well as their compliance with the reporting of exposures and with vaccine recommendations.
Sociodemographics: Including continuous variables, such as age, number of years of work experience, and categorical variables such as gender, race/ethnicity, job category, etc.

Phase 2: questionnaire administration

All procedures involving study volunteers (e.g., in depth-interviews, field internships, focus groups, cognitive testing, pre-testing, questionnaire administration, and PAR Teams).

Questionnaire management

Each questionnaire was assigned (by the Project Coordinator) a unique study number (i.e., a code number). A list of code numbers and mailing addresses for the sample of each occupational group constituted the "master code book." The agency randomly selected names for the study and mailed us an excel file with the names and home addresses- we prepared a set of seven labels per person (for one mailing packet, two reminders, two follow-up mailings, one last effort demographic sheet, and one to send the participants a summary of the results. The mailed questionnaire packet consisted of the following (please see **Appendix C** for a copy of the study questionnaire):

- Cover letter of introduction signed by the Principal Investigator and Agency Head
- Questionnaire
- Consent form
- Pre-addressed, pre-stamped return envelope
- Declination post card

The master codebook was kept under lock and key and only the study Principal Investigator and Project Coordinator had access to this book or computer files of this (password protected). Only the study Principal Investigator and Project Coordinator had access to unblinded computer files.

The Principal Investigator's name and office phone number were included on the questionnaire, the cover letter, and consent form in case the employee had any questions or comments regarding any aspect of the study.

Methods to increase response rate

Several methods were used to help increase the response rate for the questionnaires. Study team members met and greeted potential study participants during frequent visits to the various agency headquarters. We have found this to be very beneficial in boosting response. The cover letter was signed by both the Agency Head and the Principal Investigator. Other steps taken included:

- Leadership helped promote the study on their web site, at their regularly scheduled meetings, and in their newsletters.
- The consent material and questionnaire were as brief as possible.
- For mailed questionnaires, a standard follow-up procedure (Dillmans) was adapted (one reminder letter, followed by a complete packet, a second reminder letter, another packet, a final reminder letter, and a final plea to complete a one-page demographic form).[79] This helped us compare responders to non-responders on at least demographic characteristics.

Data collection and management

Qualitative data

Focus group and cognitive interview data were collected and managed as follows:

- No identifiers were linked to reports.
- Summary reports were made using a standardized format as soon as possible after the event. Original notes and reports were kept under lock and key for the duration of the study. Summary of findings were periodically presented to the research team members.
- All original notes and records will destroyed at the conclusion of the study (ie., when all publications are completed)

Quantitative Data

All questionnaires returned to the study office were inspected for legibility and completeness. Mailed questionnaires that had a substantial number of questions unanswered were re-sent to the HCW with a reminder note to fill out all sections. All illegible questionnaires were discarded. Data from the completed questionnaires were then double-entered directly onto a database. Data was backed up using cds. Data were protected by pass codes. The original questionnaires and data cds were all kept under lock and key in the study office or at the statistician's office. The master codebook was destroyed at the conclusion of the study. All stripped computer files will be maintained indefinitely.

Phase 3: Analysis of data

After checks for internal reliability and validity of responses and other data editing procedures were completed, we performed an array of descriptive statistics (e.g., frequencies, histograms, and measures of central tendency and dispersion) and graphical techniques to characterize the distribution of variables, starting at the most refined level of measurements. This strategy provided us with familiarity with the data and allowed us to determine if the data meet assumptions required by the intended statistical testing procedures. Principal components model of factor analysis were run on all scales, using maximum likelihood parameter estimates. Factors were retained in the model based on their eigenvalues, and the retained factors were transformed using orthogonal varimax criteria. All scales underwent correlation procedures.

Frequency rates for exposure were calculated (**specific aim 1**) both by work setting group and overall. Overall levels of risk factors associated with both exposure and compliance (which may be used as a surrogate in those work settings with low exposure rates) were determined for each work setting by cross-classifying independent variables with the outcome variable (exposure) appropriate to the level of measurement. Analyses were accomplished using logistic regression methods for dichotomous outcome variables, such as exposure versus no exposure, to control for demographic variables, such as age, gender, occupation, etc., in order to evaluate the effects of other variables of interest, such as availability of safety equipment, etc. The outcome (dependent) variable was "exposure" (**specific aim 2**). Risk factors were determined by work setting group, as we anticipate group differences. To compare a subset of hospital versus non-hospital HCWs (**specific aim 3**), we compared rates of exposure, per 100 worker person years, and to determine the differences in risk factors, we determined the odds ratio (at the 95% confidence interval) followed by stepwise logistic regression analysis to control for confounders.

Participatory Action Research Teams' summary reports

Summary reports for the PAR Team deliberations were prepared using quality improvement techniques, which are designed to help explain data to non-scientists **(specific aim 4).** This included the preparation of charts, frequency plots, cause and effect diagrams, and simple tables.[70] All materials were prepared in extremely user-friendly formats.

Process evaluation

It is important to periodically determine how well a program is operating, i.e., to determine how effective it is in terms of meeting the expected project goals in a timely and cost-effective manner.

The evaluation component is also important for resolving identified problems or for filling identified needs. This evaluation improves our understanding of how well the project is being conducted and documents the organizational and operational procedures of the project. Both outcome evaluations, which emphasized the effectiveness of the program, as well as process evaluations, which characterize the program, were conducted at the end of each study phase. For example, we evaluated the development of the survey, insuring adequate pre-testing and maximizing validity of responses, as well as monitoring the dissemination of reports. We used a modification of the standard process evaluation approach developed by researchers at the Office of Substance Abuse Prevention.[80] We addressed each aspect of the evaluation procedure through audits, observation, and a review of records and data. Our evaluation consultant, Dr. Ayxa Caler-Breckheimer helped provide for an objective evaluation process, usually conducted after each phase. Based on the evaluation results, we made adjustments as needed. Particular attention was focused on the participants' reaction to ensure that we have made all aspects of participation as simple, convenient, and enjoyable as possible. Any risks to participants were therefore discovered quickly through the evaluation process and immediately managed to avoid untoward adverse effects on study participants, however no adverse events involving participants were identified during the study. A flowchart describing the project evaluation format is outlined in the **Figure 3.**

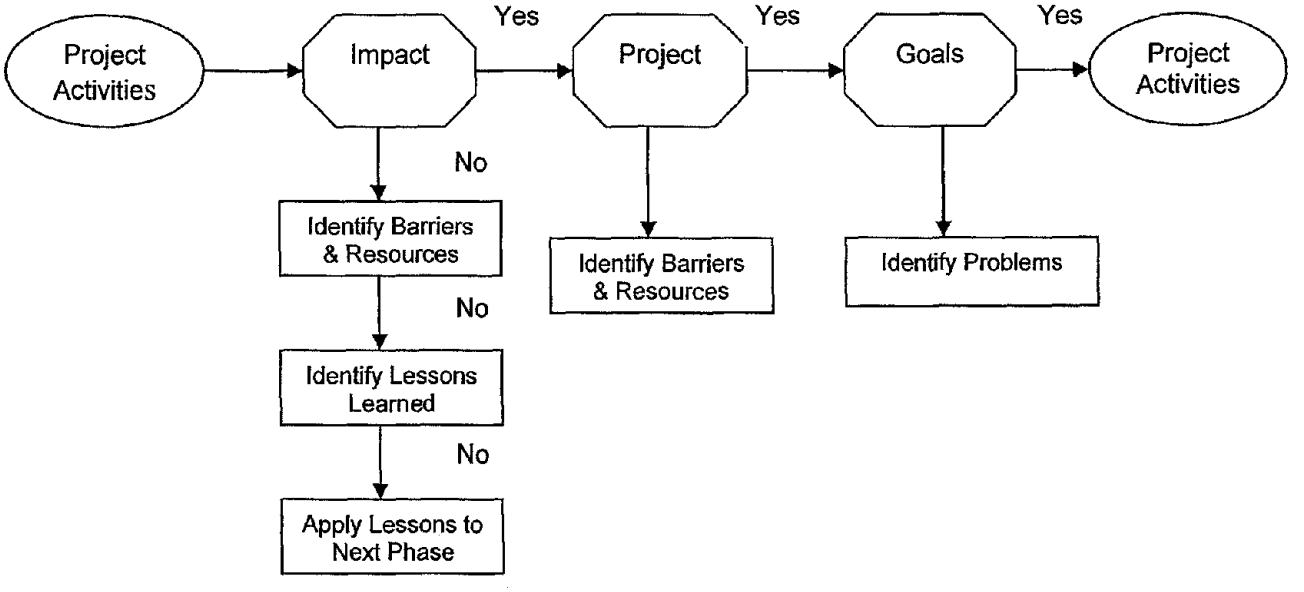


Figure 3. Systematic framework for our process evaluation

Phase 4: Participatory Action Research Teams

A PAR Team was formed in order to identify data-driven interventions. We organized a full day workshop with about 15 leaders in infection control, with most from the PEF network, but many were also members of NYSNA. All were experienced front line nurses, but all also had supervisory or administrative responsibilities for the infection control and/or safety programs at their facilities. They represented a diverse group from throughout New York State. The PAR Team process encouraged the involvement of all of the participants and helped us to close the gap between knowledge gained and the application of knowledge. The PAR process builds also builds on the strengths and resources PAR members bring to the problem. The process promotes co-learning and empowerment and facilitates the reciprocal transfer of knowledge and skills.[79]

Phase 5: Dissemination of data

The study team provided each participating agency with the recommendations of the PAR Teams. This was accomplished by preparing a report, including an executive summary, for each of the agencies. Additionally, we intend to send them each a copy of this final agency report. Also, we intend to submit a summary of recommendations to national organizations (e.g., ANA) representing the study populations. We submitted abstracts for presentations to their national meetings. All intramural dissemination to study populations will be handled by the collaborating agencies, and we will assist them in any way possible.

Extramural dissemination

In order to inform the broadest possible audience with potential interest in this area of study, several approaches are needed. All extramural information will be presented to the participating agencies. The Principal Investigator and other investigators will work closely with our NIOSH colleagues to help publicize our findings as widely as possible. Using a variety of media (e.g., print, video, computer), we intend to make several tangible products available: 1) a synopsis of study results, 2) detailed questionnaires, constructs and coding information, 3) if NIOSH indicates that it would be beneficial, we will assist in the preparation of a NIOSH *Alert* for employers regarding exposed workers. In addition, oral presentations, articles, posters, etc. will be prepared and presented to as wide an audience as possible (e.g., organizational psychologists, nurse researchers, safety specialists, health experts, etc.). Some examples of possible journals for publication include: *American Journal of Infection Control, Journal of Occupational and Environmental Medicine, Infection Control and Hospital Epidemiology, American Journal of Public Health*, and specialty publications, including nursing journals (*Journal of Nursing Research, Journal of Nursing Administration, Nursing Management*), correctional journals (*Correctional Health Care*), police officer journals (*Justice Quarterly*), and police trade journals (*Noble, The Police Chief*, etc.). Where indicated, media releases of our findings will be prepared by the Columbia University Department of Public Affairs. Study investigators also expect to present research findings at a variety of conferences intended to reach the target audience (e.g., ANA Conference), etc. We can also access existing nurse, police, corrections, and EMS links on the web to disseminate our findings.

Results

Demographics

The sample of non-hospital RNs is similar to RNs in general (compared to PEF & NYSNA membership demographics). A summary of the demographics of the sample is below in Table 7.

Table 7. Non-Hospital Demographics N=1156 all non-hospital respondents

Item	Variable	N	%
Gender	Female	999	87.1
	Male	148	12.9
Age	Mean yrs- 49.1 yrs	-	-
	Median- 50.0	-	-
	Range- 23-72 yrs old	-	-
	S.D.- +/- 8.2 yrs	-	-
Education	Diploma	201	17.6
	AS	470	41.2
	BS	336	29.5
	MA+	133	11.7

Licensure	RN	1133	98
	NP	40	3.5
	Other	39	3.4
Tenure, RN	Mean yrs- 20.5 yrs	-	-
	Median- 20 yrs	-	-
	Range- 1-48 yrs	-	-
	S.D.- +/- 10.8 yrs	-	-
Tenure, Current Employer	Mean yrs- 11.5 yrs	-	-
	Median- 10 yrs	-	-
	Range- <1-46 yrs	-	-
	S.D.- +/- 9.1 yrs	-	-
"Hands-on" Patient Care	Yes	998	88.1
Current Work Setting	Doctor's Office	6	0.5
	Group Home	79	6.8
	HMO	5	0.4
	Home Health	68	5.9
	Hospital	142	12.3
	Employee Health	38	3.3
	Infection Control	18	1.6
	Long Term Care	90	7.8
	Out-Patient	108	9.3
	Public Health Department	43	3.7
	Private Practice	3	0.3
	State Institution	538	46.5
	Surgical Center	0	_
	Other	203	17.6
Mandatory Overtime	Yes	504	44.6
Hours worked per week	Mean- 42 hrs	-	-
	Median- 40 hrs	-	-
	Range- 3-70 hrs	-	-
Hours worked per day	Mean- 8 hrs	-	-
	Median- 8 hrs	-	-
	Range- 1-16 hrs	-	-

In Table 8 below we describe the work setting of the participants.

Table 8: Characteristics of the Work Setting

Variable	n	%
# of employees at facility,		
<100	362	33
101-1000	562	51.0
>1000	177	16.0
Part of a hospital system, yes	837	39.8
Affiliated with a medical system, yes	294	26.8

In Table 9 below we present the types of typical activities performed by the non-hospital RNs.

Table 9. Work Activities

Variable	n	%
Daily living activities	375	32.4
Change, dispose of sharps containers	682	59.0
Clean-up contaminated spills	464	40.6
Dispose of contaminated waste	504	43.6
Management of bodily fluids	587	50.8
Drainage tubes	211	18.3
Dressing changes	681	58.9
Use needles, sharps	946	81.8

The respondents reported high vaccination rates for HBV as shown below in Table 10.

Table 10. Hepatitis B Vaccine History

Variable	n	%
All three doses	946	83.9
Only 1 or 2 doses	45	4.0
No, already HBV pos.	40	3.5
No, other reason	97	8.6
Don't remember/don't know	4	0.3

Exposure were not unreportedly experienced as shown below in Table 11, although as seen in Table 12, reporting such exposures to management was low.

Table 11. Exposure History

Variable	n	%
Work lifetime hx. Of sharps injury	727	64.1
Total number, Mean		
Needlestick hx in present job, Yes	262	23.3
Total number of needlesticks in present job		

Table 12. Number and type of Exposure, and Exposure Reporting, last 12 months

Variable	Experienced n	Experienced %	Reported n	Reported %	Underreporting rate
Needlesticks	101	14.7	67	16.7	34.0
Splashes to eye/mouth	101	14.7	26	6.7	74.3
Contacts with non-intact skin	79	12.0	12	3.2	84.8
Cuts with sharps	59	8.9	25	6.6	57.7
Contacts with intact skin	280	37.6	40	8.6	85.7

The reasons provided for nonreporting exposures were similar to those cited in other HCW studies. Even though 90% of the respondents were told to report all exposures, only 40% revealed that they had reported their latest exposure.

Table 13. Reporting of Exposures

Variable	%
Did you report most recent exposure, Yes	40.4
Reasons for not reporting, Inconvenience	15
Fear of getting into trouble	8
Lack of confidentiality	15
Did not know what to do	4
Did not fill out report	40
Seen within 2 hours	20
Seen in over 2 hours	10
Never seen	70
Did not think it was necessary	62
No provider was available	9
No replacement available	8
Received post exposure care and counseling	21
Offered PEP for HIV	15
Accepted/received PEP	6
Had side effects from PEP	4
Referred to an HIV specialist	3.5
Received written information on PEP	11
Lost time from work	5
Overall PEP experience reported as fair or poor	27

The reasons often cited for needlestick incidents are shown below in Table 14.

Table 14. Exposure History

Variable	n
Patient behaviors	132
Disposal related	76
Equipment design failure/Flaw	28
No safety device	26
During recapping	21
Co-worker actions	13
Safety device failed	13
Overfilled sharps container	12
Left in trash, linens	7
No sharps container available	7
Device used improperly	4
Other	81

Surprisingly, many needlesticks (42.5%) involved a safety device as shown below in Table 15. This occurred despite the high rate (78%) of reported training on such devices.

Table 15. Safety Device Related Injury/Exposure (last 12 months)

Safety device in use yes	n	%
Type of device in use		
Safety butterfly	15	10.2
Shielded needle	18	12.2
Retractable needle	29	19.7
Safety needle, other	16	10.9
Safety phlebotomy	14	9.5
Other device	55	37.4
Did you receive training on the device, Yes	118	78.1

Compliance With Standard Precautions

This was measured using a 12 item scale with a Cronbach's alpha of 0.69. There were five response choices, including*: never, rarely, sometimes, often, always.* The mean scale score was 4.45, and median of 4.7, out of a range of 1-5., the standard deviation was +/- ,41. The items that respondents were most (i.e., "always) compliant for were: "*following SP with all patients, regardless of their diagnosis*", and "*treating all materials as if they were potentially infectious*". The items they were least complaint on were: "*wearing eye protection when indicated*", and *"wearing disposable outer garments when indicated".* Please see Table 16 for the individual item responses.

Table 16: Standard Precautions N=1156			
Item	Variable	N	%
Dispose of sharp objects into sharps container	Never	8	0.7
	Rarely	32	2.8
	Sometimes	93	8.2
	Often	130	11.5
	Always	796	70.1
	N/A*	76	67
Follow standard precautions w/all patients regardless of diagnosis	Never	1	0.1
	Rarely	4	0.4
	Sometimes	19	1.7
	Often	121	10.7
	Always	960	84.5
	N/A	31	2.7
Wash your hands after removing disposable gloves	Never	2	0.2
	Rarely	9	0.8
	Sometimes	58	5.1
	Often	183	16.1
	Always	846	74.5
	N/A	37	3.3
Wear disposable outer garment resistant to blood and body fluids whenever there is a chance of soiling clothes at work	Never	182	16.1
	Rarely	213	18.8
	Sometimes	150	13.2
	Often	115	10.2
	Always	239	21.1
	N/A	234	20.7
Wear disposable gloves whenever possible exposure to blood/body fluids	Never	1	0.1
	Rarely	10	0.9
	Sometimes	35	3.1
	Often	154	13.6
	Always	893	78.6
	N/A	43	3.8

Wear eye protection whenever possibility of splashes or splatters to eyes	Never	169	15
	Rarely	160	14.2
	Sometimes	107	9.5
	Often	103	9.5
	Always	309	27.5
	N/A	277	24.6
Promptly dispose of contaminated spills	Never	9	0.8
	Rarely	36	3.2
	Sometimes	24	2.1
	Often	86	7.6
	Always	757	65.5
	N/A	213	18.9
Refrain from eating/drinking while working in areas of possible contamination	Never	19	1.7
	Rarely	23	2
	Sometimes	70	6.2
	Often	135	11.4
	Always	776	68.9
	N/A	112	9.9
Take special caution using scalpels/other sharps	Never	1	0.1
	Rarely	23	2
	Sometimes	6	0.5
	Often	32	2.8
	Always	889	78.6
	N/A	199	17.6
Do not recap contaminated needles	Never	60	5.3
	Rarely	14	1.2
	Sometimes	35	3.1
	Often	93	8.2
	Always	844	74.7
	N/A	84	7.9
Wear gloves when exposed to blood products	Never	13	1.8
	Sometimes	12	1.7
	Rarely	21	2.9
	Often	46	6.4
	Always	321	44.9
	N/A	302	42.2

Treat all materials in contact w/patients' body fluids as infectious	Never	3	0.3
	Rarely	8	0.7
	Sometimes	26	2.3
	Often	113	9.9
	Always	930	81.8
	N/A	56	4.9

*N/A= not applicable

Safety Climate

This 21 item scale had a Cronbach's alpha of .925. The range was from 1-5 (*strongly agree, disagree, neutral, agree, and strongly disagree*, with a mean scale score of 3.562., S.D. +/- 0.138. The items that received the lowest (i.e., worst) score was "*nurses who provide patient care are involved in safety product selection*", and "*inadequate staffing.*" The items that received the highest (i.e., best) scores were: "*I usually follow Standard Precautions*, and "*All reasonable steps are taken on my unit to minimize hazardous job tasks and procedures*". Please see Table 17 for the individual item responses.

Table 17: Safety Climate N=1156

Item	Variable	N	%
Protection of workers from occupational exposures to HIV/HBC/HCV is a high priority with management	Strongly disagree	31	2.7
	Disagree	66	5.8
	Neutral	154	13.6
	Agree	523	46.1
	Strongly agree	360	31.7
All reasonable steps are taken to minimize hazardous job tasks and procedures	Strongly disagree	25	2.2
	Disagree	80	7.1
	Neutral	159	14.1
	Agree	556	49.3
	Strongly agree	307	24.8
Employees encouraged to become involved in safety/health matters	Strongly disagree	38	3.4
	Disagree	97	8.6
	Neutral	204	18
	Agree	512	45.3
	Strongly agree	280	24.8

Job duties often interfere with being able to follow standard precautions	Strongly disagree	45	4
	Disagree	128	11.4
	Neutral	129	11.5
	Agree	510	45.4
	Strongly agree	312	27.8
I have enough time to always follow standard precautions	Strongly disagree	38	3.4
	Disagree	159	14.2
	Neutral	158	14.1
	Agree	549	48.9
	Strongly agree	218	19.4
I usually follow standard precautions	Strongly disagree	16	1.4
	Disagree	14	1.2
	Neutral	41	3.7
	Agree	592	52.8
	Strongly agree	459	40.9
Unsafe work practices are corrected by supervisors	Strongly disagree	65	5.6
	Disagree	165	15
	Neutral	290	26.3
	Agree	401	36.9
	Strongly agree	183	16.6
Nurse manager often discusses safe work practices	Strongly disagree	82	7.7
	Disagree	196	18.3
	Neutral	328	30.6
	Agree	321	30
	Strongly agree	144	13.4
Had the opportunity to be properly trained to use safe needle devices so I can protect myself from exposures	Strongly disagree	43	3.8
	Disagree	106	9.5
	Neutral	103	9.2
	Agree	538	48
	Strongly agree	331	29.5
Employees taught to recognize potential health hazards at work	Strongly disagree	29	2.6
	Disagree	79	7
	Neutral	151	13.4

	Agree	614	54.3
	Strongly agree	258	22.8
Copy of hospital safety manual is available at my worksite	Strongly disagree	40	3.7
	Disagree	71	6.6
	Neutral	135	12.5
	Agree	540	49.9
	Strongly Agree	297	27.4
Work are is kept clean	Strongly disagree	33	2.9
	Disagree	85	7.5
	Neutral	157	13.9
	Agree	584	51.8
	Strongly agree	268	23.8
Work area is adequately staffed	Strongly disagree	171	15.1
	Disagree	294	26
	Neutral	201	17.8
	Agree	314	27.8
	Strongly agree	156	13.3
Provided with all necessary equipment	Strongly disagree	45	4
	Disagree	198	17.7
	Neutral	185	16.5
	Agree	508	45.4
	Strongly agree	183	16.4
Work area is not crowded	Strongly disagree	68	6
	Disagree	247	21.9
	Neutral	189	16.8
	Agree	483	42.9
	Strongly agree	139	12.3
Minimal conflict w/in my dept	Strongly disagree	104	9.2
	Disagree	240	21.3
	Neutral	251	22.3
	Agree	411	36.5
	Strongly agree	121	10.7
Members of my unit support one another	Strongly disagree	60	5.3
	Disagree	166	14.8
	Neutral	234	20.8
	Agree	488	43.4
	Strongly agree	177	15.7

Open communication between nurse management and staff	Strongly disagree	71	6.4
	Disagree	158	14.1
	Neutral	229	20.5
	Agree	489	43.3
	Strongly agree	176	15.7
Product review board monitors new safety products as they become available	Strongly disagree	99	9.3
	Disagree	186	17.4
	Neutral	371	34.8
	Agree	302	28.3
	Strongly agree	108	10.1
Nurses who provide patient care are involved in product selection	Strongly disagree	157	19.3
	Disagree	276	25.2
	Neutral	288	26.3
	Agree	271	24.7
	Strongly agree	103	9.9
Overall satisfied with working conditions of job	Strongly disagree	53	4.7
	Disagree	140	12.4
	Neutral	247	21.9
	Agree	535	47.3
	Strongly agree	155	13.7

Job Satisfaction

This 5 item scale had a Cronbach's alpha of 0.789, with a mean scale score of 2.723, and a range of 1-4 (*strongly agrees, agree, disagree, strongly disagree*. The highest (i.e., worst) scores were obtained for the item: *"I have more than one task to do at a time"*, and the item that received the lowest (i.e., best) score was *"My body is here but my mind is elsewhere"*. Please see Table 19 for the individual item responses.

Table 18: Job Satisfaction N=1156

Item	Variable	N	%
My body is here but my mind is elsewhere	Strongly agree	21	1.8
	Agree	161	14.2
	Disagree	696	56.8
	Strongly disagree	309	27.2
I am often distracted at work	Strongly agree	59	5.2
	Agree	291	25.6

	Disagree	554	48.8
	Strongly disagree	231	20.4
I sometimes cut corners at work	Strongly agree	15	1.3
	Agree	322	28.4
	Disagree	544	48
	Strongly disagree	252	22.2
I often find myself doing one thing but thinking about another	Strongly agree	42	3.7
	Agree	361	31.8
	Disagree	527	46.5
	Strongly disagree	204	18
I have more than one task to do at a time	Strongly agree	312	27.5
	Agree	600	52.8
	Disagree	173	15.2
	Strongly disagree	51	4.5
Extent negatively affected by noise	Very much	204	17.9
	Moderately	400	35.1
	Very little	415	36.5
	Not at all	119	10.5
Negatively affected by temp	Very much	228	20
	Moderately	441	38.7
	Very little	360	31.6
	Not at all	111	9.7
Negatively affected by unpleasant working conditions	Very much	117	15.6
	Moderately	349	30.7
	Very little	428	37.6
	Not at all	184	16.2
Negatively affected by overcrowding	Very much	155	13.6
	Moderately	298	26.2
	Very little	399	35.1
	Not at all	284	25
Negatively affected by personal security fears	Very much	151	13.3
	Moderately	282	24.8
	Very little	412	36.2
	Not at all	294	25.8

Negatively affected by worry about infections	Very much	68	6
	Moderately	273	23.9
	Very little	55	48.7
	Not at all	244	21.4
Negatively overworked/exhausted	Very much	210	18.9
	Moderately	393	34.4
	Very little	361	31.6
	Not at all	177	15.5
Negatively affected by under-staffing	Very much	372	32.8
	Moderately	414	36.5
	Very little	237	20.9
	Not at all	112	9.9
Negatively affected by unappreciated	Verymuch	373	32.8
	Moderately	337	29.6
	Very little	294	25.8
	Not at all	134	11.8
Negatively affected by work scheduling	Very much	165	14.5
	Moderately	309	27.1
	Very little	422	37.1
	Not at all	243	21.3
Negatively affected by salary	Very much	310	27.3
	Moderately	400	35.2
	Very little	310	27.3
	Not at all	115	10.1
Negatively affected by interpersonal problem at work	Very much	118	10.4
	Moderately	269	23.2
	Very little	493	43.4
	Not at all	261	23
Negatively affected by mandatory overtime	Very much	175	15.5
	Moderately	182	16.1
	Very little	308	27.2
	Not at all	467	41.3

Negatively affected by personal problems	Very much	22	1.9
	Moderately	140	12.3
	Very little	543	47.6
	Not at all	435	38.2
Negatively affected by threat of terrorism	Very much	27	2.4
	Moderately	113	9.9
	Very little	441	38.7
	Not at all	560	44.1
Negatively affected by general job dissatisfaction	Very much	90	7.9
	Moderately	316	27.8
	Very little	469	41.2
	Not at all	263	23.1

Correlations with needlesticks

There were a number of significant correlates including compliance with standard precautions ($p < .0001$), limited access to employee health ($p < .0001$), limited training ($p < .0001$), work place environmental bothers ($p < .001$), availability of safety devices (p, .05), handling sharps ($p < .001$), job satisfaction ($p < .001$) and reluctance to report ($p < .05$).

Discussion

These results indicate that non-hospital RNs perform exposure-prone activities where exposures are not uncommon, although needlesticks were associated with lack of safety devices, exposures are not entirely prevented by safety devises, and exposures occur related to limited training and poor access to infection control/employee health nurses. Additionally, under-reporting is high compared to hospital RNs.

Conclusions

Based on these results, we have developed the following recommendations:

- Updated guidelines for both administration and workers
- Access to safety devices
- Effective and efficient product evaluation and training
- For administration; model risk management, step-by step plans or case studies
- Timely and effective post exposure care
- Reevaluation of all infection control and BBP training methods and effectiveness & revisions as necessary

We hope these findings will lead to changes that are clearly a necessity.

Publications

Gershon, R.R.M., Qureshi, K.A., Gurney, C.A., Rosen, J.D., Hogan, E.K. (2002). Bloodborne Pathogen Exposure Risk for Non-Hospital Based Healthcare Workers. *Clinics in Occupational and Environmental Medicine*, 2(3):497-518.

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Mailman School of Public Health
Columbia University

PROJECT S.T.A.R.

Quarterly Newsletter

Volume 1, Issue 1 Jan.-Mar. 2001

Project Membership: Robyn Gershon, Tanarsha Rankins, Samara Toliver, Paul Brandt-Rauf, Noreen Esposito, Kristine Gebbie, David Vlahov, Jonathan Rosen, Cynthia Gurney, Martin Sherman, and Les Wright

Project Purpose: The goal of Project S.T.A.R. is to reduce the risk of Bloodborne Pathogen exposure in Non-Hospital based Health Care Workers. Our efforts are specifically directed at non-hospital based registered nurses. Working in collaboration with our cooperating agencies (PEF, NYSNA, NYSDOC) we will identify the risk factors to develop data-driven risk reduction strategies for exposure and through participatory action research methodology.

Progress Report

The Project is making substantial progress on its targeted objectives for Phase 1. The following are highlights of Project S.T.A.R.s' recent activities:

- We held planning meetings with our colleagues at PEF and NYSNA.
- Determination of the sample frame.
- Prepared focus group script.
- Focus groups have been organized and will be conducted April, 2001 through June, 2001.
- Mini-field internships are scheduled at two correctional facilities. Bedford Hills and Arthur Kill for the first week of June.

Sample Frame Determination

From the New York State Public Employees Federation, registered nurses will be recruited from the following agencies:

- Office of Mental Health
- Department of Health
- Veterans Hospitals
- Office of Mental Retardation & Developmental Disabilities
- Department of Corrections (DOC)
- Office of Alcohol & Substance Abuse Services

- From the New York State Nurses Association, nurses from the New York City area, including Long Island, have been selected to participate in focus groups.
- DOC nurses will be recruited from Bedford Hills and Arthur Kill for focus groups.

STUDY PARTNERS

- **New York State Public Employees Federation**
  Mr. Jonathan Rosen, MS, CIH, Director of Occupational Health & Safety
  Over 50,000 members, 15,000 are HCWs
  Over 7,500 RNs
  Employed in part by:
    - OMH
    - DOH
    - Veterans Hospitals
    - OMRDD
    - DOCs
    - OASAS

- **New York State Nurses Association**
  Dr. Cynthia Gurney
  Over 35,000 members
  Affiliate of ANA
  About 1/3 work in non-hospital settings

- **New York State Department of Corrections**
  Dr. Lester Wright
  Over 70 state correctional facilities with 31,000 workers

PROJECT S.T.A.R.

Investigators and Collaborators

Columbia University
Principal Investigator
Robyn RM Gershon, MHS, DrPH
Project Manager
Tanarsha T. Rankins, BA

Co-Investigators
Paul Brandt-Rauf, MPH, MD, DrPH
Kristine Gebbie, PhD
David Vlahov, PhD

Collaborators
Cynthia Gurney, RN, PHD (NYSNA)
Jonathan Rosen, MS, CIH (PEF)
Martin Sherman, PhD (Loyola)
Lester Wright, MD (NYSDOC)

NIOSH Collaborators
Winifred Boal, MPH

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PROJECT S.T.A.R.

The Study To Assess Bloodborne Pathogen Risk in Non-Hospital Health Care Workers

A Collaborative, Cooperative and Participatory Action Research Project

Mailman School of Public Health
Columbia University

The New York Public Employee Federation

The New York State Nurses Association

The New York State Department of Correctional Services

The National Institute of Occupational Safety and Health Center

Funding Provided by CDC/NIOSH

June 28, 2001

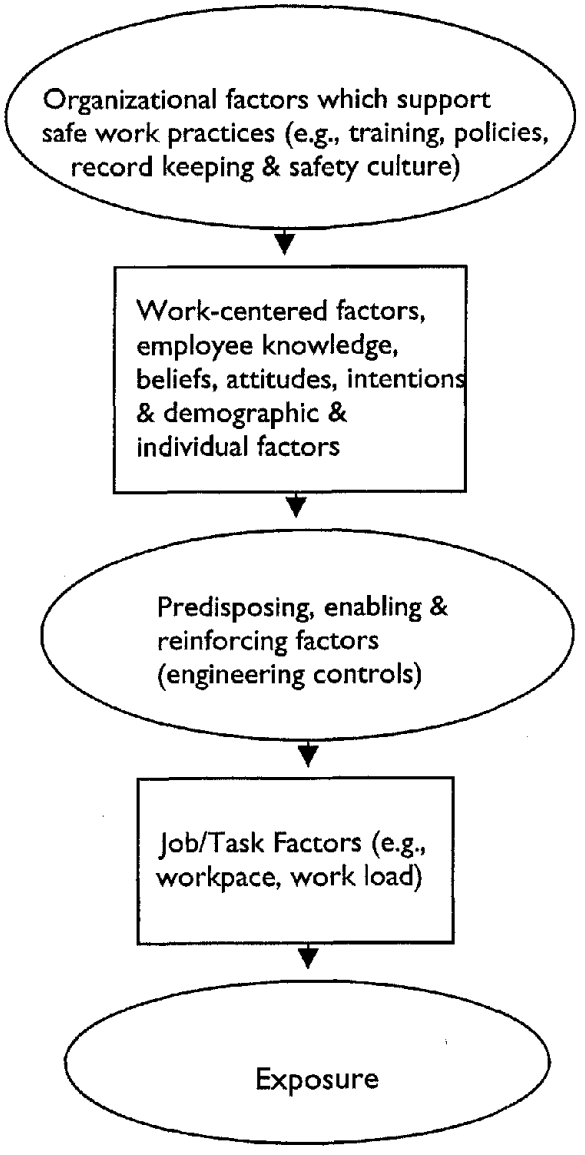
STUDY PURPOSE

- To determine the rates and risk factors for blood/body fluid exposure incidents in non-hospital based healthcare workers (HCWs).
- Identify data-driven opportunities for risk reduction through participatory action research (PAR) teams.

Study Rationale

There are an estimated 3.5 million non-hospital based HCWs in this country; including home health care workers, correctional HCWs, and EMS personnel. Their risk of occupational exposure to bloodborne pathogens is largely unknown.

THEORETICAL MODEL



STUDY METHODOLOGY

Phase 1- Qualitative Data Collection
(Months 1-6)

- In-depth Interviews
- Focus Groups
- Pilot Testing

Phase 2- Questionnaire Data Collection
(Months 7-12)

- Administer Questionnaire

Phase 3- Data Analysis
(Months 13-24)

- Psychometric Analyses

Phase 4- PAR Teams
(Months 25-30)

- Conduct PAR Teams

Phase 5- Dissemination of Results
(Months 31-36)

- Prepare Final Reports & Presentations

Risk Assessment Survey for Registered Nurses-Questionnaire Construct

Demographics	Item #	Question	Source
	1	Gender	
	2	Age	
	3	Highest academic degree	
	4	Professional license	
	5	Years as RN	
	6	Years in healthcare	
	7	Hands-on contact?	
	8	Years of Hands on contact?	
	9	Hours per week of the following:	
	10	Work setting	
	11	Years at present job?	
	12	Employees at facility?	
	13	facility part of a hospital?	
	14	affiliated with medical centre?	
	15	Number of patients responsible for	
	16	Hours worked per day	
	17	Hours worked per week	
	18	Overt-time hours	
	19	Was over-time mandatory for you?	
	20	Daily activities	
	21	What purpose did you use needles for?	
	22	How many of the following procedures did you perform?	
Bloodborne Pathogen Risk Factors	**Item #**		**Source**
	23	Have you received Hep B vaccine?	
	24	Ever had a sharp injury?	
	25	If yes, how many	
	26	needle stick injury at present job?	
	27	How many needlestick injuries and contaminated cuts have you at your present job?	
	28	In the past twelve months how many times have you experienced and/or reported the following types of exposures?	

Exposure History	**Item #**	*For recent exposures (i.e. within the last 12 months)*	**Source**
	29	Did your most recent bloodborne exposure occur through...	
	30	What type of instrument were you using at the time of your most recent bloodborne exposure?	
	31	Please check the box that indicates the seriousness of your most recent bloodborne exposure	
	32	Were you using a safety device at the time of your exposure?	
	33	If yes, what type of device?	
	34	Did you receive training as to how to use this device?	
	35	At the time of (most recent) exposure, what kind of patient care were you providing?	
	36	Did you fill out an incident report?	
	37	If not why not?	
	38	Indicate factors that contributed to the exposure	
	39	Were you feeling any of the following at the time?	
	40	Describe the exposure in your own words	
	41	What do you think could have prevented the exposure?	
	42	How many hours of infection control training have you received in the past 12 months?	
Standard Precautions	**Item #**	*How often do you...*	**Source**
	43	Dispose of sharp objects into a sharp contain	
	44	Follow standard precautions with all patients regardless of their diagnosis	
	45	Wash your hands after removing disposable gloves	
	46	Wear disposable outer garment	
	47	wear disposable gloves whenever there is a possible exposure to blood or other fluids	
	48	Wear eye protection whenever there is a possibility of splashes or splatters to your eyes	
	49	Promptly dispose of contaminated spills	
	50	Refrain form eating or drinking while working in areas where possible contamination exists	
	51	Take special caution when using scalpels or other sharp objects	
	52	Do not recap contaminated needles	
	53	Wear when exposed to blood products	
	54	Treat all materials that have been in contact with patient's body fluids as if they were infectious	

Employee Health	**Item #**		**Source**
	55	Do you have an employee health nurse or infection control practitioner on-site?	
	56	Do you have an employee health nurse or infection control practitioner at headquarters?	
	57	If not, do you have access to an employee health nurse or practitioner?	
	58	Does your employer conduct annual medical screenings for employees?	
	59	Do you have a clearly written bloodborne pathogens exposure control plan readily available at work?	
	60	Do you receive annual training on blood/body fluid exposure prevention?	
	61	Has HBV vaccine been discussed with you?	
	62	Did your employer check your vaccine titer?	
	63	Were you offered HBV vaccine at no cost?	
	64	Does your employer have a system for providing emergency care following a bloodborne pathogen exposure?	
	65	Does your employer have a written agreement with a regional healthcare provider for emergency care for bloodborne pathogen exposures?	
	66	Are you encouraged to report ALL exposures?	
	67	Are you encouraged to report ONLY SIGNIFICANT EXPOSURES?	
	68	are you reluctant in any way to report exposures?	
	69	If yes, why?	
	70	Does your employer maintain a sharps injury log?	
	71	Does your employer have a safe product selection committee?	
	72	If yes, are you a member?	
Safety Equipment	**Item #**	*Indicate availability and your personal use of the following safety devices at work*	**Sources**
	73	Safety butterfly needles	
	74	Safety syringes and needles	
	75	Safety IV needles	
	76	Safety IV therapy systems	
	77	Safety lancets	
	78	Safety scalpels	
	79	Safety tuberculin needles	

	80	Safety vaccutainers	
	81	Safety catheter securements	
	82	Safety Dialysis equipment	
	83	Sharps containers	
	84	Medical waste containers	
	85	medical waste red bags	
	86	Latex-free disposable gloves	
	87	Powder-free disposable gloves	
	88	Both powder- & latex-free disposable gloves	
	89	Face shields	
	90	Eye goggles	
	91	Face masks	
	92	Barrier gowns	
	93	If any of the above are available but you do not use them, why not?	
Post-Exposure Management	**Item #**	*If you experienced a blood/body fluid exposure within the past 12 months, please complete this section regarding your most recent exposure*	**Source**
	94	Did you fill out an accident/incident report?	
	95	Were you seen by a health care professional within...	
	96	If not within 2 hours why not?	
	97	I f you received post-exposure care, did it include counseling regarding your exposure?	
	98	Were you offered post-exposure prophylaxis (PEP) for HIV?	
	99	If offered, did you accept/receive post-exposure prophylaxis for HIV?	
	100	If not, why not?	
	101	If you received PEP for HIV did you have side effects?	
	102	Did you complete your treatment?	
	103	Were you referred to an HIV specialist?	
	104	Did you receive any written information explaining post-exposure treatment?	
	105	Did you lose time form work because of your exposure?	
	106	If yes, how many days?	
	107	Did workers compensation pay for your medical expenses?	
	108	How would you rate the overall experience?	
	109	Did you receive training on how to report an exposure when you started your job?	
	110	Have you ever left a job because of a needlestick injury?	

Safety Climate	Item #	*Agree or Disagree*	Source
	111	The protection of workers from occupational exposures is a high priority where I work	
	112	All reasonable steps are taken to minimize hazardous jobs, tasks and procedures	
	113	Employees are encouraged to become involved in safety and health matters	
	114	My job duties often interfere with my ability to follow standard precautions	
	115	I have enough time in my work to follow standard safety precautions	
	116	I usually follow Standard Precautions	
	117	Unsafe work practices are corrected by supervisors	
	118	My nurse manager often discusses safe work practices	
	119	I have had the opportunity to be properly trained to use safe needle devices	
	120	Employees are trained to recognizes potential health hazards at work	
	121	A copy of the hospital safety manual is available	
	122	My work area is kept clean	
	123	My work area is adequately staffed	
	124	I am provided with all necessary equipment	
	125	My work area is not crowded	
	126	There is minimal conflict within my department	
	127	The members of my unit support one another	
	128	There is open communication between nurse management and staff	
	129	A product review board monitors new safety products as they become available	
	130	Nurses who provide patient care are involved in product selection	
	131	Overall I am satisfied with the working conditions of my job	

Dr. Robyn Gershon
Columbia University
212-305-1186

Confidential Code Number:

Today's Date ___/___/___

RISK ASSESSMENT SURVEY FOR REGISTERED NURSES, 2002

Thank you for completing this confidential questionnaire.

SECTION 1: DEMOGRAPHICS & WORK INFORMATION

(1) What is your gender? ..... ☐1 Male ☐2 Female

(2) How old are you? (# years) _____

(3) What is your highest educational degree? ..... ☐1 Diploma ☐2 AS ☐3 BS ☐4 Masters or higher

(4) What is your professional license (check all that apply)? ☐1 RN ☐2 NP ☐3 Other _____

(5) How many years have you worked as an RN? (# years) _____

(6) How many years have you worked in healthcare? (# years) _____

(7) Do you currently have "hands-on" patient contact? ..... ☐1 Yes ☐2 No

(8) How many years have you had "hands-on" patient contact? (# years) _____

(9) Regarding your primary job responsibility, fill in about how many hours a week you do the following:

☐1 Administration _____
☐2 Education and training _____
☐3 Hands-on patient care _____
☐4 Other (please specify) _____

(10) What is your current work setting?

☐1 Doctors office
☐2 Group home
☐3 HMO
☐4 Home health care
☐5 Hospital (Dept. _____)
☐6 Employee health
☐7 Infection control
☐8 Long term care facility
☐9 Out-patient clinic
☐10 Public health department
☐11 Private practice
☐12 State institution (i.e. Greene Correctional Facility)
☐13 Surgical center
☐14 Other _____

(11) How long have you worked in your present facility? (# years) _____

(12) Approximately how many people work at your facility?

☐1 less than 10
☐2 11-20
☐3 21-30
☐4 31-40
☐5 41-50
☐6 51-100
☐7 101-1000
☐8 More than 1,000

(13) Is your facility part of a hospital system? ..... ☐1 Yes ☐2 No ☐3 N/A

(14) Is your facility affiliated with a medical center? ..... ☐1 Yes ☐2 No ☐3 N/A

(15) In general, how many patients are you personally responsible for (i.e., provide care to) in a typical work day? (fill in N/A if not applicable) ..... ☐☐☐

(16) How many hours do you typically work each day? ..... ☐☐☐

(17) How many hours do you typically work each week? ..... ☐☐☐

(18) How many over-time hours do you typically work each week? ..... ☐☐☐

(19) Is over-time mandatory for you? ..... ☐1 Yes ☐2 No

(20) In your daily activities, do you: (please check all that apply)

- ❑1 Assist with daily living activities (i.e., feeding, bathing, grooming)
- ❑2 Change or dispose of sharps containers
- ❑3 Clean-up contaminated spills
- ❑4 Dispose of contaminated waste
- ❑5 Management of bodily fluids
- ❑6 Manipulate and manage drainage tubes
- ❑7 Provide dressing changes, wound care
- ❑8 Use needles or other sharps
- ❑9 Perform administrative work in an office
- ❑10 None of the above

(21) If you use needles in your daily work activities, for what purpose do you use needles (please check all that apply)?

- ❑1 Aspirate fluids
- ❑2 Draw blood
- ❑3 Injection
- ❑4 IV insertion
- ❑5 Suturing
- ❑6 Other _____

(22) On a average day, please fill in how many of the following procedures you perform?

- ❑1 Aspirate fluids ____
- ❑2 Draw blood ____
- ❑3 Give injections ____
- ❑4 Management of bodily fluids _____
- ❑5 Start IVs ____
- ❑6 Wound/Decubitus care ____
- ❑7 Other procedures with potential for exposure ____

SECTION 2: BLOODBORNE PATHOGENS-RISK FACTORS

Please check the appropriate box or fill in the blank

(23) Did you receive the hepatitis B vaccine?

- ❑1 Yes, I received at least three doses, or am in the process of completing the series
- ❑2 Yes, but I only received one or two doses
- ❑3 No, because I am hepatitis B antibody positive
- ❑4 No, other reason (please specify _____)
- ❑5 Don't know

(24) Have you ever had an injury or cut with a sharp at <u>any time</u> during your career as an RN? ..... ❑1 Yes ❑2 No

(25) If yes, how many sharps injuries have you had altogether? (#) _____

(26) Have you ever had a needlestick injury or a cut with a blood-contaminated sharp instrument in your <u>present job?</u> ..... ❑1 Yes ❑2 No

(27) If yes, how many needlesticks and contaminated cuts altogether have you had in your <u>present job?</u> .....

(28) In the past **12 months**, how many times have you *EXPERIENCED at any level of severity and/or ACTUALLY REPORTED* to your employer the following types of exposures:

	EXPERIENCED	**ACTUALLY REPORTED**
Needlestick injuries	_____	_____
Splashes to eyes or mouth	_____	_____
Contacts with open wounds on your skin	_____	_____
Cuts with sharp objects	_____	_____
Blood or body fluids on intact skin	_____	_____
	_____	_____

SECTION 3: EXPOSURE HISTORY

If you recently (i.e., within the past 12 months) experienced a blood/body fluid exposure, please fill this section out. If you did not experience an exposure, please skip to section 4.

(29) Did your most recent bloodborne exposure occur through...

- ❑1 Needlestick injury
- ❑2 Splash to the mouth, eyes or nose
- ❑3 Cut with sharp instrument
- ❑4 Skin contact
- ❑5 Other _____

(30) What type of instrument were you using at the time of your most recent bloodborne exposure?

- ❑1 Blood collection device
- ❑2 Hollowbore needles
- ❑3 Phlebotomy device
- ❑4 Scalpel
- ❑5 Solidbore needles
- ❑6 Suture set
- ❑7 Other _____

(31) Please check the box that indicates the seriousness of your most recent bloodborne exposure:

- ❑1 Serious- deep wound with hollowbore (contaminated needle)
- ❑2 Moderate- moderate wound with a contaminated needle
- ❑3 Not Serious- superficial break in skin
- ❑4 No Exposure- clean needle or sharp

(32) Were you using a safety device at the time of your exposure? ..... ❑1 Yes ❑2 No

(33) If yes, what type of device was it?

- ❑1 Safety butterfly
- ❑2 Safety needle
- ❑3 Safety phlebotomy
- ❑4 Shielded needle
- ❑5 Retractable needle
- ❑6 Other _____

(34) If you were using a safety device, did you receive training on how to use the device? ..... ❑1 Yes ❑2 No

(35) At the time of your most recent exposure, please describe the type of patient care you were providing?

❑1 Routine care ❑2 Emergency care ❑3 Other_____ ❑4 Don't recall

(36) Did you fill out an incident report regarding this exposure? ..... ❑1 Yes ❑2 No

(37) If not, why not? _____

_____

(38) Please indicate factors that contributed to your most recent exposure (please check all that apply):

- ❑1 Caused through actions of co-worker
- ❑2 Device not being used for intended purpose
- ❑3 During disposal
- ❑4 Equipment design flaw
- ❑5 Equipment failure
- ❑6 Recapping needle
- ❑7 Needle left within linens, trash or other unusual location
- ❑8 No sharps container available
- ❑9 No safety needle or device
- ❑10 Overfilled sharps container
- ❑11 Patient caused
- ❑12 Safety needle device failed
- ❑13 Other _____

(39) Were you feeling any of the following at the time of your most recent exposure (Check all that apply)

- ☐1 Anxiety due to September 11th
- ☐2 Anxiety due to anthrax attacks
- ☐3 Calm
- ☐4 Distracted
- ☐5 Emotional exhaustion
- ☐6 Inexperienced
- ☐7 Overworked
- ☐8 Physical exhaustion
- ☐9 Rushed
- ☐10 Stressed about work
- ☐11 Stressed about personal matters
- ☐12 Tired
- ☐13 Confident/Comfortable
- ☐14 Other _____

(40) In your own words, please briefly describe how your most recent exposure happened.

_____

_____

(41) What do you think could have prevented your exposure? _____

_____

_____

(42) How many hours of training would you say you received in the past 12 months on infection control?

☐1 None ☐2 15 minutes ☐3 30 minutes ☐4 1 hour ☐5 2 or more hours

SECTION 4: STANDARD PRECAUTIONS

If any of these practices do not apply to you, please check "not applicable."

		Never	Rarely	Sometimes	Often	Always	Not applicable
(43)	Dispose of sharp objects into a sharps container	☐1	☐2	☐3	☐4	☐5	☐6
(44)	Follow Standard Precautions with all patients regardless of their diagnosis	☐1	☐2	☐3	☐4	☐5	☐6
(45)	Wash your hands after removing disposable gloves	☐1	☐2	☐3	☐4	☐5	☐6
(46)	Wear disposable outer garment that is resistant to blood and body fluids whenever there is a chance of soiling your clothes at work	☐1	☐2	☐3	☐4	☐5	☐6
(47)	Wear disposable gloves whenever there is a possible exposure to blood or other body fluids	☐1	☐2	☐3	☐4	☐5	☐6
(48)	Wear eye protection whenever there is a possibility of splashes or splatters to your eyes	☐1	☐2	☐3	☐4	☐5	☐6

		Never	Rarely	Sometimes	Often	Always	Not applicable
(49)	Promptly dispose of contaminated spills	❑1	❑2	❑3	❑4	❑5	❑6
(50)	Refrain from eating or drinking while working in areas where possible contamination exists	❑1	❑2	❑3	❑4	❑5	❑6
(51)	Take special caution when using scalpels or other sharp objects	❑1	❑2	❑3	❑4	❑5	❑6
(52)	Do not recap contaminated needles	❑1	❑2	❑3	❑4	❑5	❑6
(53)	Wear when exposed to blood products	❑1	❑2	❑3	❑4	❑5	❑6
(54)	Treat all materials that have been in contact with patients' body fluids as if they were infectious	❑1	❑2	❑3	❑4	❑5	❑6

SECTION 5: EMPLOYEE HEALTH

If any of these practices do not apply to you, please check "not applicable."

		Yes	No	Don't know	N/A
(55)	Do you have an employee health nurse or infection control practitioner on-site?	❑1	❑2	❑3	❑4
(56)	Do you have an employee health nurse or infection control practitioner at headquarters?	❑1	❑2	❑3	❑4
(57)	If not, do you have access to an employee health nurse or practitioner?	❑1	❑2	❑3	❑4
(58)	Does your employer conduct annual medical screenings for employees?	❑1	❑2	❑3	❑4
(59)	Do you have a clearly written bloodborne pathogens exposure control plan readily available at work?	❑1	❑2	❑3	❑4
(60)	Do you receive annual training on blood/body fluid exposure prevention?	❑1	❑2	❑3	❑4
(61)	Has HBV vaccine been discussed with you?	❑1	❑2	❑3	❑4
(62)	Did your employer check your vaccine titer?	❑1	❑2	❑3	❑4
(63)	Were you offered HBV vaccine at no cost?	❑1	❑2	❑3	❑4
(64)	Does your employer have a system for providing emergency care following a bloodborne pathogen exposure?	❑1	❑2	❑3	❑4

		Yes	No	Don't know	N/A
(65)	Does your employer have a written agreement with a regional healthcare provider for emergency care for bloodborne pathogen exposures?	❑1	❑2	❑3	❑4

Please check yes or no to the following items:

		Yes	No
(66)	Regarding bloodborne exposures, where you work, are you encouraged to report <u>all exposures</u>?	❑1	❑2
(67)	Regarding bloodborne exposures, where you work, are you encouraged to report <u>only significant exposures</u>?	❑1	❑2
(68)	Are you reluctant in any way to report exposures?	❑1	❑2

(69) If yes, why are you reluctant (check all that apply)?

❑1 Don't know where to report
❑2 Don't know what form to use
❑3 Don't know the official protocol to follow
❑4 Fearful of getting in trouble
❑5 Too busy
❑6 Reporting is too time consuming
❑7 Wanted to keep it confidential
❑8 Other _____

(70) Does your employer maintain a sharps injury log? ❑1 Yes ❑2 No ❑3 Don't know ❑4 N/A

(71) Does your employer have a safety product selection committee? ❑1 Yes ❑2 No ❑3 Don't know ❑4 N/A

(72) If yes, are you a member? ❑1 Yes ❑2 No

SECTION 6: SAFETY EQUIPMENT

Please check the <u>availability</u> and your <u>personal use</u> of the following safety devices at your place of work:

	Safety Devices	Personally available to me	Not Available to me	I personally use	Not Applicable to my job
(73)	Safety butterfly needles	❑1	❑2	❑3	❑4
(74)	Safety syringes and needles	❑1	❑2	❑3	❑4
(75)	Safety IV needles	❑1	❑2	❑3	❑4
(76)	Safety IV therapy systems	❑1	❑2	❑3	❑4
(77)	Safety lancets	❑1	❑2	❑3	❑4
(78)	Safety scalpels	❑1	❑2	❑3	❑4
(79)	Safety tuberculin needles	❑1	❑2	❑3	❑4
(80)	Safety vacutainers	❑1	❑2	❑3	❑4
(81)	Safety catheter securements	❑1	❑2	❑3	❑4
(82)	Safety dialysis equipment	❑1	❑2	❑3	❑4
(83)	Sharps containers	❑1	❑2	❑3	❑4
(84)	Medical waste containers	❑1	❑2	❑3	❑4
(85)	Medical waste red bags	❑1	❑2	❑3	❑4

		Personally available to me	Not Available to me	I personally use	Not Applicable to my job
(86)	Latex-free disposable gloves	❑1	❑2	❑3	❑4
(87)	Powder-free disposable gloves	❑1	❑2	❑3	❑4
(88)	Both powder & latex-free disposable gloves	❑1	❑2	❑3	❑4
(89)	Face shields	❑1	❑2	❑3	❑4
(90)	Eye goggles	❑1	❑2	❑3	❑4
(91)	Face masks	❑1	❑2	❑3	❑4
(92)	Barrier gowns	❑1	❑2	❑3	❑4

(93) If any of the above are available, yet you do not use them, why not? _____

_____

_____

SECTION 7: POST-EXPOSURE MANAGEMENT

If you experienced a blood/body fluid exposure within the past 12 months, please complete this section regarding your most recent exposure.

		Yes	No	N/A
(94)	Did you fill out an incident/accident report?	❑1	❑2	❑3

(95) Were you seen by a health care professional within..... ❑1 2 hours or less ❑2 More than 2 hours ❑3 Not at all

(96) If not within 2 hours, why not?

❑1 No healthcare professional available
❑2 I did not think it was medically necessary
❑3 I could not get a replacement
❑4 I did not know I should go
❑5 Other (please specify) _____

		Yes	No	N/A
(97)	If you received post-exposure care, did it include counseling regarding your exposure?	❑1	❑2	❑3
(98)	Were you offered post-exposure prophylaxsis (PEP) for HIV?	❑1	❑2	❑3
(99)	If offered, did you accept/receive post-exposure prophylaxsis (PEP) for HIV?	❑1	❑2	❑3

(100) If not, why not? _____

_____

(101) If you received post-exposure prohylaxis for HIV, did you have side effects? ..... ❑1 Yes ❑2 No ❑3 Not Applicable

(102) If you received post-exposure prophylaxsis (PEP) did you complete your treatment? ..... ❑1 Yes ❑2 No ❑3 Not Applicable

(103) Were you referred to an HIV specialist to manage your post-exposure care? ..... ❑1 Yes ❑2 No ❑3 Not Applicable

(104) At the time of your exposure, did you receive any written information explaining post-exposure treatment? ..... ❑1 Yes ❑2 No ❑3 Not Applicable

(105) Did you lose time from work because of the exposure? ☐1 Yes ☐2 No ☐3 Not Applicable

(106) If yes, how many days? .....

(107) Did workers' compensation pay for your medical expenses related to your exposure

☐1 Yes ☐2 No

(108) If you received any post-exposure care, how would you rate the overall experience? ..... ☐1 Excellent ☐2 Good ☐3 Fair ☐4 Poor

(109) Did you receive training on how to report an exposure when you first started your job ..... ☐1 Yes ☐2 No ☐3 N/A

(110) Have you ever left a job because of a needlestick injury ..... ☐1 Yes ☐2 No ☐3 N/A

SECTION 8: SAFETY CLIMATE

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(111) The protection of workers from occupational exposures to HIV/HBV/HCV is a high priority with management where I work	☐1	☐2	☐3	☐4	☐5
(112) On my unit, all reasonable steps are taken to minimize hazardous job tasks and procedures	☐1	☐2	☐3	☐4	☐5
(113) Employees are encouraged to become involved in safety and health matters .	☐1	☐2	☐3	☐4	☐5
(114) My job duties often interfere with my being able to follow standard precautions	☐1	☐2	☐3	☐4	☐5
(115) I have enough time in my work to always follow Standard Precautions ..	☐1	☐2	☐3	☐4	☐5
(116) I usually follow Standard Precautions	☐1	☐2	☐3	☐4	☐5
(117) On my unit, unsafe work practices are corrected by supervisors	☐1	☐2	☐3	☐4	☐5
(118) My nurse manager often discusses safe work practices	☐1	☐2	☐3	☐4	☐5
(119) I have had the opportunity to be properly trained to use safe needles devices so that I can protect myself from exposures	☐1	☐2	☐3	☐4	☐5
(120) Employees are taught to recognize potential health hazards at work	☐1	☐2	☐3	☐4	☐5
(121) At my worksite, a copy of the hospital safety manual is available	☐1	☐2	☐3	☐4	☐5
(122) My work area is kept clean	☐1	☐2	☐3	☐4	☐5
(123) My work area is adequately staffed ..	☐1	☐2	☐3	☐4	☐5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(124) I am provided with all necessary equipment	❑1	❑2	❑3	❑4	❑5
(125) My work area is not crowded	❑1	❑2	❑3	❑4	❑5
(126) There is minimal conflict within my department	❑1	❑2	❑3	❑4	❑5
(127) The members of my unit support one another	❑1	❑2	❑3	❑4	❑5
(128) On my unit, there is open communication between nurse management and staff	❑1	❑2	❑3	❑4	❑5
(129) A product review board monitors new safety products as they become available	❑1	❑2	❑3	❑4	❑5
(130) Nurses who provide patient care are involved in safety product selection	❑1	❑2	❑3	❑4	❑5
(131) Overall, I am satisfied with the working conditions of my job	❑1	❑2	❑3	❑4	❑5

SECTION 8: JOB SATISFACTION

Please indicate how much you agree or disagree with the following statements

	Strongly Agree	Agree	Disagree	Strongly Disagree
(132) My body is here but my mind is elsewhere	❑1	❑2	❑3	❑4
(133) I am often distracted at work	❑1	❑2	❑3	❑4
(134) I sometimes "cut corners" at work	❑1	❑2	❑3	❑4
(135) I often find myself doing one thing but thinking about another	❑1	❑2	❑3	❑4
(136) I have more than one task to do at a time	❑1	❑2	❑3	❑4

To what extent are you negatively affected by the following at work:

		Very much	Moderately	Very little	Not at all
(137)	Noise	❑1	❑2	❑3	❑4
(138)	Temperature	❑1	❑2	❑3	❑4
(139)	Unpleasant working conditions	❑1	❑2	❑3	❑4
(140)	Overcrowding	❑1	❑2	❑3	❑4
(141)	Personal security fears	❑1	❑2	❑3	❑4
(142)	Worry about infections	❑1	❑2	❑3	❑4
(143)	Overworked/exhausted	❑1	❑2	❑3	❑4

		Very much	Moderately	Very little	Not at all
(144)	Under-staffing	❑1	❑2	❑3	❑4
(145)	Unappreciated	❑1	❑2	❑3	❑4
(146)	Work scheduling	❑1	❑2	❑3	❑4
(147)	Salary	❑1	❑2	❑3	❑4
(148)	Interpersonal problem at work	❑1	❑2	❑3	❑4
(149)	Mandatory overtime	❑1	❑2	❑3	❑4
(150)	Personal problems	❑1	❑2	❑3	❑4
(151)	Threat of terrorism	❑1	❑2	❑3	❑4
(152)	General job dissatisfaction	❑1	❑2	❑3	❑4

CONGRATULATIONS ON COMPLETING THIS QUESTIONNAIRE!