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Factors surrounding and strategies to reduce recapping used needles by nurses at a Venezuelan public hospital

Luis J. Galindez Araujo

University of South Florida

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Factors Surrounding and Strategies to Reduce Recapping Used Needles by Nurses at a Venezuelan Public Hospital

by

Luis J. Galindez Araujo

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy Department of Global Health College of Public Health University of South Florida

Co-Major Professor: Boo Kwa, Ph.D.
Co-Major Professor: Donna Haiduven, Ph.D.
Aurora Sanchez-Anguiano, Ph.D.
Ricardo Izurieta, Dr.P.H.

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Keywords: focus groups, intervention, PRECEDE-PROCEED Model

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DEDICATION

This dissertation is dedicated to the nurses and other health care workers from Maracay Central Hospital who selflessly perform their jobs despite the very hard working conditions.
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FACTORS SURROUNDING AND STRATEGIES TO REDUCE RECAPPING USED NEEDLES BY NURSES AT A VENEZUELAN PUBLIC HOSPITAL

Luis J. Galindez A.

ABSTRACT

Nurses as health care workers are at risk of biological agents such as bacteria, viruses and others. At health care settings exposure to bloodborne pathogens can cause infections through needlestick injuries. The objectives of this research were to determine factors surrounding recapping needles in hospital nurses and to implement an educational strategy to reduce the recapping practices.

It was a descriptive and exploratory approach where the PRECEDE component of the PRECEDE/PROCEDE Model was used as the framework to systematize and analyze the information obtained from the focus group sessions.

A total of 120 nurses participated from four different departments. The study was conducted in three phases: diagnosis, implementation and evaluation of the educational strategy. The results obtained from the focus group sessions revealed that predisposing, reinforcing, enabling and environment factors were related to the practice of recapping and needlestick injuries. Most of this information represented the essential basis for the implementation of the educational strategy. During the diagnostic phase, the percentage of needles without recapping was 24% contrasting with 40% found after the educational strategy. The percentage difference (16%) was statistically significant ($p <0.001$).
odds ratios calculation in the departments studied showed that the educational strategy was a protective factor to avoid the recapping of used needles.

An important conclusion is that the educational strategy, which focused on the practice and habit of what should be done (e.g., NOT recapping used needles), contributed to the decrease in recapping practice. However, nurses perceived did it not provide a safe working environment.

The implications are focused on: nurses and hospital management have to engage in an active role to promote a safety work environment where nurses and other health care workers can be protected. The incorporation of educational strategies, continuous and updated training, as well as the evaluation and monitoring process can play a determinant role in the control of hazard exposures. It is imperative that a safe and healthy workplace for the personnel be provided; not less important is the acquisition of equipment and devices for sharp handling and disposal, to complement the prevention of accidents related to needlestick injuries.
CHAPTER ONE: THE STUDY PROBLEM

Introduction to the Problem

Nurses as health care workers (HCWs) have several challenges every day in their workplace in order to provide the best care to their patients. One of these challenges is to perform their work within numerous risks present in health care settings such as: biological, chemical, mechanical, physical, psychosocial and ergonomic factors. The occupational health of this group has long been neglected both organizationally and by governments (Lipscomb & Rosenstock, 1997). The misconception exists that the healthcare industry is “clean and without hazard” (Wilburn & Eijkemans, 2004 p. 1). Leading the risks to HCWs including nurses are exposures to biological hazards that may result from needlestick or cuts from other sharp instruments contaminated with an infected patient’s blood or through contact of the eyes, nose, mouth or skin with a patient’s blood or bloody body fluids. Needlestick injury is defined “as the parenteral introduction into the body of a health care worker, during the performance of his/her duties, of blood or other potentially infectious material by a hollow bore needle or sharp instrument, including but not limited to, needles, lancets, scalpels, and contaminated broken glass” (Bandolier, 2003, p. 1). Sharps mean hollow bore needles or sharp instruments, including but not limited needles, lancets and scalpels.

Needlestick injuries and other sharp related injuries due to occupational exposure to bloodborne pathogens are an important public health concern because of the severity of some of the infections that can result, including Hepatitis B virus (HBV), Hepatitis C
virus (HCV), Human Immunodeficiency Virus (HIV), and other infectious agents.

Globally, needlestick injuries (NSIS) are the most common source of occupational exposure to blood and the primary cause of bloodborne infections of HCWs (CDC, 2003b). The most common cause of injuries has been associated with certain work practices such as recapping, and the unsafe collection and disposal of sharps waste containers (WHO, 2003).

In general, in developed countries, occupational surveillance evaluates and monitors the hazard related to bloodborne pathogens and prevention measures reduce the risk of transmission (Canadian Center for Occupational Health and Safety, 2000).

There are problems that still happen worldwide but in particular in developing countries. These are related to recapping used needles as a cause of needlestick injuries due to personnel work practices especially in hospital nurses, and because of lack of availability of safety devices, due mainly to the high cost of these devices.

For these reasons there is an immediate need to develop means for preventing needlestick injuries caused by recapping used needles and consequently prevent the risk of infection in health care workers, especially nurses who are the group with the highest risk worldwide and mainly in developing countries (Prüss-Üstün, Rapiti, & Hutin, 2003).

Bloodborne Exposure and Needlestick Injuries as a Public Health Concern

The healthcare workforce, 39.5 million people worldwide, represents 13% of the working population (WHO, 2006). In the United States, there are an estimated more than 8.8 million health care workers who work in hospitals and other health care settings (NIOSH, 2002). Epidemiologic data on sharps injury events, including the circumstances associated with occupational transmission of bloodborne viruses are essential for
targeting and evaluating interventions at the local and national levels. The CDC estimates 385,000 needlesticks and other sharps injuries per year among hospital workers in the United States (CDC, 2004).

The true magnitude of the problem is difficult to assess because information has not been gathered on the frequency of injuries among healthcare personnel working in other settings (e.g., long-term care, home healthcare, private offices). In addition, although CDC estimates are adjusted for it, the importance of underreporting must be acknowledged. Surveys of healthcare personnel indicate that 50% or more do not report their occupational percutaneous injuries (Abdel & Sepkowitz, 2000).

Data from the EPINet system suggest that at an average hospital worker incurs approximately 26 needlestick injuries per 100 beds per year for teaching hospitals and 18 injuries per 100 beds occupied for non-teaching hospitals (US, EPINet, 2001). Some of these injuries expose workers to bloodborne pathogens that can cause infection. The National Institute for Occupational Safety and Health (NIOSH) in 1999 estimated that each year between 600,000-800,000 needlesticks and other sharps-related injuries are sustained in health care settings. Percutaneous exposure to blood, blood products, and infectious body fluids presents the greatest risk for disease transmission in the health care setting (Prüss-Üstün, et al., 2003). Needlestick injuries account for approximately 80% of percutaneous exposures to blood among HCWs. In November 2002, the World Health Report published data demonstrating that 2 million needlestick injuries occur in HCWs worldwide each year. It is also estimated that 2.5 % of HIV, and 40% of Hepatitis B and Hepatitis C cases among health care workers worldwide are the result of occupational exposure (WHO, 2002a). The risk of transmission to a HCW from an infected patient
after such an injury has been one in three (1/3) when a source patient is infected with HBV and is e-antigen positive, one in 30 (1/30) when the patient is infected with HCV, and one in 300 (1/300) when the patient is infected with HIV. HBV is the most easily transmitted bloodborne pathogen. Hepatitis B is 100 times more likely to be acquired than HIV after exposure to infected blood (Alter, 1997).

**Needlestick Injuries According to the Job Classification**

Data from the United State National Surveillance System for Health Care Workers (NaSH) show that nurses experience the highest number of needlestick injuries. However, other professionals (physicians, technicians, and laboratory staff as well as support personnel as housekeeping) are also at risk (Wilburn, 2004). Nurses experience the majority of needlestick injuries in the world including half of the exposures that occur in the US (Prüss-Üstün et al., 2003), and 70% of exposures occurring in Canada (CCOHS, 2000). In a study of 60 U.S. hospitals in a 4-year period, nurses were the most likely to experience a blood or body fluid exposure, nurses 44%, physicians 29%, technicians 13%, housekeeping 3%, and others 11% (U.S. Department of Labor, 1999). According to a European survey of occupational exposure of HCWs to needlesticks injuries, nurses are exposed more commonly (91%) than doctors (6%) or phlebotomist (3%), (Sulsky, Birk, Cohen, Luippold, Heidenreich, & Nunes, 2005). Consistent with patterns reported in the literature, HCWs most likely to be in direct patient contact were at the highest risk of needlestick injuries.

**Where Do Injuries Occur?**

Although sharp devices can cause injuries anywhere within the health care environment, NaSH data show that the majority (40%) of injuries occur on patient units,
particularly medical floors, intensive care units, and in the operating room (CDC, 2004). According to Perry, Parker and Jagger (2005), the three most common sites for injuries are the operating rooms (33%), patient room (27%), and emergency department (10%). In the study of Sulsky et al., 2005, in European countries, NSIS were most likely to occur in patient room and operating room, locations where sharps were most possible to be used.

*Works Practices or Procedures Associated with Needlestick Injuries*

Needlestick injuries have been associated with certain work practices such as recapping, transferring a body fluid between containers and failing to properly dispose of used needles in puncture-resistant sharps containers. Injuries most often occur after use and before disposal of a sharp device (41%), during use of a sharp device on a patient (39%) and during or after disposal (16%) (CDC, 2004). NSIS are most likely to occur during use, with the second highest rate associated with recapping used needles and disposal of used sharps.

*Safety Culture and Health Care Workers*

Some industrial sectors are finding that a strong safety culture is correlated with productivity, cost, product quality, and employee satisfaction (Gershon, et al., 2000). Organizations with strong safety cultures consistently report fewer injuries than organizations with weak safety cultures. This happens not only because the workplace has well developed and effective safety programs, but also because management, through these programs, sends cues to employees about the organization's commitment to safety. The concept of institutionalizing a culture of safety is relatively new for the healthcare industry and there is limited literature on the impact of such efforts. However, healthcare organizations are linked measures of safety culture with both employee compliance with
safe work practices and reduced exposure to blood and other body fluids, including reductions in sharps related injuries (Gershon, 1996).

According to Clarke, Sloane, & Aiken (2002), the risk of sharps injuries in nurses is significantly related to nurse staffing levels and working climate. System analysis strategies, used by many healthcare organizations to improve patient safety, also can be applied to the prevention of sharps related injuries to healthcare personnel.

*Causes of Percutaneous Injuries with Hollow Bore Needles*

According to CDC (2004), and the United State National Surveillance System for Hospital Health Care Workers (NaSH, 1999), the main causes of percutaneous injuries with hollow bore needles were: manipulating needle in patient (27%), disposal related causes (12%), clean up (11%), improperly disposed sharp and handling/passing device during or after use with 10%, collision with health care worker or sharp and IV line-related causes with 8%, and handling/transferring specimens and recapping with 5%. It is important to emphasize that although recapping by hand has been prohibited under the OSHA bloodborne pathogens standard (29 CFR 1910.1030), (1991), needlesticks injuries are still related with this practice. Health care workers use many types of needles and other sharp devices to provide patient care. However, according to CDC (2004), and the NaSH (1999), only a few needles and other sharp devices are associated with the majority of injuries, 59% were associated with hollow bore needles. For Wilburn (2004), six devices are responsible for nearly 80% of all injuries, disposable syringes (32%), suture needles (19%), winged steel needles (12%), scalpel blades (7%), intravenous (IV) catheter stylet (6%), and phlebotomy needles (3%).
NIOSH in 1999, recognized that the characteristics of devices which increase the risk of injury included: devices with hollow bore needles; needle devices that need to be taken apart or manipulated by the health care worker such as blood drawing devices that need to be removed after use; syringes that retain an exposed needle after use; and needles that are attached to tubing such as butterflies that can be difficult to place in sharps disposal containers.

It is important to state that technology exits that can protect HCWs from needlestick injuries but less than 15% of the hospitals in the United State use safer needle devices because of the cost in purchasing these devices. Figures for other countries are not known, but uptake of safer devices is almost certainly lower outside the US, where there has been specific legislation (Bandolier, 2003).

*Impact of Needlestick and Sharp Injuries*

Another aspect concerning needlestick and sharp injuries is the emotional impact that can be severe and long lasting, even when an infection is not transmitted. This impact is principally severe when the injury involves exposure to HIV. But is not only the HCWs who are affected; the family member may suffer emotionally from the needlestick and sharp injuries.

In addition to their physical and emotional consequences, accidental needlestick injuries produce an enormous economic impact. According to the American Hospital Association, a single case of serious bloodborne pathogen infection from an accidental needlestick leads to more than $1 million in expenditures, from testing, follow-up, lost time, and disability payments. Current recommended drug regimens for high-risk exposures run from $850 to $1,000 for a 28 day supply (Shelton & Rosenthal, 2004).
Statement of the Problem

In Venezuela, inadequate industrial hygiene and unsafe conditions characterize many workplaces, including healthcare settings. Venezuelan healthcare workers are faced with the challenge of providing the best care to their patients while facing risks of exposure to biological agents, particularly Hepatitis B, C and Human Immunodeficiency Virus (HIV). One of the greatest risks for HCWs acquiring a bloodborne pathogen infection is through a needlestick or sharps injury in Venezuelan health care settings. Few studies have been done to date in hospitals to determine risk factors, which personnel may be exposed to a specific type of risk, the numbers of injuries/accidents among HCWs, activities more frequently involved in such injuries, or the relation between risk and associated health problems, etc. Consequently, few measures of intervention are being taken to prevent or to correct risk factors to avoid health problems in people who work in health care settings. In addition, Venezuela does not have safer needle device legislation mandating their use. The information about the frequency of needlestick injuries reported in Aragua State in the years 2004 and 2005 was approximately 186 events; most of these events came from Maracay Central Hospital with an average of 5 events per week (CORPOSALUD, 2004). It is important to point out that according to the Maracay Central Hospital needlestick and sharps injuries surveillance report the number of injuries has increased in the last 2 years, from 104 in 2004 to 113 in 2005, an 8% increase (MCH Surveillance report, 2005). The personnel involved in NSIS were nurses, nursing students, physicians and medicine students; the locations more frequently associated with NSIS were adult emergency room and operating room; the device involved were scalpels and needles representing the 77% (104/134) of the total accidents
in the hospital for 2004 (MCH Surveillance report, 2005). It is important to indicate that
the circumstances related to NSIS were not described in the surveillance report.

The problem under study in this project is to understand the factors surrounding
recapping used needles and needlestick injuries as cause of bloodborne pathogens in
nurses at the Maracay Central Hospital. The identification and exploration of these
factors is necessary in order to gain a richer understanding of the conditions under which
these nurses are working. Obviously, the identification of these factors is a very
important step before interventions can be planned to reduce the incidence of this practice
and the most important aspect is that if reducing recapping used needles, needlestick
injuries and blood exposure can be prevented in these workers. The educational
intervention implemented was based on the accomplishment of the Standard Precautions
(OSHA, 2001) as a measure to avoid unsafe work practices (recapping used needles) and
to prevent bloodborne pathogens diseases from needlestick injuries. The analysis was
based on the measure of recapping used needles proportion/rates in each of the four (4)
selected departments as a unique opportunity to evaluate the effectiveness of the
intervention program.

Purpose of the Study

The purposes of this study were: a) to determine the factors surrounding recapping
used needles in nurses in four (4) departments at the Maracay Central Hospital; b) based
on the finding, design and implement an educational strategy in order to reduce recapping
used needles practice as a cause of needlestick injuries and to prevent bloodborne
pathogens diseases; c) to evaluate the intervention.
Aims of the Study

The primary aims of the study were as follows:

1. To determine reliable estimates of the incidence of needlestick injuries from needles and sharps in nurses working in four (4) departments at the Maracay Central Hospital.
2. To determine reliable estimates of the proportions/rates of recapping used needles used by nurses working at the four (4) departments of the Maracay Central Hospital.
3. To design an educational strategy based on the factors surrounding recapping used needles.
4. To apply the educational strategy.
5. To evaluate the effectiveness of the educational strategy.
6. To report the results and suggest to the hospital and health authorities modifications regarding work safety practices.

Research Questions

1. What are the factors related to recapping used needles in nurses working at the four (4) departments at the Maracay Central Hospital?
2. Does an educational strategy modify the proportions/rates of recapping used needles as an unsafe work practices?

Significance of the Study

This study provided important information about the circumstances or factors associated with recapping used needles and how an educational strategy can modify such factors. Results from this study will inform Maracay Central Hospital and
CORPOSALUD authorities on approaches that should be purposed to reduce recapping used needles practices in nursing personnel as a cause of NSIS, and to prevent bloodborne pathogens diseases initially in the Maracay Central Hospital and after, in other public hospitals in the state. According to several studies, needlesticks and sharps injuries are preventable almost in 80% of situations. Obviously, one of the most important aspects is related to the education of health care workers about occupational risks and adherence to infection control procedures which are important to prevent exposure to bloodborne pathogens

Rationale for the Study

Little work has been performed at Venezuelan hospitals to determine the circumstances related to recapping used needles, needlestick injuries and bloodborne pathogens diseases. There are factors associated with recapping used needles, needlestick and sharp injuries that can produce bloodborne infection. These factors could be environmental, educational, behavioral, and organizational among others. According to Haiduven 2000b, health care professionals involved in the prevention of needlestick and sharp injuries would benefit from the information that identified such factors in order to promote interventions.

According to the study of Galindez and Haiduven, done in 2004 at the Maracay Central Hospital, Aragua, Venezuela, a voluntary survey was applied to 129 health care workers, approximately 10% of the total hospital workers (2000 HCWs). The results showed 39 (30%) reported sustaining a needlestick or other sharps exposure and 113/129 (88%) reported routinely recapping used needles. The two activities most frequently involved in the exposures were blood withdrawal and disposal-related activities,
involving 14.7% and 12% of the injuries respectively. Professional nurses sustained the majority of injuries (21/39) with the next highest frequency occurring in physicians and lab assistants (4/39). The laboratory and Obstetrics wards were locations with the highest frequency and percent of injuries (5/13%) followed by the pathology and surgery room (4/10%). The circumstances most frequently reported to contribute to needlestick injuries were recapping of used needles (23%) and manipulating the needle in the patient (21%). It is important to note that 35/39 (90%) of respondents who had sustained needlestick injuries reported recapping used needles as a routine procedure. Forty eight percent (18/39) recommended education and training programs in a manner to reduce the number of NSIS. Even though these results were obtained from a voluntary and small sample the most important conclusion was the widespread practice of recapping used needles is an alarming and important finding indicating an area for possible intervention that could be targeted to prevent future needlestick and sharps injuries and consequently bloodborne pathogens diseases. Exploration into wards with the highest frequency of injuries should be conducted. For these reasons, this study has been designed to investigate the factors surrounding recapping used needles and needlestick injuries. After the identification of the factors is necessary to implement an educational strategy that could reduce the number of recapping used needles and the number of events of needlestick injuries in order to prevent bloodborne diseases.
CHAPTER TWO: BACKGROUND AND LITERATURE REVIEW

Recapping Used Needles as a Specific Problem

Accidental needlestick injuries account for up to 80% of reported occupational needle exposures, and 45% of needlestick injuries occur at recapping (Dalton Blondeau, Dockerty, Fanning, Johnston, et al., 1992). In particular, recapping used needles has been noted as a major risk factor for injury, leading to the US Occupational Safety and Health Administration (OSHA) prohibiting the practice in most circumstances. The habit of recapping persists, however, and interviews with HCWs suggest that their rationale for recapping has been management of competing risks (Sulsky, et al., 2005). Nevertheless, recapping or disassembly activity is not actually an important cause of NSIS in developed nations. According to the countries surveillance data, for example, in France, represent 4.6%, in Germany 3.98%, in Italy 1-18%, Scotland 5%, in Spain 10%, in USA 3.6-6%, and UK 5.7% (Sulsky et. al., 2005). However, in developing countries compliance with no recapping needle policies is not a regular practice where there are similar situations such as unsafe work conditions in health care centers, unsafe work practices of the personnel and lack of safer needle device legislation mandating their use. Although of these problems, the frequency of recapping needle by health care workers including nursing personnel has not been adequately reported.

Additionally, there are few studies worldwide including U.S. about recapping used needles as a cause of needlestick injuries. Most of the studies focus on needlestick injuries as main outcome measure and not about recapping practices. In the study of
Henry, Campbell, Collier, and Williams (1994) they used recapping rates for comparison overall, all needles (370) were recapped 51% of the time. This rate did not differ significantly from the mean health care workers self-reported rate of recapping. The observed recapping rates for different needles types was significantly different (phlebotomy needle recap rate, 55.9%; injection needles recap rate, 53%; IV needle recap rate, 34.2%. p< 0.01). It is noteworthy that 5% of all needles were left uncapped and then placed in the trash or left at bedside. Most of the needles that were recapped (79%) were recapped by two hand technique. They affirm that the study was focused on needle techniques and disposal. The major problem observed with needle technique was the high rate of recapping. Most of the recapping rate observed among both nurses and physicians involved the use of two hands.

According to Sulsky et al., (2005), a comprehensive literature searches on MEDLINE identified more than 2,300 publications, about needlestick/sharp injuries, initial searches were complete on November 4, 2004 and update on April 26, 2005. Sixty one (61) publications on interventions were selected to be included in the Quality Based Critical Review (QBCR) in those papers the main outcome measure was needlestick injury rate. The possible reason for this difference would be related to that recapping procedure was forbidden in US in the 1990s (OSHA legislation) and new safety device has been incorporate into the health care industry and then numerous studies are focus on needlestick rates as outcome measure than other types of measurements.

Bloodborne Pathogens

Twenty years after the onset of the AIDS epidemic and widespread recognition of health care providers’ risks of occupational exposures to bloodborne pathogens,
To understand the severity of the problem about the factors related to needlestick injuries, it is necessary to review the main diseases associated to this problem. There are more than twenty bloodborne pathogens but the most related to needlestick injuries are Hepatitis B virus, Hepatitis C virus and Human Immunodeficiency Virus (HIV). Concern about these diseases has prompted research to find out why these injuries occur and to develop measures to prevent them.

Hepatitis B

Hepatitis B is a serious disease that is caused by the Hepatitis B virus (HBV) which usually exists in the blood and bodily fluids of the infected (or HBV+) person. The virus infects people of all ages and every year; about 200,000 people are newly infected in the United States (AMA, 2004). Of these people, 90% eventually recover and clear the virus, but over 11,000 will have to be hospitalized and over 20,000 (10%) will become chronically infected with the virus (AMA, 2004). Chronic HBV is found in 0.5% of adults in the United States and in 0.1%-20% of people from other part of the world (Chin, 2000). In the U.S. more than 4,000 people die each year from Hepatitis B related liver disease. An estimated 15%-25% of persons with chronic HBV infection will die prematurely of either cirrhosis or hepatocellular carcinoma (Heymann, 2004).

Worldwide Distribution

Hepatitis B is distributed worldwide. The World Health Organization (WHO, 2002b) estimates that more than 2 billion persons have been infected with HBV. Of this, more than 350 million have chronic (lifelong) infections. The prevalence of chronic HBV infection varies markedly around the world. High rates of infection, defined as prevalence...
greater or equal to 8%, occur in China, Southeast Asia, the Pacific Basin, sub-Saharan Africa and the Amazon Basin. In Western Europe, North America, Australia and New Zealand, the prevalence of chronic infection are low (< 2%), and infection occurs predominantly in adults. Intermediate prevalence of infection, between 2% and 7%, occur elsewhere in the world (WHO, 2002b).

**Modes of Transmission**

Major modes of HBV transmission include sexual or household contact with an infected person, perinatal transmission from mother to infant, injecting drug use and nosocomial infection. In health care settings the transmission occurs by percutaneous (intravenous (IV), intramuscular (IM), subcutaneous (SC), or intradermal) and permucosal exposure to infective body fluids (Heymann, 2004). The concentration of HBV in body fluids is high for blood, serum and wound exudates, moderate for semen, vaginal fluid, saliva and low/not detectable for urine, feces, sweat, tears and breast milk (CDC, 2003b, WHO, 2002b).

**Clinical Characteristics**

The clinical presentation of acute HBV ranges from asymptomatic, subclinical illness to fulminant hepatic failure. The disease has a long incubation period from 45-180 days, with an average of 60-90 days (Heymann, 2004, Chin, 2000). Initial symptoms are nonspecific, and typically include malaise, anorexia, vomiting, fever, rash, and polyarthritis; these symptoms last 3-10 days. This is followed by the onset of jaundice and/or dark urine. Fulminant viral hepatitis is defined as the development of severe acute liver failure with hepatic encephalopathy within 8 weeks of the onset of symptoms with jaundice. About one-third to one-half of persons with acute HBV infection develops
symptoms of hepatitis such as jaundice, fever, nausea, and abdominal pain. Most acute infections resolve, but 5% to 10% of patient develop chronic infection with HBV that carries an estimated 20% lifetime risk of dying from cirrhosis and 6% risk of dying from liver cancer (Shapiro, 1995).

HBV and Health Care Workers

The rate of HBV transmission to susceptible health care workers ranges from 6% to 30% after a single needlestick exposure to an HBV-infected patient (CDC, 1997). However, such exposures are a risk only for health care workers who are not immune to HBV. Health care workers who have antibodies to HBV either from pre-exposure vaccination or prior infection are not at risk. The most distinctive laboratory finding of viral hepatitis is dramatic elevations of aminotransferases (ALT and AST), but the diagnosis of HBV rests on specific serologic testing, with the finding of HBV surface antigen (HBsAg) in the serum during the acute phase. Any person seropositive for Hepatitis B surface antigen is potentially infectious.

Prevention

The Hepatitis B vaccine has been available since 1982. Two types of Hepatitis B vaccines have been licensed in the USA and Canada. Both have been shown to be safe and highly protective against all subtypes of HBV (Heymann, 2004). The vaccines currently used in the United States are made with recombinant DNA technology, and contain protein portions of HBV (usually parts of the outer protein or the surface antigen of HBV). Thus, the vaccines do not contain any live virus. The vaccine is administered intramuscularly in three doses usually given on a schedule of 0, 1, and 6 months, but there can be flexibility in this schedule (WHO, 2002b & CDC, 2003a). More than 95% of
children and adolescents and more than 90% of young, healthy adults under the age of 40-50 years develop adequate immunity following the recommended three doses (CDC, 2003a). Persons who respond to the vaccine are protected from both acute Hepatitis B infections as well as chronic infection. The higher the antibody titer after vaccination, the longer anti HBs persists. Vaccine-induced antibodies decline gradually with time, and as many as 60% of those who initially respond to vaccination will lose detectable anti-HBs by 8 years (CDC, 2001a). Boosters doses of vaccine are not routinely recommended, because persons who respond to the initial vaccine series remain protected against clinical hepatitis and chronic infection even when their anti-HBs level become low or undetectable (CDC, 2001a). Older age, obesity, heavy smoking, and immunologic impairments have been associated with lower anti HBs responses. One of the problems is that the vaccine is expensive, particularly considering that three shots are required, and for now, beyond the reach of poor countries (Krasner, 2002).

**Health Care Workers Vaccination**

Hepatitis B vaccination of health care workers who have contact with blood and other potentially infectious materials (body fluids) can prevent transmission of HBV and is strongly recommended (CDC, 2003b). However, such exposures are a risk only for health care workers who are not immune to HBV. If a susceptible worker is exposed to HBV, post-exposure prophylaxis with Hepatitis B immune globulin and initiation of Hepatitis B vaccine is more than 90% effective in preventing HBV infection (NIOSH, 1999). Even though exposure to HBV causes a high risk for infection, administration of pre-exposure vaccination or post-exposure prophylaxis to workers can considerably reduce the risk. In these recommendations, the treatment is based on the type of the source (positive,
negative or unknown) and the status of health care workers vaccination (Appendix A).

Nevertheless, there is no known cure for Hepatitis B. Thus, prevention is the best option to dealing with this disease.

Hepatitis C

Hepatitis C virus (HCV) infection is the most common chronic bloodborne infection in the United States affecting an estimated of 3 million of people (Krasner, 2002). At the same time it is one of the most significant causes of chronic liver disease (NIAID, 1998; Krasner, 2002). Approximately 75%-85% of these persons are chronically infected and may not be aware of their infection due to a lack of clinical symptoms. However, infected persons can serve as a source of transmission to others and are at risk for chronic liver disease or other HCV-related chronic diseases during the first two or more decades following initial infection (AMA, 2004). Chronic liver disease is the tenth leading cause of death among adults in the United States. It is estimated from population-based studies that 40% of chronic liver disease is HCV-related, resulting in an estimated 8,000–10,000 death each year (NIAID, 1998; Krasner, 2002). HCV associated end-stage liver disease is the most frequent indication for liver transplantation among adults. Because most HCV infected persons are aged 30–49 years, the number of deaths attributable to HCV-related chronic liver disease could increase substantially during the next 10–20 years as this group of infected people reaches ages at which complications from chronic liver disease typically occur (Krasner, 2002).

Worldwide Distribution

The distribution of the Hepatitis C is worldwide. The prevalence is directly related to the prevalence of persons who routinely share injection equipment and to the prevalence
of poor parenteral practices in health care setting (Heymann, 2004). WHO estimated that as of the late 1990s, about 1% of the world’s population was infected with HCV. In Europe and North America the prevalence is between 0.5% and 2.0%; in parts of Africa prevalence is over 4%.

Modes of Transmission

The Hepatitis C virus is primarily parenterally transmitted (transfusion, and or parenteral contact with blood products). Sexual transmission has been documented to occur but is far less efficient or frequent than parenteral route (Heymann, 2004). The high risk groups are drug users; people who receive blood transfusion; employment in client care or clinical laboratory work; exposure to a sex partner or household member with a history of hepatitis; exposure to multiple sex partners and low socioeconomic level (Krasner, 2002).

Clinical Characteristics

The clinical presentation of acute HCV is usually insidious, with anorexia, vague abdominal discomfort, nausea and vomiting; progression of jaundice is less frequent than with Hepatitis B. The incubation period for Hepatitis C is 6 to 7 weeks, and nearly all persons with acute infection will have chronic HCV infection occur with persistent viremia and the potential for transmission of HCV to others. Although initial infection may be asymptomatic or mild, a high percentage (between 50% and 80%) will develop a chronic infection (Chin, 2000). Of these chronically infected persons, about half will eventually develop cirrhosis or cancer of the liver (Heymann, 2004).
HCV and Health Care Workers

The exact number of healthcare personnel who acquire HCV occupationally is not known. Healthcare personnel exposed to blood in the workplace represent 2% to 4% of the total new HCV infections occurring annually in the United States, a total that has declined from 112,000 in 1991 to 38,000 in 1997 (Alter, 1997). However, there is no way to confirm that these are occupational transmissions. Prospective studies of health care workers exposed to HCV through a needlestick or other percutaneous injury have found that the incidence of anti-HCV seroconversion (indicating infection) averages 1.8% (range, 0% to 7%) per injury (CDC, 1998a).

Prevention

Currently, it is not possible to prevent HCV infection after exposure. However, recent data suggest that early treatment of acute HCV infection with interferon may be highly effective in preventing chronic HCV infection (Sulkowski et al, 2002). Recently, ribavirin is available for the treatment of HCV infection but, unfortunately, the results are disappointing (Krasner, 2002). Further clinical studies are under way, and it now appears that the combination of interferon and ribavirin clears the virus from about 40% of patients, whereas only 20 to 30% are helped with interferon alone (Krasner, 2002). At present, no vaccine exists to prevent HCV infection. In fact, the only means of preventing new cases of Hepatitis C are to screen the blood supply, encourage health professionals to take blood and body fluid precautions, and to inform people about high risk behavior (NIAID, 1998, CDC, 1998b). Neither immunoglobulin nor antiviral therapy is recommended as post-exposure prophylaxis. Health care workers with known exposures
should be monitored for seroconversion and referred for medical follow up if conversion occurs.

The primary method of preventing occupational HCV transmission is to reduce exposures by implementing the Bloodborne Pathogens Standard, using safer devices for accessing blood, and providing education and counseling for health care workers (Haiduven, 2000a & Sulkowski et al., 2002). The importance of such administrative, technical and educative measures is underscored by the lack of commercially available vaccinations to prevent HCV infection.

_HCV and Health Care Institutions_

Health care institutions should consider implementing recommended policies and procedures for follow up for HCV infection after percutaneous or mucosal exposures to blood. CDC Personnel Health Guidelines (1998a & 2001c), affirms immune globulin not to be administered to health care workers who have exposure to blood or body fluids positive for antibody to HCV. Instead, the guidelines recommend that administration should consider implementing policies for post-exposure follow-up at baseline and 6 months for health care personnel who have had a percutaneous or mucosal exposure to blood containing antibody to HCV. According to Haiduven, (2000a) health care institutions have an ethical and moral responsibility to educate health care workers, who are at risk for the disease about screening, treatment and prevention, and to identify and compensate those who acquire HCV in the course of their employment. It is important for infection control and employee health to monitor the literature and regulatory standards for changes requiring policy revision (Haiduven, 2000a).
Human Immunodeficiency Virus

Human Immunodeficiency Virus (HIV) is the virus that causes Acquired Immunodeficiency Syndrome (AIDS). HIV infection is a complex disease that can be associated with many symptoms. The virus attacks part of the body’s immune system, eventually leading to severe infections and other complications producing a condition known as AIDS a fatal disease. In the summer of 1981, the U.S. Centers for Disease Control and Prevention (CDC) reported the unexplained occurrence of Pneumocystis carinii pneumonia in previously healthy homosexual men in Los Angeles and of Kaposi's sarcoma (KS) in other homosexual men in New York and Los Angeles. Within months, the disease became recognized in injection drug users and soon thereafter in recipients of blood transfusions in hemophiliacs. As the epidemiologic pattern of the disease extended, it became clear that a microbe transmissible by sexual (homosexual and heterosexual) contact and blood or blood products was the most likely etiologic agent. The evaluation of the patients showed that they had in common a marked deficiency in cellular immune responses. The term Acquired Immunodeficiency Syndrome (AIDS) first appeared in 1982 in CDC Morbidity and Mortality Weekly Report and was described as “a disease, at least moderately predictive of a defect in cell-mediated immunity, occurring with no known cause with diminished resistance to that disease” (CDC, 1982, p. 508, CDC, 2001). In 1984, the HIV virus type 1 (HIV-1) was discovered as the primary causative viral agent. In 1986, the virus type 2 (HIV-2) was isolated from patients in West Africa, where it may have been present decades earlier (UNAIDS, 2004).
**Worldwide Distribution**

According to the Joint United Nations Program on HIV/AIDS, between 2000 and 2020, over 68 million people will die of AIDS prematurely in the 45 countries most affected by the disease (UNAIDS, 2004). In the year 2003, the number of people living with HIV worldwide was 38 million (UNAIDS, 2004). Just fewer than 5 million people became infected with HIV more than any year before and almost three million were killed by AIDS (UNAIDS, 2004). As many as 950,000 Americans may be infected with HIV, one-quarter of who are unaware of their infection. The epidemic is growing most rapidly among minority populations and is a leading killer of African-American males ages 25 to 44. AIDS affects nearly seven times more African Americans and three times more Hispanics than whites (UNAIDS, 2004). Current trends show cases increasing in injecting-drug users, women, blacks, hispanics, adolescents/young adults, and among persons infected through heterosexual contact with a partner at risk for or known to have HIV infection or AIDS. AIDS is the fourth leading cause of death worldwide, the number one cause of death due to infectious disease, and has exceeded malaria as the number one killer in Africa (Krasner, 2002).

**Clinical Characteristics**

The spectrum of HIV infection ranges from an asymptomatic state to severe immunodeficiency and associated opportunistic infections, neoplasms, and other conditions. Initial infection can be followed by an acute flu-like illness. Features include fever, lymphadenopathy, sweats, myalgia, arthralgia, rash, malaise, sore throat, and headache (Strickland, 2000). The natural history of HIV infection can vary considerably from person to person. Infection with HIV virus does not initially constitute AIDS. The
term AIDS applies to the most advanced stages of HIV infection after an incubation period that can vary from a few years to as many as 15 years. CDC's definition of AIDS in 1993 included all HIV-infected people who have fewer than 200 CD4+ T cells (T-helper cells) per cubic millimeter of blood (Goldsby, Kindt, Osborne, & Kuby, 2003). In addition, the definition includes 26 clinical conditions that affect people with advanced HIV disease. Most of these conditions are opportunistic infections that generally do not affect healthy people. In people with AIDS, these infections are often severe and sometimes fatal because the immune system is so destroyed by HIV that the body cannot fight off certain bacteria, viruses, fungi, parasites, and other microbes. One of the best examples is the TB and HIV relationship. Each accelerates the other’s progress. TB is the leading cause of death in HIV infected populations, accounting for about 15% of deaths (Krasner, 2002).

HIV and Health Care Workers

To estimate the rate of HIV transmission, data were combined from more than 20 worldwide prospective studies of health care workers exposed to HIV-infected blood through a percutaneous injury (NIOSH, 1999). In all, 21 infections followed 6,498 exposures for an average transmission rate of 0.3% per injury (Ippolito et al., 1999). A retrospective case-control study of HCWs who had percutaneous exposures to HIV found that the risk of transmission was increased when the worker was exposed to a larger quantity of blood from the patient, as indicated by (1) a visibly bloody device, (2) a procedure that involved placing a needle in a patient's vein or artery, or (3) a deep injury (Cardo, Culver & Cieslinski, 1997). Preliminary data suggest that such high-risk needlestick injuries may have a substantially greater risk of disease transmission per
injury (Bell, 1997). According to the CDC Surveillance of Healthcare Personnel with HIV/AIDS of the adults reported with AIDS in the United States through December 31/02, 24,844 had a history of employment in healthcare (CDC Surveillance, 2002)).

These cases represented 5.1% of the 486,826 AIDS cases reported to CDC for whom occupational information was known. The type of job is known for 23,212 (93%) of the 24,844 reported healthcare personnel with AIDS. The “other” category is comprised of maintenance workers, administrative staff, and other nonmedical staff. Overall, 73% of the healthcare personnel with AIDS, including 3,962 nurses, 1,407 nonsurgical physicians, 385 dental workers, 328 paramedics, and 92 surgeons, are reported to have died. Fifty-seven healthcare personnel in the United States have been documented as having seroconverted to HIV following occupational exposures. Twenty-six have developed AIDS. The exposures resulting in infection were as follows: 48 had percutaneous (puncture/cut injury) exposure; 5, mucocutaneous (mucous membrane and/or skin) exposure; 2, both percutaneous and mucocutaneous exposure; and 2, an unknown route of exposure. Forty-nine healthcare personnel were exposed to HIV-infected blood; 3, to concentrated virus in a laboratory; 1, to visibly bloody fluid, and 4, to an unspecified fluid.

According to surveillance conducted by the CDC, of 57 healthcare workers with documented occupationally acquired HIV infection, most (86%) were exposed to blood, and most (88%) had percutaneous injuries. The circumstances varied among 51 percutaneous injuries, with the largest proportion (41%) occurring after a procedure, 35% occurring during a procedure, and 20% occurring during disposal of sharp objects. Unexpected circumstances difficult to anticipate during or after procedures accounted for
20% of all injuries. Of 55 known source patients, most (69%) had acquired immunodeficiency syndrome (AIDS) at the time of occupational exposure, but some (11%) had asymptomatic HIV infection. Eight (14%) of the healthcare workers were infected despite receiving post-exposure prophylaxis (Do, et al., 2003). Transmission of HIV in the health care setting may result from three types of exposures: percutaneous (e.g., needlestick or cut caused by a sharp object), mucous membrane (eyes, mouth, nose), and direct contact with nonintact skin (e.g., in case of dermatitis, eczema, laceration, or open wound). Contact of intact skin is considered to be a potential source of transmission of HIV, especially when extensive areas of skin are contaminated and the duration of exposure is prolonged (e.g., at least several minutes). The main sources of HIV transmission among health care personnel are blood, visibly bloody fluids, tissues, and HIV concentrates. Other sources include semen, vaginal secretions, and synovial, peritoneal, pleural, pericardial, cerebrospinal, and amniotic fluids (CDC, 1998c & 2001a).

Specific characteristics of a high-risk exposure have been defined by a case-control study of health care personnel that pooled data from the United States, France, United Kingdom, and Italy (Cardo, et al., 1997). Thirty-three patients with seroconversion (case patients) were compared with 665 exposed controls without seroconversion, regarding to the specific characteristics of the exposure. Data analysis showed that significant risk factors for seroconversion included deep injury, injury with a device that was visibly contaminated with the blood of a source patient, a procedure involving a needle placed in the artery or vein of the source patient, and exposure to a source patient who died of AIDS within 2 months of the exposure (Cardo, et al., 1997). According to this study, the
risk of transmission of HIV after percutaneous exposure when the source patient has terminal AIDS, for example, is increased approximately six-times compared with source patients with earlier infection.

**Prevention**

The bottom line is that there is no cure for AIDS, and there is no preventive vaccine. Actually, there are drugs that can be used for treatment of HIV infections such as the antiviral drug zidovudine (AZT) and recently, other drugs named protease inhibitors are used for HIV infection treatment. However, little information exists from which the efficacy of post exposure prophylaxis (PEP) in humans can be assessed. Seroconversion is infrequent following an occupational exposure to HIV-infected blood (CDC, 2001). The use of ZDV as PEP was associated with a reduction in the risk of HIV infection by approximately 81% (Cardo et al., 1997). Although the results of this study suggest PEP efficacy, its limitations include the small number of cases studied and the use of cases and controls from different cohorts (CDC, 2001).

The risk of HIV transmission among health care personnel can be prevented by a two-part strategy. First, interventions must be directed to decrease the risk of occupational exposures, and second, if exposure has occurred, post exposure monitoring and prophylaxis should be delivered promptly (Ferreiro & Sepkowitz, 2001). In this sense, the Center for Disease Control and Prevention (CDC, 2003b) offers the following recommendations. Healthcare personnel should assume that the blood and other body fluids from all patients are potentially infectious. They should therefore follow infection control precautions at all times. These precautions include: the routine use of barriers (such as gloves and/or goggles) when anticipating contact with blood or body fluids;
washing hands and other skin surfaces immediately after contact with blood or body fluids; and the careful handling and disposing of sharp instruments during and after use.

Although the most important strategy for reducing the risk of occupational HIV transmission is to prevent occupational exposures, plans for postexposure management of health care personnel should be in place. CDC has issued guidelines for the management of HCP exposures to HIV and recommendations for post-exposure prophylaxis (PEP) (Appendix B). The recommendations are based on the type of postexposure (percutaneous injuries or mucous membrane exposures and nonintact skin exposures). The criteria are exposure time and infection status of source (HIV-positive-class 1/class2, unknown HIV status, HIV-negative).

In addition to providing emotional support, the counseling of health care workers with high-risk exposures must stress necessary behavioral changes (CDC, 1998c & CDC, 2003b). These include sexual abstinence or condom use for up to a 6-month period, avoidance of pregnancy among female workers, and discontinuation of breast-feeding. Other measures include refraining from donating blood, organs, tissue, or semen, even in those sustaining low-risk exposures. There is no indication to alter patient-care responsibilities. Health care workers should be strongly advised to report any syndrome that may indicate acute HIV infection, such as mononucleosis-like syndrome, fever, rash, malaise, fatigue, nausea, arthralgia, lymphadenopathy, and neurologic symptoms, among others (CDC, 2003b).

Needlestick and Sharps Injuries Prevention Strategies

Prevention of percutaneous injuries and other blood exposures is an important step in preventing the transmission of bloodborne viruses to healthcare personnel. The current
Federal standard for addressing needlestick injuries among health care workers is the OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030; 56 Federal Register 64004, 1991). The standard applies to all occupational exposures to blood or other potentially infectious material. Important elements of this standard require the following: a) written exposure control plan designed to eliminate or minimize worker exposure to bloodborne pathogens, compliance with universal precautions; b) engineering controls and work practices to eliminate or minimize workers exposure; c) personal protective equipment (if engineering controls and work practices do not eliminate occupational exposure); d) prohibition of bending, recapping, or removing contaminated needles and other sharps unless such an act is required by a specific procedure or has no feasible alternative; e) prohibition of shearing or breaking contaminated needles; f) free Hepatitis B vaccinations offered to workers with occupational exposure to bloodborne pathogens, worker training in appropriate engineering controls and work practices, post-exposure evaluation and follow-up, including post-exposure prophylaxis when appropriate.

*Hierarchy of Controls*

In the last years healthcare organizations have adopted as a prevention model the hierarchy of controls concept used by the health and safety profession to prioritize prevention interventions (CDC, 2004). In the hierarchy for sharps injury prevention, the first priority is to eliminate and reduce the use of needles and other sharps where possible using substitution control measures. Next is to isolate the hazard, thereby protecting an otherwise exposed sharp, through the use of an engineering control. When these strategies are not available or will not provide total protection, the focus shifts to work-practice controls and personal protective equipment.
Substitution is the best alternative to eliminate or reduce the hazard. Prevention of needlestick injuries is possible by analyzing the hazards and applying control measures using a hierarchy of controls starting with the elimination of unnecessary sharps and injections to eliminate the hazard. Needleless IV systems, recommended by the Food and Drug Administration in 1992, remove an unnecessary sharp and reduce the risk of injury (Gartner, 1992; Yassi, McGill, & Khokhar, 1995). Eliminating unnecessary injections by using oral instead of injectable medications eliminates the hazard (unless not available or less effective).

According to the Sharps Injury Prevention Workbook (CDC, 2004), healthcare organizations are working to eliminate or reduce needle use in several ways. The majority (70%) of U.S. hospitals (Pugliese, Bartley, & McCormick, 2000) have eliminated unnecessary use of needles through the implementation of IV delivery systems that do not require (and in some instances do not permit) needle access. Other important strategies for eliminating or reducing needle use include: using alternate routes for medication delivery and vaccination when available and safe for patient care, and reviewing specimen collection systems to identify opportunities to consolidate and eliminate unnecessary punctures, a strategy that is good for both patients and healthcare personnel.

Engineering controls use principles of substitution, isolation, enclosure, or ventilation. In the context of sharps injury prevention, engineering controls include sharps disposal containers and needles and other sharps devices with an integrated engineered sharps injury prevention feature. The emphasis on engineering controls has led to the development of many types of devices with engineered sharps injury
prevention features (ECRI, 2000) and there are suggested criteria for the design and performance of such devices. Safety feature characteristics listed by NIOSH for evaluating and selecting needlestick injury prevention products (NIOSH, 1999) include: the device is needleless; the safety feature is an integral part of the device; the device preferably works passively (requires no activation by the user). If user activation is necessary, the safety feature can be engaged with a single-handed technique and allows the worker’s hands to remain behind the exposed sharp; the user can easily tell whether the safety feature is activated; the safety feature cannot be deactivated and remains protective through disposal; the device performs reliably; the device is easy to use and practical; the device is safe and effective for patient care.

The 2000 U.S. Needlestick Safety and Prevention Act established the requirement for health care settings to use engineering controls known as safer needle devices (OSHA, 2001). Safer needle devices have been shown to reduce 62% to 88% of all needlestick injuries (Jagger, 1996; CDC, 1997). These devices blunt, sheath, or retract the needle immediately after use and are available in injection equipment (syringes), IV access devices, lancets, and phlebotomy needles. Research suggests that no single safety device or strategy works the same in every facility. In addition, no standard criteria exist for evaluating safety claims, although all major medical device manufacturers market devices with safety features. Therefore, employers must develop their own programs to select the most appropriate technology and evaluate the effectiveness of various devices in their specific setting.
**Administrative Controls**

Effective needlestick injury prevention measures include policies, administrative procedures and work practice controls such as educating workers about hazards, implementing standards precautions, eliminating needle recapping, and providing sharps containers for easy access that are within sight and arm’s reach (Haiduven, DeMaio, & Stevens, 1992; Jagger, 1996). Standard Precautions (Universal Precautions) is an infection control principle that treats all human blood and other potentially infectious materials as infectious. This is an important concept and an accepted prevention approach with demonstrated effectiveness in preventing blood exposures to skin and mucous membrane. Standard Precautions also mean that healthcare workers use personal protective equipment to prevent direct contact with a patient's blood or body fluids. Standard Precautions are designed to reduce the risk of transmission of bacteria, viruses among others from both recognized and unrecognized sources of infection in health care settings. The constant practice of Standard Precautions is one of the best methods that healthcare workers can use to protect themselves from occupational exposure.

According to CDC 2004, another important element of a sharps injury prevention program is the education and training of healthcare personnel in sharps injury prevention. As part of the program planning process, careful thought should be given to how and when training is provided to ensure that those who need training receive it, the training is relevant to those who are being trained, and that educational efforts are sustained over time.
Personal Protective Equipment

Personal protective equipment (PPE) is specialized clothing and equipment worn by an employee for protection against a hazard such as blood or other potentially infectious materials. PPE includes gloves, gowns, masks, eye protection, face shields and any equipment that can protect health care workers in their daily tasks. General work clothes for instance, uniforms, pants, shirts not intended to function as protection against a hazard are not considered to be personal protective equipment (OSHA, 1991). PPE should be readily available and provided to the employee at no cost. Employees should never put themselves at risk of exposure to bloodborne pathogens by not using the appropriate protective equipment. PPE should be removed after use. Care should be taken not to contaminate the skin. Soiled gowns, gloves, etc. should be disposed of in a biohazard container immediately at the point of use and hands thoroughly washed.

Safety Culture and Health Care Workers

Some industrial sectors are finding that a strong safety culture correlates with: productivity, cost, product quality, and employee satisfaction (Gershon, et al., 2000). The concept of institutionalizing a culture of safety is relatively new for the healthcare industry and there is limited literature on the impact of such efforts. According to Clarke et al., 2002, the risk of sharps injuries in nurses is importantly related to nurse staffing levels and working climate. System analysis strategies, used by many healthcare organizations to improve patient safety, also can be applied to the prevention of sharps-related injuries to healthcare personnel. These strategies include the following: defining "Sentinel Events" and performing a "Root Cause Analysis" to determine their underlying
cause; applying "Failure Mode Analysis" to a problem pre-event to systematically identify how to prevent it from occurring (CDC, 2004).

Other important aspect is related to healthcare personnel who have difficulties changing long-standing practices. This observation is borne out by studies conducted in the years following implementation of universal precautions, when observed compliance with recommended practices was not satisfactory (Evanoff, et al., 1999), especially in older nurses who may be more resistant to adopt new ways of working (Osborne, 2003). The same holds true for devices with safety features-healthcare organizations have difficulty convincing healthcare personnel to adopt new devices and procedures (Gershon, et al., 1999). Psychosocial and organizational factors that slow the adoption of safety practices include: risk-taking personality profile, perceived poor safety climate in the workplace, and perceived conflict of interest between providing optimal patient care and protecting oneself from exposure (Gershon, et al., 1995). Personnel most readily change their behavior when they think that they are at risk, the risk is significant, behavior change will make a difference, and the change is worth the effort (Simpkins, Haiduven & Stevens, 1995).

**Combination of Measures**

In the literature reviewed, all the researchers are in agreement that to effectively reduce the problem about needlestick and sharp injuries, more than one measure needs to be taken. In fact, a combination of measures should be instituted and directed towards healthcare workers: education and information about standard precautions, adoption of devices with safety features and review of the critical point in the practical procedures, disposal and elimination of devices (IV catheters, IV stylet, phlebotomy needles, butterfly
needles, and syringes). In this aspect, the utilization of multi component prevention approach is a way to diminish the needlesticks and sharp injuries in health care setting.

Experts agree that safety devices and work practices alone will not prevent all sharps injuries (Davis, & AHA, 1999). Significant declines in sharps injuries also require: education, a reduction in the use of invasive procedures (as much as possible), a secure work environment, and an adequate staff-to-patient ratio. These are parts of something called multi-component prevention approaches. One report detailed a program to decrease needlestick injuries that involves simultaneous implementation of multiple interventions: formation of a needlestick prevention committee for compulsory in-service education programs; out-sourcing of replacement and disposal of sharps boxes; revision of needlestick policies; and adoption and evaluation of a needleless IV access system, safety syringes, and a prefilled cartridge needleless system (Gershon, Pearse, Grimes, Flanagan & Vlahov, 1999). This strategy showed an immediate and sustained decrease in needlestick injuries, leading researchers to conclude that a multi-component prevention approach can reduce sharps injuries.

New Safety Devices

Obviously, the introduction of devices with safety features could lead to a significant reduction in the number of injuries from needles because healthcare are protected even when there is behavior indicating lack of education on a specific, or hurried maneuvering in urgent situations, or major attention to the care to the patient rather than to one's own safety. But the elevated costs of these devices do not currently allow their large-scale use in hospitals (Clarke, et al, 2002). In consideration of cost containment and reduction of the number of injuries, a compromise solution would be to identify those hospital units
where percutaneous injuries could be prevented with devices with safety features and to introduce their use in these alone. However, the choice to adopt devices with safety features should not be based on economic aspects alone, as even if the number of HBV, HCV or HIV preventable infections in healthcare workers is not great, it bears ethical and legislative implications.

*Preventing Needlestick Injuries and Quality Health Care*

Preventing needlestick injuries and resulting infections is possible and necessary to provide quality health care. While Clarke et al., (2002) demonstrated the relationship between short staffing and needlestick injuries, appropriate staffing is difficult to maintain when health care workers are unable to work due to work-related injuries and illness. Nursing shortages are exacerbated by uncontrolled occupational hazards and further made worse by the nurses’ fear of bringing a life-threatening illness home to their families. In 2000, 88% of nurses responding to a web based occupational health survey, indicated that the risk of occupational hazards determine whether they will continue to work in nursing and in what clinical area (ANA, 2001).

*Needlestick Injuries and Cost*

The risks and costs associated with a blood exposure are serious and real. Costs include the direct costs associated with the initial and follow-up treatment of exposed healthcare personnel, which are estimated to range from $500 to $3,000 depending on the treatment provided (USGAO, 2000). Costs that are harder to quantify include the emotional cost associated with fear and anxiety from worrying about the possible consequences of an exposure, direct and indirect costs associated with drug toxicities and lost time from work, and the societal cost associated with an HIV or HCV
seroconversion. The latter includes the possible loss of a worker's services in patient care, the economic burden of medical care, and the cost of any associated litigation.

Health Care Workers and HIV or Hepatitis Status

Other essential aspect to be considered is not discriminating against health care workers on the basis of real or perceived HIV status or hepatitis infection. According to the International Labor Organization (ILO, 2001), HIV infection is not a cause of termination of employment indicating that persons with HIV-related illnesses should be able to work for as long as medically fit (ILO, 2001). Nurses who are infected with HIV or Hepatitis whether from occupational exposure or not, should be able to work in the health care workplace as long as their health allow. In the case that the disease has been acquired from a previous undocumented exposure, the health care provider has a moral and ethical responsibility to counsel and educate these employees and to protect their confidentiality, illustrating the principles of beneficence and autonomy (Haiduven, 2000a).

Needlestick Injuries and Developing Countries

According to Wilburn, (2004) in developing countries, where the prevalence of HBV, HCV and HIV infected patients is the highest in the world, the number of needlestick injuries is also the highest. For example, African health care workers suffer on average two to four needlestick injuries per year and over half of the hospitalized patients in South Africa are HIV positive (Pruss-Ustiun et al., 2003). In some regions of Africa and Asia close to half of all Hepatitis B and C infections among health care workers are attributable to contaminated sharps. In some areas of the Eastern Mediterranean region over two-thirds of Hepatitis B and C infections in health care workers are attributable to
contaminated sharps. Over two thirds of all Hepatitis B in Central and South American are the result of occupational exposure (Pruss-Ustiun et al., 2003).

As consequence, the problem to face in these countries is multifaceted and requires more than one way to solve the situation about needlestick and sharp injuries. In this case is not only that some governments can not afford the new technological devices and vaccines (Hepatitis B), but also how to convince health authorities to promote policies and regulations to be implemented in health care settings to avoid needlestick injuries.

According to Prüss-Üstün et al., (2003), the measures could be: to acquire preventive Hepatitis B vaccine to be used not only in health care workers but also in the general population, to establish a written exposure control plan, to use engineering controls, to enforce work practice controls, to provide adequate personal protective equipment, to make available Hepatitis B vaccine, to promote and develop procedures to follow up people exposed to bloodborne pathogen; to use labels and signs to communicate hazards, to provide information and training to employees, to maintain employee medical and training records, and to promote and develop a culture of safety in health care setting. In summary, the OSHA’s Bloodborne Pathogens Standard needs to be implemented. On the other hand, aspects related to human beings need to be aboard, for example, change behavior in daily tasks, open mind to new technology and procedures, and to be stimulated to an ongoing education and training program (CDC, 2004).
CHAPTER THREE: VENEZUELAN HEALTH SECTOR

Characteristics about Venezuela

*Demographic Context*

According to Pan-American Health Organization (PAHO, 2002), the population in 2000 was estimated at 24,896,379 inhabitants with a demographic density of 26.37 inhabitants by km². In 2000, 87.2% of the inhabitants lived in urban areas and 12.8% in rural areas. Of this population, 50.3% are men and 49.7% are women. In terms of age, 45.2% are younger than age 19, while 50% are between 19 and 65, and 4.3% are older than 65. Between 1995 and 1999 the life expectancy at birth remained steady at 72 years (PAHO, 2004).

*Legal Framework of Health in Venezuela*

The Constitution of the Bolivarian Republic of Venezuela (1999) establishes in the Article 83 that health is a fundamental social right and the responsibility of the State, which must/shall guarantee it as part of the right to life. All persons have the right to protection of health, as well as the duty to participate actively in their protection, and to fulfill with such health and hygiene measures as may be established by law, and in accordance with international conventions and treaties signed and ratified by the Republic. In order to guarantee the right to health, the State is promoting a National Public Health System integrated with the Social Security System and governed by the principles of gratuity, universality, completeness, fairness, social integration and
solidarity according to the article 84. Furthermore, the State is responsible for the financing of the Public Health System as was established in the Article 85.

Organization of Venezuelan Health Sector

The public health sector is composed by the Ministry of Health and Social Development, the Venezuelan Social Security Institute, the Social Welfare Institute of the Ministry of Education, and the Armed Forces Institute of Social Welfare. In Venezuela, more than 2,400 institutions exist in the area of health (PAHO, 2002). These institutions belong to the public as well as the private sectors, including nongovernmental organizations (e.g. Red Cross). The public sector bears the greatest responsibility for providing health services to the general population. There are serious limitations in health services coverage and the network ability to respond to health care is insufficient. Health expenditures as a percentage of Gross Domestic Product (GDP) were 4.06% showing a tendency to decline. Such decline is sharper in the area of public spending (PAHO, 2004).

All the public health establishments are part of a network of hospitals and outpatient clinics, and conduct promotional activities, prevention, and health education. The outpatient and hospital establishments belong to the National Public Health System and are organized according to their level of complexity and problem solving capacity such as primary level and secondary level of care (PAHO, 2004). Primary level of care: Establishments which seek to deliver comprehensive health services of the public subsector should adjust to the characteristics that pertain to them in keeping with the following classification: Rural Outpatient Type I and II, which provide comprehensive, general, and family medical care at the primary level, except for hospitalization, and
which are located in populations of less than 10,000 inhabitants. Urban Outpatient Type I, II, and III, which provide comprehensive general, family, and specialized medical care, do not provide hospitalization, and are located in populations of over 10,000 inhabitants. In practice, coverage is limited, and most interventions of health promotion, community participation, and disease prevention are conducted by the physicians during their year of social service, and by Simplified Medicine Auxiliaries in the Outpatient Rural I and II setting, oriented to scattered rural environments and populations of less than 1,000 inhabitants.

**Secondary level of care:** Facilities that seek to deliver hospitalization services to the public subsector provide comprehensive medical care at the primary, secondary, and tertiary level. They are classified as Type I, II, III, and IV Hospitals, as a function of several characteristics, most notably by the population served, number of beds, and level of complexity. Type I Hospitals are located in populations of up to 20,000 inhabitants, with a demographic catchment area of up to 60,000 inhabitants. They have between 20 and 50 beds and are organized to provide medical services, surgery, pediatrics, gynecology and Obstetrics. Type II Hospitals are located in populations of more than 20,000 inhabitants, with a demographic catchment area of up to 100,000 inhabitants. They have between 50 and 150 beds and are organized to provide services of greater complexity than the previous level. Type III Hospitals are located in populations of more than 60,000 inhabitants, with a demographic catchment area of up to 400,000 inhabitants. They have between 150 and 300 beds and are organized to provide services of greater complexity than the previous level. Type IV Hospitals are located in populations of more than 100,000 inhabitants, with a demographic catchment area of up to 1,000,000
inhabitants. They have more than 300 beds and are organized to provide services of
greater complexity than the previous level. The hospitals with the highest problem-
solving ability are located in the capital city and in the State capitals. The problem-
solving ability of the hospitals is very limited; there are long waiting lists for surgery and
outpatient care, and there are often shortages/deficiencies in essential supplies for care.

In Venezuela, there are 296 hospitals in the network of public establishments and 344
hospitals in the private sector. In 2000, there were 40,675 public hospital beds in the
governmental sector (17.6 beds per 10,000 population). A public hospital receives all of
its funding from the government (PAHO, 2004). Approximately 53,818 physicians,
14,676 professional nurses and 31,629 nurse's aides are registered in the MSDS. In 1999,
there were 19.7 physicians and 7.9 nurses per 10,000 populations (PAHO, 2004). It is
important to notice that there are more physicians than professional nurses. Venezuela
suffers a shortage of professional nurses. The Venezuelan professional nurses have
undertaken a deep transformation in the last 15 years. At this moment the organizations
responsible for the formation are the Universities or Colleges and Technological
Institutes. The technological ones supply the formation of superior technicians in nurses
with three (03) years of study. The Universities are training professionals (License in
nurses) in five (05) years.

Venezuela Health Profile

During the period of 1983 to 2000, 8,047 cases and 4,726 deaths due to HIV/AIDS
were reported. According to UNAIDS, underreporting in Venezuela was estimated at
around 80% basically for lack of adequate surveillance systems. At the same time 62,000
people throughout the country were HIV carriers in 2000 (PAHO, 2004).
Blood banks conduct tests to detect HIV, Hepatitis B, and Hepatitis C among others. In 1999, the highest prevalence found from the screening of 202,515 donors was for Hepatitis B at 5.9%; for Hepatitis C at 0.8%; and for HIV at 0.4% (PAHO, 2002). There are not available statistics related with which percentage would be associated with occupational exposure. The incidence of Hepatitis B in Venezuela is 2%. There are 450,000 HBsAg positive persons in a population of 24,000,000 (19/1,000 population) (PAHO, 2004). There are not data available for occupational exposure.

Occupational Health and Safety Laws

The National Constitution of the Bolivarian Republic of Venezuela was enacted in 1999 and it was the first Venezuelan Constitution that included aspects related to health and workplace conditions. In article 87, it stipulates that all persons have the right and duty to work. The State guarantees the adoption of the necessary measures so that every person must/shall be able to obtain productive work providing him or her with a dignified and decorous living and guarantee him or her full exercise of this right. It is an objective of the State to promote employment. Measures tending to guarantee the exercise of the labor rights of self-employed persons shall be adopted by law. Freedom to work must/shall be subject only to such restrictions as may be established by law. Every employer must/shall guarantee employees adequate safety, hygiene and environmental conditions on the job. The State must/shall adopt measures and create institutions such as to make it possible to control and promote these conditions.

The Organic Law of Prevention, Conditions, and Workplace Environment published on 26 July 2005 states that its purpose is to guarantee conditions of safety, health, and well-being to workers in a suitable work environment that is propitious for exercising
their physical and mental capabilities, recreation, use of free time, and social tourism. Its purpose is also to regulate the responsibilities of employers in cases of occupational illness or injury caused by their fraud or negligence.

The National Institute of Occupational Prevention, Health and Safety at Workplace has assumed the responsibility for the policy of workers' health, in accordance with the Organic Law on Prevention, Conditions and Environment at Workplace by means of the control and the promotion of safety and health in the workplace. The objective is to achieve the commitment of all sectors of workers and employers to develop diverse programs directed to the education and information of workers regarding the risks inherent in the activities undertaken, in order to avoid occupational accidents and diseases. The promotional work on the health of workers itself is focused on specific activities for communication and education for the creation, constitution and operation of the of Occupational Safety and Health Committees; educational agreements with Universities that provide for Postgraduate Studies in Occupational Health and with International Agencies; and programs for updating technicians and professionals on the disciplines that make up this area. According to the Institute, in Venezuela 17 industrial accidents occur each hour, 410 occur every day, 2,885 occur each week, 12,500 occur in a month and 150,000 occur every year. Of the total industrial accidents, 15,000 result in permanent injury with some level of disability in the workers. Approximately 1,500 (10%) die every due to such industrial accidents (INPSASEL, 2004). These numbers are greater than the rates of any epidemic of dengue, malaria, HIV/AIDS, and even car accidents. It is a serious public health problem that must be targeted with great priority (INPSASEL, 2004). Regarding occupational diseases, musculoskeletal disorders, noise-
induced hearing loss, and pulmonary diseases are the most common reported according to the Institute statistics. There is not information about health care workers.

There are also guidelines of the hygiene and industrial safety conditions which were enacted in 1968 and modified in 1973. These guidelines are specifically oriented to apply to the manufacturing industry. Additionally, there are some guidelines called "Normas Covenin." Some of these are related to hygiene and safety in hospital settings, but the majority of these guidelines are oriented to the manufacturing industry. In summary, Venezuela has general laws related to hygiene and industrial safety conditions in workplaces but there are few guidelines related to HCWs and hospital activities.

**Aragua State Characteristics**

The State of Aragua is located in the north-central region of Venezuela, approximately 100 km west of Caracas, Venezuela. In 2001, Aragua had an estimated population of 1,450,000. Maracay is the capital and most important city of the Aragua State. Most of it falls under the jurisdiction of the Girardot Municipality. The population as per the 2001 census was 750,000 (PAHO, 2004).

**Health Sector Organization**

The Health in the State is administrated by the Corporation of Health in Aragua, CORPOSALUD, that is an autonomous institute which dependent on the State Government created by law to develop the State Health System and to administrate and operate health care facilities around the state. CORPOSALUD represents and applies the policies of the Ministry of Health and Social Development (CORPOSALUD, 2004).
The organization is the same illustrated for Venezuela. There are 203 establishment of health care in Aragua State, 30 are in the capital of the State (Maracay). Additionally, there are 5 hospitals in entire State; the biggest is the Maracay Central Hospital located in the capital (CORPOSALUD, 2004).

**Maracay Central Hospital**

The Maracay Central Hospital is a tertiary hospital of reference and short stay (Type IV). It serves not only the state of Aragua but also the neighbor states as well as to other states of the country. It has been an institution founded for more than 30 years, represents the most important health center in Aragua State, with a capacity of 470 beds and a worker population of 2,000 people approximately. The Maracay Central Hospital is one of the main reference centers in the central area of Venezuela. One of the most recent outpatient specialties of the hospital is the Occupational Medicine Service, with a physician in Occupational Health. Also, the hospital has one Epidemiologist physician (Ph.D.) and one Infection Control Specialist who works to prevent and control nosocomial infections. One of the functions is to perform surveillance for occupational accidents including needlesticks injuries. There is a teaching hospital affiliated with the Medical School of the University of Carabobo and others Universities and it provides clinical education for medical and nurses students (CORPOSALUD, 2004). In 2003, physicians and nurses, represent more than 70% of the total workers in the hospital (CORPOSALUD, 2004).

The occupational risks found are similar among hospitals of Venezuela. These include physical, chemical, biological, and psychological risks as well as risks of musculoskeletal
disorders. There is not information about the number of occupational diseases. The information about the incidence of needlestick injuries reported in Aragua State in 2004 and 2005 was approximately 186 cases per year; most of these cases came from Maracay Central Hospital (MCH) with an average of 5 cases per week (CORPOSALUD, 2006).
CHAPTER FOUR: THEORETICAL FRAMEWORK
PRECEDE/PROCEED MODEL

Background

The PRECEDE-PROCEED Model (PPM) is a theoretically strong model that addresses comprehensive planning in health promotion and health education (Greene & Kreuter, 1999; Social and Behavioral Sciences Applied to Health lectures, University of South of Florida, 2003). This model was originally developed by Lawrence W. Green in 1968 in order to evaluate health education programs and guide their development. The PROCEED component was added to the model by Marshall Kreuter in the late 1980s in recognition of the emergence of and need for health promotion interventions that go beyond traditional educational approaches to changing unhealthy behaviors. This model is multidimensional, founded in the social/behavioral sciences, epidemiology, administration and education.

Components of the Model

The model has two components: the PRECEDE and the PROCEED (Appendix C). The PRECEDE stands for predisposing, reinforcing, enabling, environmental assessment factors and the PROCEED component incorporates policy, regulatory, and organizational constructs. There are two propositions emphasized throughout this model: a) health and health risk have multiples determinants, and b) because health and health risks are determined by multiples causes, efforts to affect behavioral, environmental, and social
change must be multi-dimensional or multisectoral (Haiduven, 2000b; Social and Behavioral Sciences Applied to Health lectures, University of South of Florida 2003).

There are six basic phases involved in the complete PPM; however, valuation of the interventions in the PROCEED portion can extend the model to many as nine phases. The six basic phases are as follows: (a) social assessment, (b) epidemiological assessment, c) behavioral and environmental assessment, d) educational and ecological assessment, e) administrative and policy assessment, and f) implementation and evaluation (Green & Kreuter, 1999). The goals of the model are to explain health-related behaviors and environments, and to design and evaluate the interventions needed to influence both the behaviors and the living conditions that influence them and their consequences. The comprehensive nature of PRECEDE component allows for application in a variety of settings such as school health education, patient education, community health education, and direct patient care settings (Green & Kreuter, 1999).

The PRECEDE model component contains predisposing, reinforcing, enabling, and environmental assessment factors (Fig. 1). All these factors can influence a given health behavior or decision. **Predisposing factors** are an individual’s or group’s knowledge, attitudes, beliefs, values, and perceptions that positively or negatively influence motivation for a behavioral change (Green & Kreuter, 1999, p. 40).

According to Green & Kreuter, (1999), **attitudes** are relatively constant feelings directed toward something or someone that always contain an evaluative dimension. Attitudes can always be categorized as positive or negative” (Green & Kreuter, 1999, p. 164). In the perspective of this study, it refers to attitudes toward recapping of needles, safety, report a needlestick injury, and compliance with Standards Precautions (Universal
Precautions) among others. **Beliefs** are convictions that a phenomenon is true or real (Green & Kreuter, 1999, p. 162). A potent motivator related to beliefs is fear (Green & Kreuter, 1999, p. 163). In the context of this study, it refers to beliefs that consequences of a needlestick injury are true or real linked to bloodborne diseases (e.g., Hepatitis B, Hepatitis C or HIV). **Knowledge** is the cognitive learning that results from awareness. (Green & Kreuter, 1999, p. 158). It is usually a necessary but not always a sufficient cause of individual or collective behavior change. In other words, at least some awareness of a particular health or quality-of-life need and of some behavior that can be taken to address that need must exist before that behavior will occur (Green & Kreuter, 1999, p. 159). For example, in this study was the awareness of nurses’ experiences or experiences of others regarding needlestick injuries, recapping of used needles, bloodborne diseases, etc that might predispose nurses toward or against the goal behavior (safe practices). **Values** are preference for life goals or ways of life that are often shared within a culture or community (Haiduven, 2000b). In this study, examples are values placed on safety of patients, quality care, and values placed on personal safety and other colleagues’ safety.

**Reinforcing factors** are those consequences of action that determine whether the action receives positive or negative feedback and are supported socially after it occurs (Green and Kreuter, 1999, p. 171). Reinforcing factors are the rewards and punishments received. Rewards may sustain continuation of the target behavior while punishments might influence cessation of the behavior (Haiduven, 2000b). Reinforcing factors are factors following a behavior that provide the continuing reward or incentive for the persistence or repetition of the behavior.
**Enabling factors** facilitate the performance of an action by individuals or organizations. These include “availability, accessibility and affordability of resources” (Green & Kreuter, 1999, p. 167). This category also includes skills, resources or barriers that can affect behavioral and environmental changes (Haiduven, 2000b). It is important to add that enabling factors are conditions of the environment (Haiduven, 2000b).

According to Green and Kreuter (1999) **environmental factors** are those external to an individual, often beyond of his her control, determinants outside the person that can be modified to support behavior, health, or quality of life of that person or others affected by that persons’ actions.” (p. 40). Environmental conditions can either positively or negatively influence behavioral risk factors for a disease, condition, or health related behavior (Haiduven, 200b).

**PROCEED Component**

The PROCEED component incorporates policy, regulatory, and organizational constructs with the purpose of designing interventions to overcome barriers that may be identified in the PRECEDE component. In Green and Kreuter work (as cited in Haiduven, 2000b), policy is the set of objectives and rules guiding activities in an organization, which also provides authority for resource allocation. Regulatory refers to the process of enforcing policies, rules or laws. Organization refers to the act of implementing a program, including coordination of necessary resources. The identification of priorities and setting of objectives from PRECEDE provide the objects and criteria for PROCEED.
Applications of the PRECEDE-PROCEED Model

The PPM assessment has been applied in community settings across several health problems, including domestic violence, smoking among women, cervical cancer screening among African American women among others (Green & Kreuter, 1999), as well as the health care or counseling setting, including patient education, nutrition counseling, smoking-cessation, and self care programs (Green & Kreuter, 1999). Also the PPM have been applied to assist in school settings for curriculum planners, administrators, parents, teachers, and advocates for children to meet the ongoing challenge creating health promoting schools (Green & Kreuter, 1999). For example, Ransdell in 2001 used the PPM to increase productivity in health education faculty. The PPM also has been used as a framework for studying worker self-protective behaviors in the construction industry (Dedobbeleer & German, 1987). Brosseau, Parker, Lazovich, Milton, and Dugan, in 2002, used the model for designing intervention effectiveness studies for occupational health and safety in the Minnesota wood dust study. In 2004, the model was used in a health science teaching in the Democratic Republic of the Congo (Parent, Kahombo, Bapitani, Garant, Coppieters, Levêque1 and Piette, 2004).

In this study, the PRECEDE component (educational and ecological assessment) was used as a theoretical framework to identify the circumstances surrounding recapping needles as cause of needlestick injuries in nurses in the Maracay Central Hospital, using the predisposing, reinforcing, enabling and environmental factors (see Figure 2). In studying the circumstances in this nursing staff, it was necessary to utilize a theoretical framework that accounts for all the factors that interact in influencing this behavior.
Figure 1. Diagram of PRECEDE Component of PRECEDE PROCEED MODEL (Green & Kreuter, 1999, p. 41)
Figure 2. Diagram of PRECEDE Component Applied to Study Problem: Factors Surrounding Recapping Used Needles by Nurses at a Venezuelan Public Hospital
CHAPTER FIVE: METHODOLOGY

The purpose of this chapter is to explain in detail the different methodological tools that were incorporated in this investigation. A before and after design, with focus group sessions and a theoretical model base of the PRECEDE/PROCEED model were part of a triangulation methodology where qualitative and quantitative methods were used.

Methodological Triangulation

According to Bryman (1988) “triangulation refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings” (p 1). Sometimes this meaning of triangulation is taken to include the combined use of quantitative research and qualitative research to determine how far they arrive at convergent findings. For example, a study in the United Kingdom by Hughes et al., (1997) of the consumption of “designer drinks” by young people employed both structured interviews and focus group. The two sets of data were mutually confirming in that they showed a clear pattern of age differences in attitudes toward these types of alcoholic drinks. Triangulation is sometimes used to refer to all instances in which two or more research methods are employed. Thus, it might be used to refer to multimethod research in which a quantitative and a qualitative research method are combined to provide a more complete set of findings than could be arrived at through the administration of one of the methods alone.

This study was planned and developed using different methodologies: quantitative (descriptive analysis), qualitative (focus group), Wolcott transformation qualitative data
methodology, and the PPM approaches. The quantitative approach allowed the
description and analysis of the information obtained in the questionnaire to be applied
before the beginning of each focus group as well as the data obtained from each
department about the used needles counted before and after the educational strategy.
Aspects related to work hours and problems with continued education were discussed in
the focus group sessions. The qualitative approach was conducted through focus groups
that allowed obtaining information that was used later to prepare the educational strategy.
In order to analyze the information obtained in the focus group sessions, the author
followed the methodology suggested by Wolcott to use three levels
(Description/Categorization, Analysis and Interpretation). The PRECEDE component of
the PPM was used to systematize and integrate the information obtained in the focus
group sessions. In summary, all these methodologies were used as a complementary tool
to accomplish the objectives as well as to answer the research questions of the
investigation. It is important to emphasize that triangulation allowed the author to get the
results obtained that may not have been achieved by only one method alone.

Study Design

In this study, a before-and-after design was proposed, a type of non-experimental
design commonly used in safety studies. The word terminology, “before” refers to a
measurement being made before an intervention is introduced to a group and “after”
refers to a measurement being made after its introduction (CDC, 2001c). This type of
study provides preliminary evidence for safety intervention effectiveness. A safety
intervention is defined as an attempt to change how things are done in order to improve
safety (CDC, 2001c). Within the workplace it could be any new program, practice, or
initiative intended to improve safety (e.g. engineering intervention, training program, or administrative procedure).

There are some reasons to select this design: a) is most useful in demonstrating the immediate impacts of short term programs, in fact, is less useful for evaluating longer term interventions; b) there are not previous studies related to recapping used needles and needlestick injuries in Venezuelan public hospitals; c) this preliminary study attempts to implement an educational strategy based on the factors surrounding recapping needles as a cause of needlestick injuries and bloodborne diseases in nursing staff at the Maracay Central Hospital.

Threats to Internal Validity

Threats to internal validity are possible alternative explanations for observed evaluation results. According to the CDC guide to evaluating the effectiveness of strategies for preventing work injuries (2001c), there are some possible threats to internal validity that can affect the before-after-design such as history and the Hawthorne effects. History effects: this threat occurs when one or more events, which are not part of the intervention but could affect the outcome, take place between the “before” and “after” measurements. The opportunities for history threats to arise in safety intervention evaluations are considerable because of the complex nature of the workplace and its environment. This effect was not present at the time this research was conducted. The Hawthorne effect involvement of outsiders could have an effect on the outcome, independent of the key intervention component. To avoid this potential Hawthorne effect, the researcher visited on a daily basis until his presence seemed to no longer create a reaction and the visits became constant during the study period.
Focus Groups Overview

Focus groups were originally called "focused interviews" or "group depth interviews.” The technique was developed during World War II to explore morale in the U.S. military (Krueger & Casey 2000) and after World Word II was used to evaluate audience response to radio programs (Stewart & Shamsdasani, 1990). Since then social scientists and program evaluators have found focus groups to be useful in understanding how or why people hold certain beliefs about a topic or program of interest. Focus group is a descriptive design with a qualitative data collection method. According to Krueger and Casey (2000), a focus group is a special type of group in terms of purpose, size, composition, and procedures. The purpose of a focus group is to listen and gather information. It is a way to better understand how people feel or think about an issue, product or service. It is possible with this technique to generate discussion among participants about topics that they might not bring up in everyday conversation (Haiduven, 2000b). Participants are selected because they have certain characteristics in common that relate to the topic of the focus group.

Characteristics of Focus Groups

According to Krueger and Casey (2000), focus group interviews have some features: are people, who possess certain characteristics, provide qualitative data, in focused discussion, to help understand the topic of interest. Focus group participants are similar to each other in a way that is important to the researcher. The nature of this homogeneity is determined by the purpose of the study. The goal of a focus group is to collect data that are of interest to the researcher in order to find the range of opinions of people across several groups.
When to use Focus Group interviews

Focus group interviews should be considered when: (a) the researcher is searching for the range of ideas or feelings that people have about a specific topic; (b) the purpose is to uncover factors that influence opinions, behavior, or motivation. Focus groups can provide insight into complicated topics when opinions are conditional or when the area of concern relates to multifaceted behavior or motivation (Krueger & Casey, 2000).

Advantages of using Focus Group

According to Marczak and Sewell (1998), there are several advantages of the use of focus groups to study a specific topic, for instance, provide data more quickly and at lower cost than if individuals were interviewed separately; groups can be assembled on shorter notice than for a more systematic survey; the researcher can interact directly with respondents (allows clarification, follow-up questions, probing); can gain information from non-verbal responses to supplement (or even contradict) verbal responses; data uses respondents' own words; can obtain deeper levels of meaning, can make important connections. Additional advantages are designed to produce a great deal of information, including experiences and opinions of participants, in a relatively short time (Morgan & Krueger, 1998).

Disadvantages of using Focus Group

Focus groups are not without disadvantages, which include the threat of social desirability; attempts of group members to conform and therefore be unwilling to express different opinions; the risk of some persons not responding at all or group reluctance to discuss sensitive issues; or one or more members monopolizing the conversations or exhibiting unnecessarily negative behavior (Haiduven, 2000b). Other disadvantages are
small numbers and convenience sampling severely limit the ability to generalize to larger populations; requires a carefully trained interviewer who is knowledgeable about group dynamics; and the moderator may knowingly or unknowingly bias results by providing cues about what types of responses are desirable (Marczak & Sewell, 1998).

Participants in a Focus Group

Participants should be systematically and purposefully selected. In focus groups, the goal is to have a homogenous (similar in terms of background, employment level, experiences etc.) audience, but with sufficient variation among the participants to allow for contrasting opinions. To achieve this goal is very important to select people who are close to the objective of the study, in this case, nurses who have certain characteristics in common, such as experience with circumstances regarding needlestick injuries and experience with recapping used needles that are helpful in the study. They are what are called “information-rich” cases. They are purposefully selected so that the researcher can learn, in detail, about issues of central importance to the study (CDC, guidelines to evaluating the effectiveness of strategies for preventing work injuries, 2001c).

Developing Effective Questions

According to Krueger & Casey (2000, p. 40, 41), focus group questions should be carefully structured and sequenced, and based on the purpose of the study, a review of the literature and consultation with experts has to be done. There are some qualities that a good question has to meet: a) sound conversational questions help create and maintain an informal environment; b) use words the participants use when talking about the issues. The questions have to be reviewed by people similar to the target audience to make sure the language is understandable; c) questions have to be clear, participants should
understand what is the moderator asking; d) questions have to be short, lengthy questions can be confusing to respondents, f) questions are usually open-ended, are a hallmark of focus group interviewing. This type of question allows the respondents to determine the direction of the response (Kruger & Casey, 2000).

Analysis in Focus Group

In focus group the analysis begins by going back to the intent of the study. A key principle is that the depth or intensity of analysis is determined by the purpose of the study. According to Krueger and Casey (2000, p. 128), there are some characteristics related to analysis process: **systematic, sequential, verifiable and continuous**.

**Systematic** analysis is deliberate and planned. **Systematic analysis** means that the analysis strategy is documented, understood, and able to be clearly articulated by each member of the research team. As the same time analysis is a **sequential** process. Systematic and sequential analyses procedures help ensure that results will reflect what was shared in the groups. **Verifiable:** researcher must continually be careful to avoid the trap of selective perception. For analysis to be verifiable there must be sufficient data to constitute a trail of evidence. The data stream begins with field notes and recordings taken during each focus group, continues with the oral summary (verification) of key points during each group, and goes into the debriefing with the moderator team immediately following the groups. **Continuous:** in focus group analysis begins in the first focus group. The analysis is done concurrently with data collection. Each subsequent group is analyzed and compared to earlier group.

Different ways of capturing data are used as the basis for analysis: transcripts, audiotapes, notes and memory (Krueger & Casey 2000, p. 130, 131). Transcript based
analysis uses full-length transcripts of the focus group as a basis for the analysis. These are often supplemented with field notes taken by researchers. The researcher reads the transcript and makes notes, codes sections, or develops categories. It is used for academic purpose. Tape based approach relies on listening to a tape recording of each focus group and then developing a condensed transcript of the relevant and useful portions of the discussion.

According to Wolcott (1994), data from the transcripts will be analyzed doing a process entitled “transformation”, where the transformation of qualitative data can be broken down into three ways. The first level is called “description” and is designed to answer the question, “What is going on here?” In this level, the “data consist of observations made by the researcher and/or reported to the researcher by others” (Wolcott, 1994, p. 12). It is important during the descriptive level that researchers allow the data to speak for itself, using the participants’ own words whenever possible. Wolcott offers ten strategies for completing this level of transformation. In order to develop this level, the author used as strategy to follow an analytical framework. The second level of transformation is “analysis” which addresses the identification of essential features and the systematic description or interrelationships among them—in short how things work (Wolcott, 1994). This level requires that there be systematic and careful attention to the data to identify key factors and relationships (Wolcott, 1994). Wolcott offers ten strategies for completing this level of transformation. For this level, the author used the PRECEDE component as analytical framework to guide the data collection. The third level of transformation is “interpretation” is designed to address questions of meanings and contexts to answer the questions, “How does it all mean?” “What is to be made of It
all?” It is important in this level that the links between the qualitative and descriptive inquiry and the interpretation are clear and relevant (Wolcott, 1994). Wolcott lists eleven ways to conduct interpretation and states that interpretation is where “the researcher transcends factual data and cautious analyses and begins to probe into what is to be made of them” (p. 36). For this purpose, the author followed to extend the analysis part as a strategy mentioned by Wolcott.

**Reliability and Validity of Focus Group**

Concern about reliability and validity apply to qualitative data, just as they do to quantitative data. According to the CDC guidelines to evaluate the effectiveness for preventing work injuries (2001c), there are ways to guard against bias: a) outlining explicit methods for data collection and data analysis; b) adhering to these methods; c) having more than one researcher collect data; d) having a second, non-biased person summarize and/or draw conclusions from the data; e) letting the data speak for themselves and not forcing them into a framework designed by the researcher. In qualitative research, the terms “internal validity, external validity, and reliability” are analogous to “credibility or trustworthiness, transferability or fittingness, and auditability or dependability” (Miles & Huberman, 1994; Lincoln & Guba, 1985). In order to strengthen internal validity the use of member checks to document group responses and then verify with group is suggested. The use of member checks is another step in the planning process to strengthen the credibility or trustworthiness of the data (Haiduven, 2000b). The purpose of the member checks is not only to test for factual and interpretative accuracy but also to provide evidence of credibility (Lincoln & Guba, 1985). To strengthen external validity some authors recommend: a) repeat focus groups;
b) validating findings with questionnaires of the target population; and c) conducting focus groups in different settings. To strengthen reliability it is important to: a) tape record the sessions; b) take detailed field notes; and c) conduct debriefing sessions. a) Tape recording sessions are a way to get useful information from the focus group. b) Take detailed field notes should capture information on any necessary changes in the list of questions, participant characteristics, descriptive phrases or words used by participants as they discuss the key questions, subthemes indicating a point of view held by participants with common characteristics, description of participant enthusiasm, consistency between participant comments and their reported behaviors, and body language (Morgan & Krueger, 1998); c) Debriefing sessions will be held immediately after the focus group by the researcher and assistant(s) to discuss impression, problems or possible modification that would be needed to be made in questions with the remaining groups. Also, this meeting would be important to share perceptions about points, notable quotes, and immediate reactions to the group that may later help in the analysis (Morgan & Krueger, 1998). The uses of field notes and debriefing sessions will be designed to strengthen both the credibility and dependability of the data (Haiduven, 2000b).

Can focus group results be generalized? Focus groups involve a limited number of people who may not be selected in a random manner; however, the concept of transferability can be used. This means that those who seek to use the results look over the study, examine procedures, methods and the analysis strategies and they decide the degree to which this might be applied to their situation. Transferability, according to Lincoln and Guba (1989), is parallel to the positivistic concept of generalizability, except
that it is the receiver (not the researcher) who decides if the results can be applied to the next situation.

Procedure for the Focus Group Sessions in the Study

The purpose of focus group as data collection technique was to obtain information about factors associated with recapping used needles as cause of needlesticks injuries in nurses. There were 120 participants in twelve (12) focus group conducted on working hours at the different departments and shifts (Tables 1 & 2). The meeting rooms for the sessions were located at each department. It was not possible to find a common place to conduct the sessions, because nursing staff had to be close to the job area. However, in general, the environment was comfortable in each department. The nursing staff was greeted at the door of the meeting room by the moderator (researcher) and the assistant moderator. Nurses were asked to read and sign a consent form and fill out the demographic questionnaire. The research team tried in each session to have a friendly, warm and comfortable environment. The focus group sessions were led by the moderator who was seated in front of the group and the research assistant was seated at the back side taking field notes and handling the recorder device. At the beginning the participants were asked to introduce themselves. After the last nurse presentation, the moderator read the introduction (Appendix D), presenting himself and the assistant moderator, explained the overview of the topic (research goals), the purpose of the focus group, and the ground rules for the activity and began with the first question.

The focus group sessions were audio-tape recorded and lasted two hours. At the conclusion of each focus group, the nurses were asked to verify the assistant moderator’s brief summary comments. The moderator asked for any explanation, modification or
corrections. After each session, debriefing sessions were held by the researcher and assistant to discuss impression, problems or possible modification to be made in questions with the remaining groups. Also, this meeting was important to share perceptions about points, notable quotes, and immediate reactions to the group that helped in the analysis (Morgan & Krueger, 1998). In order to show appreciation and make the atmosphere more comfortable refreshment was served in each focus group session. After each focus group, the researcher transcribed the audio tapes. The full-length transcripts and the field notes taken by the assistant moderator were used in the analysis process.

In this investigation, there were some actions taken to ensure that good quality data were collected such as: a) to minimize the problem of the moderator (researcher) bias in the questioning, focus group questions were designed collaboratively with a group of experts in the topic of recapping used needles and needlestick injuries as well the questions were built based on the previous information regarding health care workers work conditions at the Maracay Central Hospital during a survey done by the researcher in 2004; b) the questions were tested, with a group of professionals including the facilitator Dr. Richard Krueger during a focus group course at the USF during Spring 2006 to guarantee that questions were understood; (c) the dynamic of the focus group allowed to the investigator to listen carefully to nurses; d) the team observed how they answered and sought clarification on areas of ambiguity; e) at the conclusion of each focus group, the participants were asked to verify the team summary comments; and f) field notes sheets (Appendix E) were developed for the assistant in order to achieve reliability between the assistant and the moderator (researcher). In order to strengthen
internal validity, member checks were used to verify group responses. The member checks were conducted by the key informants who helped the researcher to find the nurse participants in each of the focus group sessions. The moderator developed a procedure for the member checks that were planned to be carried out with one member from each of the twelve (12) focus groups. The materials presented to the participants included a cover letter describing the purpose of the member check, a summary of the categorization schema (Appendix F) and three questions. Members were asked to provide an overall opinion regarding the believability of the findings and identify missing themes or additional items. In summary, the focus group sessions were conducted in a manner to ensure accuracy of the results.

According to experts in focus groups, there is a term called “saturation” which is used to describe the point when the researcher will have heard the range of ideas and is not getting new information (Kruger & Casey, 2000). Typically, the first two groups provide a considerable amount of new information but by the third or fourth session, a fair amount may have already been covered (CDC, Guidelines for evaluating the effectiveness of strategies for preventing work injuries, 2001c). In this study, the researcher intentionally worked with twelve (12) focus groups in order to hear the comments from the nurses in the different shifts in the same department selected (Table 2). Nevertheless, at the conclusion of the eight focus group session, it did not appear that any complement information regarding the factors surrounding recapping used needles and NSIS was gathered.
Study Phases

This study consisted of three phases: **diagnosis period, intervention period and, evaluation/ follow up period** (Appendix G). The duration of the study was 15 months (November 2006 to February 2008). **1.- Diagnosis period:** the duration of this phase was six (6) months (November 2006, April 2007). The purposes of this phase were: a) to collect data that was used as baseline for evaluation purpose (for instance, the number of recapping used needles was counted); b) to gain understanding about predisposing factors of knowledge, attitudes, beliefs, values, and perceptions of nurses that influence motivation for a behavior, in this case, about recapping used needles and needlestick injuries, work practices, culture of safety, policies, procedures and any education/training on needlestick injury prevention applied at the Maracay Central Hospital; c) to use the information obtained in a and b to develop an educational strategy.

**2.- Implementation/intervention period:** the duration of this phase was five (5) months (Jun–October 2007). In order to develop the educational strategy, the researcher used the information obtained from the the focus group sessions. The material prepared was related to information about epidemiology and transmission of bloodborne pathogens such as Hepatitis B, Hepatitis C and HIV; epidemiology of needlestick injuries, concepts and techniques of Standard Precautions (hand hygiene, the use of personal protective equipment, and the safe disposal of needles); and information about post exposure management. **3.- Evaluation/Follow up period:** the duration of this phase was of four (4) months (November 2007, February 2008). The objective of this phase was to evaluate the effectiveness of the educational strategy.
Setting of Intervention

The Maracay Central Hospital is a teaching university hospital located in Maracay the capital city of Aragua state (Chapter 3). This hospital was selected for this study for several reasons: a) it is the largest hospital in the state; b) it is the health care setting with the highest number of NSIS in the state (more than 140 in a year and more than five events every week); and c) the preliminary study of circumstances surrounding needllestick/sharp injuries among healthcare workers in a Venezuelan (Maracay Central Hospital) Public Hospital done by Galindez & Haiduven, 2004 showed a high percentage of recapping used needles according to the health care workers interviewed.

Four (4) hospital departments were used for the study. The departments were Adult Emergency Room, observation area with 38 nurses and 16 beds, Neonatology Intensive Care Unit (NICU) with 32 nurses and 12 incubators, Surgery wards with 28 nurses and 66 beds and Obstetrics wards with 36 nurses and 64 beds (Tables 3 & 4). The justification to select the departaments was based on the the data of needlestick injuries surveillance carried out by the Epidemiology office and accessibility to each department to collect the containers with used needles. The departments were comparable in the variable of study (number of recapping used needles). It is important to point out that the departments were similar, especially with respect to any variables that might affect the measured outcome (number of recapping used needles). In all selected departments measurements of number of recapping used needles were taken before, and after the educational strategy. A baseline time trend was first established by taking several outcome measurements before implementing the intervention (November 2006-February 2007). Similary, in order to establish a second time trend, several of the same
measurements were made after the intervention (November 2007-February 2008). The count process was carried out at the Heavy Metal Laboratory at the University of Carabobo. Data about hospital needlestick injuries surveillance reports were collected from the Epidemiology office. Recapping used needles rates/proportions, odd ratios and needlestick injuries rates results were the final outcome.

Data Collection Methods and Data Collection Instruments

Data collection methods and data collection instruments were structured according to the primary aims of the study:

1. To determine the factors surrounding recapping used needles as cause of needlestick injuries in nurses. To accomplish this objective the focus group sessions were used as data collection methods. These focus group sessions were applied in the first phase (diagnosis period). Data collection instruments: The two basic instruments used were a) focus group questions: a list of focus group questions (Appendix H) were designed to answer the research question about the factors related to recapping used needles in nurses in the Maracay Central Hospital. These questions were carefully prepared by the researcher with the help of Dr. Donna Haiduven and Dr. Richard Krueger who have experience in needlestick injuries and focus groups respectively. The purpose of the questions was the identification of circumstances regarding recapping used needles. According to Krueger and Casey (2000, p. 43), there are two different questioning strategies used by focus group moderators: topic guide and questioning route. The topic guide is like an outline with a list of topics or issues to be pursued in the focus group. By contrast, the questioning route is a sequence of questions in
complete, conversational sentences often used in academic environments (Krueger & Casey, 2000). Advantages of the questioning route over the general topic guide are increased confidence of the moderator, enhanced quality analysis by minimizing subtle differences in questions, and enhanced consistency of questions from one group to the other (Krueger, 1998). For this research, the questioning strategy selected was the questioning route (Opening, introductory, transition, keys and ending questions). Open-ended questions were used to allow the participants to determine the direction of the response (Krueger & Casey, 2000). The answer was not implied, and the type or manner of response was not suggested. Questions came from general to specific; the focus group began with general overview questions before to ask for more specific questions of critical interest and b) demographic questionnaire: (Appendix I), before the session started, nurses were asked to complete a short questionnaire. The purpose of this questionnaire was to get demographic, education and work information used in the analysis process.

2. To obtain reliable estimates of the incidence of needlestick injuries from needles and sharps to nurses working in four (4) departments at the Maracay Central Hospital. To complete this objective a data collection sheet (Appendix J) from the Maracay Central Hospital surveillance epidemiology report was used to get information about the data of the needlestick injuries. Additionally, the information for the years 2007, 2008 and 2009 was obtained from CORPOSALUD Occupational Safety and Health Department.
3. To obtain reliable estimates of the proportion of recapping used needles used by nurses working at the four (4) departments of the Maracay Central Hospital. To achieve this objective the researcher visited the selected departments twice a week in the morning to get the disposal containers with the used needles. In summary, there were 192 visits to the selected departments during the investigation (15 months) (Tables 5 & 6). Data collection instruments: data sheet of recapped used needles (Appendix K) was used to get the information about the number of recapped used needles at the selected departments.

4. To design the educational strategy based on the factors surrounding recapping used needles. To accomplish this objective the researcher identified the problem with the information obtained in the diagnosis phase. However, according to the literature about the topic and the results obtained in the voluntary survey applied by Galindez & Haiduven, (2004), this type of intervention was considered by health care workers one of the most appropriate to be used in this matter. The objectives of the educational strategy were to promote changes in knowledge, attitudes, and work practices regarding the avoidance of recapping used needles as a cause of needlestick injuries and acquisition of bloodborne pathogens. For example, it is important to promote campaigns that emphasize the disadvantage of recapping used needles and addressed employee misconceptions about knowledge, and training on safety issues in recapping used needles and needlestick injuries prevention.

5. To apply the educational strategy. The intervention phase was organized with the information obtained in the previous phase (focus group sessions). This
educational strategy involved 144 nursing staff from four (4) Maracay Central Hospital departments (Table 7). Twelve (12) separate meetings were applied during the intervention period (Table 8). The educational strategy was conducted in sessions of two hours of duration at the same places where the focus group sessions were performed. The objectives of these meeting were: a) to provide knowledge and to encourage safe nursing practices for the prevention of recapping used needles and consequently to avoid needlestick injuries; b) to discuss information about epidemiology and transmission of bloodborne pathogens such as Hepatitis B, Hepatitis C and HIV; c) to update concepts and techniques of Standard Precautions (hand hygiene, the use of personal protective equipment, and the safe disposal of needles); and d) to discuss information about post exposure management and the most appropriate prevention measure to prevent needlestick injuries. With the information obtained in the focus group sessions, the author prepared and distributed to each participant an envelope containing material which included a main pamphlet (Appendix L), the Act and the Regulation on Prevention, Conditions and Working Environment Act (Appendix M), a guide with articles of the law discussed (Appendix N), American Nurses Association guidelines to follow after needlestick injuries (Appendix O) and material from the National Institute for Prevention, Health and Safety at Work (INPSASEL) regarding the functions of delegate of prevention as promoter of health and safety at work sites (Appendix P) and a pamphlet of the Center for Workers with Disabilities (Appendix P). It is important to emphasize that the brochure (Appendix L) provided to each participant was also sent to colleagues.
that were unable to attend, due to departmental duties, in order to communicate this information. At the beginning of the meeting, a pretest (Appendix Q) was given to each nursing staff in order to measure the degree of knowledge on issues relating to bloodborne pathogens agents, needlestick injuries, and legal issues. At the end of the meeting, the same test (Appendix Q) was applied to measure if the acquisition of knowledge increased.

6. To evaluate the effectiveness of the educational strategy. To achieve this objective, the researcher compared the number of recapped used needles obtained during the two phases (first and third). The researcher applied the same methodology used during the first phase in order to obtain the number of recapped used needles. In summary, there was total of 24 visits in each department for a total of 96 visits in the study period (Table 7). Data collection instruments: a data collection sheet (Appendix K) was used to get the information about the number of recapped used needles at the selected departments. After the needles were collected at the MCH, the researcher and the assistants brought the boxes or plastic bottles to the Heavy Metal Laboratory at the University of Carabobo, placed them in a big refrigerator to avoid blood decomposition. Fridays and Saturdays were the days used to count the needles. In order to avoid injuries the researcher wore personal protective equipment (gloves, masks and gridders). The needles were separated into two groups (recapped needles and not recapped needles) and then were counted. The results were incorporated to an Excel sheet. When the process was done the material was discharged into a plastic bottle and it was sent to the hospital incinerator.
7. To report to the nurses, hospital and health authorities the results and suggest modifications regarding safety work practices. To accomplish this objective the researcher had meetings with the hospital and regional authorities in order to discuss and analyze the preliminary results and the corrective measures to be taken.

Data Analysis Methods

In this study, for qualitative information, the analysis process was conducted according to the strategies and methodology used by experts in this type of research as well as to the material reviewed about focus group analysis (Chapter 4). Data from the transcripts were analyzed doing a process entitled “transformation” (Wolcott, 1994) (Chapter 5).

The PRECEDE component of PRECEDE/PROCEED Model PPM (Chapter 5) was used to analyze the factors of the description and categorization part developed in the first level of Wolcott’s methodology. This provided a framework to understand factors or circumstances surrounding nurses’ safety practices specifically related to recapping used needles.

For the quantitative information, descriptive statistics were used to represent the demographic and work related variables from the demographic data sheet. Frequencies, rates and proportions were calculated using Epi Info version 3.4.3 (November 2007). It was also used to calculate 95% confidence intervals around proportions. Also the t-student test was applied to measure the impact of the educational strategy. For the recapped used needles proportion, the numerator was the total number of recapped used needles obtained from the selected departments and the denominator was the number of
total used needles placed in the disposal container during the three months previous and posterior the educational strategy. The rate of needlestick injuries by hospital occupied beds was calculated using a numerator, the number of events of needlestick injuries reported for all health care workers and nurses obtained in a year in the hospital from 2003 to 2009. The denominator was the total number of occupied hospital beds (470) multiplied by 100. For the departments studied other rate was calculated using all the number of events reported in the all four departments and the denominator was the total number of occupied departments beds (158) multiplied by 100. Because the data were complete for 2007 and 2008, these were the years used. Also, odd ratios and proportions of number of not recapped needles were applied.

Target Population/ Study Sample/Sample size

The target population for this study is all nurses who work in healthcare in Venezuela. Study sample: Nurses were the group selected as healthcare workers, because they are the biggest group in the Maracay Central Hospital, Aragua, Venezuela (62% of the hospital healthcare workers workforce), and according to the literature is the group around the world with the highest risk of needlestick injuries. The researcher used the administrative denomination used by Venezuelan hospitals. Graduate Nurses are the personnel who were attended in a training school (National School of Nurses) during 3 years; this program was operating until 1970s; and the Licensed Nurses who are currently trained at the university level in 5 year programs. The Nurses aids are personnel who help the professionals’ nurses to do some specific duties especially with patient care, such as (feed, bathe, dress, move patients, or change linens). This type of program was revoked by the Ministry of Health and Social Development; nevertheless private organizations
exist that prepare this type of resource in a time that varies between six months and one year (PAHO, 2004). The last group was nursing students who are not hospital employees but are receiving training at the hospital and are exposed to needlestick injuries; in fact, according with the hospital needlestick surveillance report this group has high number of injuries (Maracay Central Hospital Needlestick Injuries Surveillance, 2003, 2004, 2005). All nurses (women and men) from the four selected departments from the Maracay Central Hospital who have the potential to be exposed to needlestick injuries and who were interested in participating in the study were included. Sample size: for the focus group sessions, there were 120 participants from the four (4) departments. In each group there were approximately 8 to 12 nurses in attendance. A convenience sample (purposeful sampling) of nurses was used from each department involved in the study. The percentage of nurses participating in the focus group sessions was 86% (120/141) of the total of nurses working in the four departments (Table 3).

Inclusion/Exclusion Criteria

All nurses from the four (4) selected departments who are exposed to needlestick injuries and who were interested in participating in the study were included. Exclusion criteria: there were not exclusion criteria.

Recruitment of Subjects

The researcher used a person in each of the selected departments to serve as the contact person (key informant) for interested participants, maintain a list of potential subjects, and who scheduled a date and time for the focus group sessions with the researcher. The contact person was requested to attempt to recruit up to 12 persons for the focus group sessions. This allowed for up to 4 drop-outs and still has 8 focus group members. Each of
these people received a date and time for the focus group sessions with the researcher. The contact in each facility was the intermediary to recruit participants. The researcher did not know the identity of the participants until the focus group sessions. The nurses were informed that participation in the investigation was strictly voluntary and that refusal would not affect their employment status. For the educational meeting a general invitation to the all nurses’ personnel in each department was provided.

Ethical Considerations

An informed consent process was carried out before the study began. For that reason, this investigation on human subjects was submitted for the Institutional Review Board of the USF for evaluation. On December 7th 2005, the principal investigator (PI) received the approval letter from the USF-IRB to conduct the investigation under the number 10.4241 (Appendix R). The informed consent forms in English and Spanish were approved (Appendix S). In both, the most important aspect was that the participation in this study was voluntary; no one under any circumstances was obligated to take part in the study. Nurses were informed that they could withdraw from the study at any time and that declining to participate or withdrawing from the study not result in any penalty or loss of benefits. The strategies used to protect the privacy of participants included: no identification of subjects, data kept in locked file cabinets, limiting access to the research data, and assuring that individual subjects could not be identified in any step of the research. All records and written communications from individuals were secured in the office of the PI and were not available for public or unauthorized access. No names were written on sheets or associated with any response. Responses were transcribed into a computer file. Both the paper sheets and the computer file were kept in a locked area
accessible only to relevant study personnel. Only summary reports of data were produced. There were no attempts to link responses to individual focus group participants or questionnaires in any summary reports. No identifying information was divulged in any summary reports of the study findings.

Table 1

*Number of Nurses in the Focus Group Sessions Distributed by Departments and Shifts, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/Shifts</th>
<th>7 am–1 pm</th>
<th>1 pm-7 pm</th>
<th>7 pm-7 pm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td>NICU</td>
<td>10</td>
<td>11</td>
<td>10</td>
<td>31</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>08</td>
<td>09</td>
<td>09</td>
<td>26</td>
</tr>
<tr>
<td>Obstetrics wards</td>
<td>12</td>
<td>08</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
<td><strong>38</strong></td>
<td><strong>40</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

*Note: Focus group sessions*

Table 2

*Number of Focus Group Sessions Distributed by Departments and Shifts, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/Shifts</th>
<th>7 am -1 pm</th>
<th>1 pm-7 pm</th>
<th>7 pm-7 pm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>NICU</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Obstetrics wards</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

*Note: Focus group sessions*
Table 3

*Number and Percentage of Total Nurses of the Departments Studied and Nurses Participants in the Focus Group Sessions, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/Nurses</th>
<th>Total Nurses in the departments</th>
<th># of focus group participants</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>8</td>
<td>32</td>
<td>84</td>
</tr>
<tr>
<td>NICU</td>
<td>39</td>
<td>31</td>
<td>79</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>28</td>
<td>26</td>
<td>93</td>
</tr>
<tr>
<td>Obstetrics wards</td>
<td>36</td>
<td>31</td>
<td>86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>141</strong></td>
<td><strong>120</strong></td>
<td><strong>86</strong></td>
</tr>
</tbody>
</table>

*Note.* Hospital Nurses’ Office

Table 4

*Number of Beds of the Departments Studied, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/Beds</th>
<th>Number of beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>16</td>
</tr>
<tr>
<td>NICU</td>
<td>12</td>
</tr>
<tr>
<td>Surgery ward</td>
<td>66</td>
</tr>
<tr>
<td>Obstetrics ward</td>
<td>64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>158</strong></td>
</tr>
</tbody>
</table>

*Note.* Hospital Nurses’ Office
### Table 5

**Number of Visits to Each Department to Collect Used Needles Distributed by Months and Weeks Before the Educational Strategy, MCH, Maracay, 2006-2008.**

<table>
<thead>
<tr>
<th>Months/weeks/Departments</th>
<th>Adult Emergency room</th>
<th>NICU</th>
<th>Surgery wards</th>
<th>Obstetrics wards</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov1 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov2 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov3 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov4 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Dic1 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Dic2 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan1 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan2 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan3 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan4 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Feb1 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Feb2 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>96</strong></td>
</tr>
</tbody>
</table>

*Note.* Researcher report

### Table 6

**Number of Visits to Each Department to Collect Used Needles Distributed by Months and Weeks After the Educational Strategy, MCH, Maracay, 2006-2008.**

<table>
<thead>
<tr>
<th>Months/weeks/Departments</th>
<th>Adult Emergency room</th>
<th>NICU</th>
<th>Surgery wards</th>
<th>Obstetrics wards</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov1 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov2 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov3 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Nov4 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Dic1 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Dic2 2007</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan1 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan2 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan3 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Jan4 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Feb1 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Feb2 2008</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
<td><strong>96</strong></td>
</tr>
</tbody>
</table>

*Note.* Researcher report
Table 7

**Number of Participants in the Educational Strategy Sessions Distributed by Departments and by Shifts, MCH, Maracay, 2006-2008**

<table>
<thead>
<tr>
<th>Departments/Shifts</th>
<th>7 am -1 pm</th>
<th>1 pm-7 pm</th>
<th>7 pm-7 pm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>NICU</td>
<td>11</td>
<td>13</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>Surgery ward</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>34</td>
</tr>
<tr>
<td>Obstetrics ward</td>
<td>14</td>
<td>10</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47</strong></td>
<td><strong>46</strong></td>
<td><strong>51</strong></td>
<td><strong>144</strong></td>
</tr>
</tbody>
</table>

*Note*: Educational strategy sessions

Table 8

**Number of Educational Strategy Sessions Distributed by Departments and Shifts, MCH, Maracay, 2006-2008.**

<table>
<thead>
<tr>
<th>Departments/Shifts</th>
<th>7 am -1 pm</th>
<th>1 pm-7 pm</th>
<th>7 pm-7 pm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Emergency room</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>NICU</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Surgery ward</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Obstetrics ward</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

*Note*: Educational strategy sessions

Table 9

**Age, Experience in Profession and Experience of Nurses, According Other Sources, MCH, Maracay, 2006-2008.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>MCH data*</th>
<th>Galindez data**</th>
<th>Nurses 2007***</th>
<th>Nurses 2008****</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>36</td>
<td>37</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Experience in profession (years)</td>
<td>12</td>
<td>14</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Experience at hospital (years)</td>
<td>15</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
</tbody>
</table>

*Note*: * Hospital Nurses’ Office. ** Field experience 2004. *** CORPOSALUD report. **CORPOSALUD report
CHAPTER SIX: RESULTS

This part was divided in two sections. The first one is the presentation of the quantitative findings obtained from the questionnaire applied in the focus group sessions, the information about the number of the needles collected in each of the four departments before and after the educational strategy, the information related to needlestick injuries obtained from the hospital surveillance report, the data collected from the pretest and posttest applied in the educational strategy, and the information about needlestick injuries in the Maracay Central Hospital. In the second one, the qualitative results were developed using the Wolcott and the PPM methodologies (Chapters 4 & 5).

Quantitative Results

Table 10 provides the demographic data information collected in the questionnaire applied to the study sample at the Maracay Central Hospital (MCH). Of the 120 nurses who were participating in the focus group sessions, female nurses predominated with 106 (88%) and 14 (12%) male. According to educational level one hundred and thirty (94%) of nurses had a university/college level, and only seven (6%) had elementary or middle educational level. In relation to job position in the hospital, 81 (67%) of nurses were graduates personnel, 26 (22%) aid nurses and 13 (11%) students in the last year of nurses’ school. According to unit or department 32 (27%) of the respondents were working in the Adult Emergency Room (AER), 31 (26%) in the Neonatology Intensive Care Unit (NICU) and Obstetrics wards, and 26 (21%) in the Surgical wards. In Venezuela hospital nurses work in three shifts. In the sample, 42 (35%) were working at
the first shift (7am.-1p.m.), 38 (32%) were working in the second shift (1pm-7pm.) and 40 (33%) in the third shifts (7pm-7am.). It is important to point out that thirty four (28%) of nurses reported to work in more than one shift.

Table 10

Variables of the Focus Group Participants at MCH, Maracay, 2006-2008.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>106</td>
<td>88</td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Educational Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University/College</td>
<td>113</td>
<td>94</td>
</tr>
<tr>
<td>Others</td>
<td>07</td>
<td>06</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Job position</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Nurses</td>
<td>81</td>
<td>67</td>
</tr>
<tr>
<td>Nurses Aids</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>Nursing Students</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Unit or department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult Emergency room</td>
<td>32</td>
<td>27</td>
</tr>
<tr>
<td>NICU</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Obstetrics wards</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Shifts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 a.m. - 1 p.m.</td>
<td>42</td>
<td>35</td>
</tr>
<tr>
<td>1 p.m. - 7 p.m.</td>
<td>38</td>
<td>32</td>
</tr>
<tr>
<td>7 p.m. - 7 a.m.</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Work in another institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>105</td>
<td>87</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

Note. Questionnaire applied in the focus group sessions
For the question asking if they were working in other institutions 105 (87%) reported that they did not. From this information it appears that the majority of nurses do not work in other institutions but remains in the same hospital working in different shifts.

Table 11 provides information regarding the antecedent of a needlestick injury in the last year, only 35/120 (29%) responded affirmatively. Concerning the question if the needlestick injuries were reported, all 35 nurses (100%) reported the accident at the time.

Table 11

*Antecedents of Exposure of the Focus Group Participants at MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the past year have been stuck with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>used needles?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>85</td>
<td>71</td>
</tr>
<tr>
<td>Yes</td>
<td>35</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100</td>
</tr>
</tbody>
</table>

If your answer about NSIS was yes, how many times?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27</td>
<td>78</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* Questionnaire applied in the focus group sessions

The mean age of nurses in the sample was 36.29 years. The age range was 21-56 years. The mean number of years of nursing experience was 13.68. The mean number of years of experience in the hospital was 12.50 years and the mean number of years in the position was 9.59. The mean number of hours worked daily was 11.01 and the mean number of hours worked weekly was 48.63 (Table 12).
Table 12

Age, Experience in Profession, Experience at Hospital, Experience in Position, Daily and Weekly Work Hours of the Focus Group Participants, MCH, Maracay, 2006-2008.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>36.29</td>
<td>10.05</td>
</tr>
<tr>
<td>Experience in profession</td>
<td>13.68</td>
<td>10.24</td>
</tr>
<tr>
<td>Experience at hospital</td>
<td>12.50</td>
<td>9.61</td>
</tr>
<tr>
<td>Experience in position</td>
<td>9.59</td>
<td>8.58</td>
</tr>
<tr>
<td>Daily work hours</td>
<td>11.01</td>
<td>4.6</td>
</tr>
<tr>
<td>Weekly work hours</td>
<td>48.63</td>
<td>17.88</td>
</tr>
</tbody>
</table>

Note. Questionnaire applied to focus group participants

Table 13 provides information about the number of needles discarded for all four departments of the hospital before and after the educational strategy. Of the 33015 needles collected before the education strategy, 7772 (24%) were not recapped in contrast with 33267 needles collected after the education strategy, 13245 (40%) were not recapped. The difference of 16% was statistically significant (< 0.005).

Table 13

Number of Needles at all Four Departments Studied Before and After Educational Strategy, MCH, Maracay, 2006-2008.

<table>
<thead>
<tr>
<th>Needles</th>
<th>Before strategy</th>
<th>After strategy</th>
<th>Difference</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total needles</td>
<td>33015</td>
<td>33267</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recapped needles</td>
<td>25243</td>
<td>20022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No recapped needles</td>
<td>7772</td>
<td>13245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of no recapped needles</td>
<td>24</td>
<td>40</td>
<td>16</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

Note. Data sheet of used needles. * p < 0.005

Table 14 shows the number of needles discarded discriminated by departments before and after the educational strategy. The Obstetrics wards presented the highest percentage with 23% of no recapped needles after the intervention, followed by NICU, AER and
Surgery wards departments with 18%, 14% and 10% respectively. P-values in all departments showed statistical significance.

Table 14

*Number and Percentage of Needles Counted by Departments Studied Before and After Educational Strategy, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/Needles</th>
<th>Before strategy</th>
<th>After strategy</th>
<th>Differences %</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetrics. Total needles</td>
<td>8875</td>
<td>8858</td>
<td>23</td>
<td>0.001*</td>
</tr>
<tr>
<td>Recapped needles</td>
<td>5665</td>
<td>3678</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No recapped needles</td>
<td>3210</td>
<td>5180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of no recapped needles</td>
<td>36</td>
<td>59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| NICU. Total needles       | 8080            | 8087           | 18            | 0.001*  |
| Recapped needles          | 6439            | 5033           |               |         |
| No recapped needles       | 1641            | 3054           |               |         |
| % of no recapped needles  | 20              | 38             |               |         |

| AER. Total needles        | 8183            | 8198           | 14            | 0.0001* |
| Recapped needles          | 6668            | 5494           |               |         |
| No recapped needles       | 1515            | 2704           |               |         |
| % of no recapped needles  | 19              | 33             |               |         |

| Surgery. Total needles    | 7877            | 8124           | 10            | 0.001*  |
| Recapped needles          | 6471            | 5817           |               |         |
| No recapped needles       | 1406            | 2307           |               |         |
| % of no recapped needles  | 18              | 28             |               |         |

*Note.* Data sheet of used needles report. * p < 0.005

Table 15 provides the information of the percentages of needles not recapped by departments and by months after the educational strategy. Except for the Obstetrics wards, in all the departments studied the percentage of needles not recapped decreased slightly in the last month of collection.
Table 15

Percentages of Needles Not Recapped by Departments Studied and by Months After the Educational Strategy  
*MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments/months</th>
<th>After educational strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetrics wards</td>
<td>59</td>
</tr>
<tr>
<td>NICU</td>
<td>39</td>
</tr>
<tr>
<td>AER</td>
<td>33</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>30</td>
</tr>
</tbody>
</table>

*Note.* Data sheet of used needles report.

Table 16 indicates the odd ratios (OR) at all four hospital departments were less than 1, indicating a protective effect, demonstrating that the educational strategy was associated with less recapped needles. For all four departments together the OR was 0.47, which means that the educational strategy increased the likelihood of not recapping used needles by 53%. The odds ratio discriminated by each departments also was less than 1 (protective effect), noting that in the Obstetrics wards the OR was 0.40, meaning that the educational strategy increased the likelihood of not recapping used needles by 60%. This department had the most successful response to the intervention, followed by the NICU and Adult Emergency Room (Observation area) departments with an OR of 0.42 and 0.46 respectively. The Surgery wards had the highest OR (0.55) but still showed a protective effect (<1).
Table 16

*O.R. of Needles Recapped Counted by Departments Studied Before and After the Educational Strategy, MCH, Maracay, 2006-2008.*

<table>
<thead>
<tr>
<th>Departments</th>
<th>OR</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All departments</td>
<td>0.47</td>
<td>(0.45, 0.48)</td>
</tr>
<tr>
<td>Obstetrics wards</td>
<td>0.40</td>
<td>(0.39, 0.45)</td>
</tr>
<tr>
<td>NICU</td>
<td>0.42</td>
<td>(0.41, 0.49)</td>
</tr>
<tr>
<td>Emergency room</td>
<td>0.46</td>
<td>(0.43, 0.50)</td>
</tr>
<tr>
<td>Surgery wards</td>
<td>0.55</td>
<td>(0.51, 0.59)</td>
</tr>
</tbody>
</table>

*Note. Data sheet of used needles report*

Table 17 shows that there were only 3 questions in the pretest with a percentage of corrects answer above 50%, corresponding to the questions: needlestick accident as hazards or risk (1); ways to get Hepatitis B (4); and recapping as routine procedure (7). The other questions showed percentages of correct answers between 8% and 44%. The question No.2 that was related to the transmission of Hepatitis B, C and HIV only 8% answered correctly on the pretest. In summary, the range for the correct answers in the pretest was 8%-100%. The posttest was applied after the educational strategy and the results improved, presenting a positive change between 9% and 59% (difference between percentage of correct answers in the pretest and posttest). The range for the correct answers in the posttest was 63%-100%.

When a t-student test was applied to observe if the variation of percentage of correct answers before and after the test (pre and post) had a statistical significance, the questions (2, 3, 5 and 6) showed statically significance (p<0.005), and three questions (1, 4 and 7) were not.

It is important to note that the question No. 7 regarding if the recapping used needles is an important cause of NSIS, the number of correct answers did not significantly increase after the education strategy.
The questions 9, 10 and 11 (**) were regarding the nurses’ knowledge about Occupational Law, National Institute for Prevention and the existence of the hospital committee for health and safe prevention. The majority of nurses did not have information about those issues. It is important to notice that these questions were not applied in the posttest because were used only to get information about occupational and safety issues.

Table 17


<table>
<thead>
<tr>
<th>Questions</th>
<th>Pre-test Correct %</th>
<th>Post-test Correct %</th>
<th>Dif.</th>
<th>t-test p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Needlestick accidents are very important risks because their consequences could be severe for the health care worker health</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>&gt; 0.005</td>
</tr>
<tr>
<td>2. Which of these viruses are easily transmitted after exposure to contaminated blood</td>
<td>8</td>
<td>67</td>
<td>+ 59</td>
<td>&lt; 0.005*</td>
</tr>
<tr>
<td>3. Which is the global percentage of underreport needlestick injuries</td>
<td>36</td>
<td>87</td>
<td>+ 51</td>
<td>&lt; 0.005*</td>
</tr>
<tr>
<td>4. It is possible to get Hepatitis B through casual contact such as hugging or shaking hands</td>
<td>78</td>
<td>87</td>
<td>+ 09</td>
<td>&gt; 0.005</td>
</tr>
<tr>
<td>5. The Hepatitis B can cause liver cancer</td>
<td>44</td>
<td>70</td>
<td>+ 26</td>
<td>&lt; 0.005*</td>
</tr>
<tr>
<td>6. Effectiveness of Hepatitis B vaccine in preventing Hepatitis B virus in nursing staff</td>
<td>29</td>
<td>87</td>
<td>+ 59</td>
<td>&lt; 0.005*</td>
</tr>
<tr>
<td>7. Recapping used needles is an important cause of NSIS</td>
<td>54</td>
<td>63</td>
<td>+ 09</td>
<td>&gt; 0.005</td>
</tr>
<tr>
<td>8. Among the reasons for the underreporting of needlestick accidents are...</td>
<td>38</td>
<td>70</td>
<td>+ 32</td>
<td>&lt; 0.005*</td>
</tr>
<tr>
<td>9. Do you know about the Organic Law of Prevention, Conditions and Environment at Workplace?</td>
<td>10</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>10. Do you know about the National Institute for Prevention, Health and Safety at Work?</td>
<td>22</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>11. Do you know about the existence of the Committee on Occupational Health and Safety in the hospital?</td>
<td>36</td>
<td>**</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

Note. Pretest and posttest applied *statistically significant. ** No applied in the posttest
Table 18 shows that only 55 (38%) of nurses staff who attended the meeting of the educational strategy had completed the 3 dose Hepatitis B vaccine schedule in contrast with 81 (44%) who only had only completed the first and second doses. Additionally, it is important to note that 26 (18%) answered no to that question, suggesting that nursing staff had not completed any immunization doses. It is important to point out that persons require the three doses of vaccine to obtain immunological protection.

Table 18


<table>
<thead>
<tr>
<th>Doses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>First dose</td>
<td>37</td>
<td>26</td>
</tr>
<tr>
<td>Second dose</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Third dose</td>
<td>55</td>
<td>38</td>
</tr>
<tr>
<td>No doses</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
<td>100</td>
</tr>
</tbody>
</table>

Note. Pre-test applied.

Table 19 shows the number of needlestick injuries in the healthcare workers population at the MCH from 2004 to 2009. The total of NSIS had a range between 101 and 130 for the six years reported. The highest value was obtained in 2007 with 130 and the lowest in 2006 with 101 NSIS. In 2009, 75 NSIS have been reported through Jun. It is important to highlight that the researcher only received the data from CORPOSALUD Occupational Safety and Health Department for the years 2007 and 2008 that allowed it to obtain information from the departments studied, for the other years the information from these departments was missing. Of all the needlestick injuries reported in the MCH, the departments studied accounted for 44% (46/104) for 2004. For the year 2007 the
percentage was 64% (83/130) and for the year 2008 the percentage increased to 76% (84/111).

Table 19

Needlestick Injuries by Years at MCH, Maracay, 2004-2009.

<table>
<thead>
<tr>
<th>Years</th>
<th>N</th>
<th>Departments Studied</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>104</td>
<td>46</td>
</tr>
<tr>
<td>2005</td>
<td>113</td>
<td>ND</td>
</tr>
<tr>
<td>2006</td>
<td>101</td>
<td>ND</td>
</tr>
<tr>
<td>2007</td>
<td>130</td>
<td>83</td>
</tr>
<tr>
<td>2008</td>
<td>111</td>
<td>84</td>
</tr>
<tr>
<td>2009</td>
<td>75*</td>
<td>ND</td>
</tr>
</tbody>
</table>

Note. Hospital Surveillance Program and CORPOSALUD data. * Data available until Jun 2009. ND = no data available

Table 20 provides information about the percentage of nurses with NSIS which was stable around 37% until 2007 where the percentage diminished to 30%. In 2008, the percentage increased to a 37%. The nursing students’ percentage was increasing gradually in the five years from 11% in 2004, 19% in 2005, 18% in 2006 to 16% in 2007 and 17% in 2008. Nurses and nursing students represented 48%, 57%, and 54% of NSIS respectively until 2006. For 2007 and 2008, both groups sustained 120 NSIS representing 46% and 54% of needlestick injuries occurring in all health care workers from MCH.

Table 20

Number and Percentage of Needlestick Injuries Distributed by Nurses, Nursing Students and Other Health Care Workers by Years, at MCH, Maracay, 2004-2008.

<table>
<thead>
<tr>
<th>HCWs/Years</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Nurses</td>
<td>38</td>
<td>37</td>
<td>43</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>Nursing students</td>
<td>12</td>
<td>11</td>
<td>21</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>Other personnel</td>
<td>54</td>
<td>52</td>
<td>49</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td>100</td>
<td>113</td>
<td>100</td>
<td>101</td>
</tr>
</tbody>
</table>

Note. Hospital surveillance program and CORPOSALUD data
In Table 21 there is the information about the number of needlestick injuries in nurses from the departments studied versus departments not studied at the Maracay Central Hospital. For the year 2007, of the 60 nurses and nursing students with NSIS 45% (27/60) came from the departments studied and the 55% (33/60) came from other departments. For 2008, of the 60 nurses and nursing students with NSIS 43% (26/60) came from the departments studied while 57% (34/60) was not.

Table 21

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>%</th>
<th>2008</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses from departments studied</td>
<td>27</td>
<td>45</td>
<td>26</td>
<td>43</td>
</tr>
<tr>
<td>Nurses from other departments not studied</td>
<td>33</td>
<td>55</td>
<td>34</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* Hospital surveillance program and CORPOSALUD data

Table 22 shows the numbers of NSIS sustained by nurses from each of the departments studied and other departments not studied for 2007 and 2008. For both years, of the 120 NSIS reported, 67% (80/120) were from nurses and 33% (40/120) were nursing students. When comparing the departments participating in the study and other departments not studied, 44% (53/120) of NSIS came from departments studied and 56% (67/120) from other units. Of those nurses and nursing students from the departments studied (27+26=53), nurses represented 28% (34/120) and nursing students had 16% (19/120). In the departments studied, the AER had the highest percentage of NSIS with 26% (31/120), follow by Obstetrics wards with 10% (12/120), Surgery wards with 6% (7/120) and NICU with 2.5% (3/120). In all the departments studied nurses had the highest percentage of NSIS. In ER was 16% (19/120), 7% (8/120) in Obstetrics wards, 6%
(7/120) in Surgery wards and 2.5% (3/120) in NICU. However, nursing students also had high percentage of NSIS in the AER with 10% (12/120).

Table 22

Number of Needlestick Injuries in Nurses and Nursing Students from Each of the Departments Studied Versus Those Departments Not Included in the Study at MCH, 2007 and 2008.

<table>
<thead>
<tr>
<th>Nurses</th>
<th>ER</th>
<th>OBST</th>
<th>NIUC</th>
<th>SURG</th>
<th>Total number of nurses of departments studied</th>
<th>Total number of nurses of departments not included in the study</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
<td>19</td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>34</td>
<td>46</td>
<td>80</td>
</tr>
<tr>
<td>Nursing Students</td>
<td>12</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>19</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>12</td>
<td>3</td>
<td>7</td>
<td>53</td>
<td>67</td>
<td>120</td>
</tr>
</tbody>
</table>

Note. Hospital surveillance program and CORPOSALUD data

Regarding the rates of needlestick injuries and occupied beds, Table No. 23 shows that for 2004 there was a rate of 22 NSIS per 100 occupied beds. For the next two years, the rates were 24 and 21 respectively. The rate had an increase to 28 in 2007 and a decrease to 24 in 2008. The rate for 2009 is 16 NSIS per 100 occupied hospital beds but the report is only to Jun 2009.

Table 23

Rates of Needlestick Injuries per Occupied Hospital Beds, MCH, Maracay, 2004-2008.

<table>
<thead>
<tr>
<th>Years</th>
<th>Rates**</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>22</td>
</tr>
<tr>
<td>2005</td>
<td>24</td>
</tr>
<tr>
<td>2006</td>
<td>21</td>
</tr>
<tr>
<td>2007</td>
<td>28</td>
</tr>
<tr>
<td>2008</td>
<td>24</td>
</tr>
<tr>
<td>2009*</td>
<td>16</td>
</tr>
</tbody>
</table>

Note. Hospital surveillance program and CORPOSALUD data. *until Jun ** Rate = Number of NSIS/ 470 occupied hospital beds x 100
Table 24 shows the rates of needlestick injuries reported by other health care workers, nurses from other units and nurses from the departments studied by occupied hospital beds in 2007 and 2008. All rates were similar for both years, except the rate of NSIS in other health care workers that decreased from 15 NSIS per 100 hospitals occupied beds in 2007 to 11 NSI per 100 hospital occupied beds in 2008.

Table 24

Rates of Needlestick Injuries in Other Health Care Workers, Nurses from Other Units and Nurses from the Departments Studied by Occupied Hospital Beds in 2007 and 2008, MCH, Maracay, 2006-2008.

<table>
<thead>
<tr>
<th>Rates* of NSIS in hospital/years</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates of NSIS in other HCWs</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Rates of NSIS in nurses</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Rates of NSIS in nurses from departments studied</td>
<td>5.7</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Note. Hospital surveillance program and CORPOSALUD data
*Rates = Number of NSIS/ 470 hospital occupied beds x 100

When the denominator of the occupied hospital beds is the number of beds (158) of the departments participating in the study (Table 4), the rates of NSIS are 17 and 16 NSIS per 100 occupied departments beds respectively (Table 25).

Table 25

Rates of Needlestick Injuries in Nurses from the Departments Studied by Occupied Departments Beds in 2007 and 2008, MCH, Maracay, 2006-2008.

<table>
<thead>
<tr>
<th>NSIS /Years</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rates of in nurses from departments studied</td>
<td>17</td>
<td>16</td>
</tr>
</tbody>
</table>

Note. Hospital surveillance program and CORPOSALUD data
* Rate = Number of NSIS/ 158 occupied departments beds x 100
Qualitative Findings

In this part the first level “description and categorization” of Wolcott’s methodology (Wolcott, 1994) was used (Chapter 5).

*First Level: Description and Categorization*

This part begins with a description and categorization of the findings from the focus group questions, using examples to illustrate themes. The themes that emerged from focus group information were: a) Circumstances related to recapping of used needles and needlestick injuries. b) Perception of nurses about needlestick injuries, and c) Needlestick injury prevention strategies.

*Circumstances Related to Recapping of Used Needles and Needlestick Injuries*

Nursing staff were asked to describe circumstances or procedures related to recapping used needles and needlestick injuries. According to nurses there were several factors or conditions that were identified to contribute to needlestick injuries and promote recapping procedures. Regarding the causes of needlestick injuries, nurses mentioned that this situation occurs due to the high demands of work, multitasking and excessive pressure. “Sometimes the service collapses and in order to fulfill the patients’ expectations we accelerate the speed of the work and as a result the risk of needlestick injuries increases.” “The stress, patients’ overcrowding, the patients’ family exigencies and their disagreement with the quality of service, play a role in our accidents.” “This is terrible, it is like a war, we do our best under poor work conditions, here we work under the vineyard of God.”

Among the factors associated with recapping, nurses said that this procedure was applied as a preventive measure to avoid needlestick injuries on nursing staff and other
health care workers, such as hospital cleaning and maintenance personnel who handle the waste without adequate information or without appropriate personal protective equipment (PPE). Another influencing factor of the recapping was associated with the absence of availability of appropriate sharps containers in the hospital. "There are opportunities where we have to recap because we do not have the sharp container available and at the same time we can not release such quantities of needles on a tray because we have more risk." “We recap to protect the hospital’s cleaning and maintenance staff.” "One feels that recapping is a safe way to avoid needlestick injuries.” "I do it because it is easy and fast.” “I recapped used needles until I got a needlestick injury.” “I never recap because I have seen many nurses get needlestick injuries.”

In order to amplify the previous information, the researcher developed two subthemes to provide an expanded description of these circumstances. The subthemes were: A) Environmental factors, and B) Hospital policies or guidelines to prevent needlestick injuries.

The environmental factors were subdivided in a1) Physical conditions and a2) Organizational climate factors.

a1) Physical conditions: Nurses described the hospital working conditions as characterized by many environmental constraints and deficits. There were several conditions mentioned as problems that might affect the procedures that needed to be performed. Nurses related various situations such as poor lighting, inadequate or absence of handwashing facilities, and unsanitary conditions.

Poor lighting is a problem that affects several hospital areas, it is present during the day, but it is obviously more perceptible at night, interfering with nursing staff
procedures. Nurses stated "There are deficiencies in lighting during the day as well as night." “Sometimes we have to move patients to a better illuminated area to provide treatment.” In addition, poor lighting is an unsafe condition that increases the likelihood of needlestick injuries. “I had a needlestick injury because I was working in a poor lighting area.” “I know techniques and I have knowledge about needlestick and recapping used needles but there are unsafe places to work as result of poor lighting.”

Inadequate or absence of handwashing facilities ranged from lack or deficiency of them, to do not having running water, malfunction of faucets and absence of soap and paper towels. "Sometimes handwashing facilities do not work." and “On occasion handwashing facilities are used for different activities such as cleaning equipment used for maintenance of floors.” “We use the handwashing facilities to wash our hands, mouth, and instruments.” “We use the same handwashing facility to wash everything.” “Sometimes we have paper towels but we do not have soap or viceversa.”

Unsanitary conditions in the hospital were another issue mentioned by nursing staff. “The hospital environment isn't always as clean as you'd like it to be.” The reasons are lack of water, inappropriate biohazard disposal, as well as deficiency of containers for waste disposal. “Hospital cleanliness is poor.” “Sometimes there is no water.” “After treatments are done you do not find where to place the waste.” “The cleaning and maintenance staffs just work in the morning shift. Most of the time we are obligated to place the waste into a plastic bag or bottle to avoid the risk of needlestick injuries because other containers are full and there is not enough space to put it.” “Clearly, all these aspects can affect asepsis and antisepsis of nursing staff that would lead to possible infectious diseases transmission.”
a2) Organizational climate factors: nursing staff mentioned consistently the high patients (beds) to nurse ratio linked to the problem of needlestick injuries and recapping procedure. Participants in the focus group sessions expressed that as result of the increase of population to be attended there is a disproportion between patients and nurse staffing. According to the shortage of nursing staff the participants stated “There is a big disparity between the ratio of number of beds and number of nurses.” “Most often there are insufficient nurses to care for patients.” “Patients demand care because we are here to help them, but sometimes we can not handle this, because it is not only the patient care, but also to attend the family.” “Sometimes inadvertently we have accidents.” “There are a lot of functions here.” At college you learn how to manipulate needles but we can not handle this at the hospital with lack of resources.” “Can you imagine the amount of needlestick injuries that may occur because the number of patients to care by one nurse?” “There is too much multi-tasking.” “There are sometimes situations where one might administer the wrong treatment to patients.” “We assume that all this will impact negatively on the quality of service provided.” “There are too few beds for the number of patients we have.” “The staff is not sufficient to provide good care (more quantity than quality of care); in addition, there is lack of space to perform some procedures.” “No one works with the adequate conditions one should have.” “You have to work two or three times more because the lack of nursing staff.” “You need to work faster, even if it means taking shortcuts.” “If we would have comfortable working conditions, we might reduce our major problems.” “At work, we have many limitations and work overload.” Derived from the above, nursing staff expressed that work overload and overcrowding conditions relates to the amount of people and the small space they have to work in creating a
The stress was mentioned by nurses as an aspect present on daily basis, which is related to occurrence of needlestick injuries. The stress is generated by the large volume of patients, deficiency of nurses, lack of security and not having safety devices available, in addition to high demands from doctors as well as patients’ family members. “Stress inadvertently leads to accidents.” “I think it is a particularly stressful environment that you live in every day, except for days where there are 10 patients and 5 nurses for all.”

One aspect linked to stress by nurses was the lack of security in the wards as an important issue mainly in the night shift. “There is lack of security members or police officers in the wards.” “There are many security problems in the night shift and nobody comes to help us.” “We can die and nobody knows about that.” “The security is deplorable in this hospital.” Another aspect highlighted by the focus group participants was associated with violence. “Violence comes from patient, patients’ family members or coworker.”

Similarly, there were opinion about the coworkers’ violence and how they try to solve the situation in a very difficult work environment. “We also are abused/mistreated by patients, doctors ... it all combines to be a hostile environment. Many times the nurses do “small share” to join a little more, but that depends on the working group where you are. There are shifts where the staff is more friendly/committed”.

B) Hospital policies to prevent needlestick injuries: In response to the guidelines of the hospital related to needlestick injuries prevention, the comments were very critical. In general, nursing staff stated that there is not a policy regarding safe work conditions to protect personnel, neither for acquisition of sharps disposal containers, or other
appropriate supplies to prevent accidents. The first aspect was regarding to the availability of sharps containers. In this topic nurses related to the fact that there were not sharps containers available at the hospital. For this reason, the disposal of used needles does not follow an appropriate and consistent procedure in the hospital. The work practice is to use makeshift containers using plastic bottles (soft drinks, mineral water), cardboard boxes or any objects that allow someone to place used needles. Two or three years ago adequate sharps containers were provided by the hospital, facilitating the disposal of needles in a safe way but these containers were discontinued, and no information was given about what happened. Descriptions of these situations are mentioned: “Sometimes we use a box or a plastic bottle or anything available to disposal of used needles, trying to avoid putting it in a plastic bag (to protect our cleaning and maintenance staff). “Any big container is “appropriate” for discarding needles.” “In fact, the nursing staff is frequently inventing.” “Family members sometimes provide us with bottles of water or soda and then we use those to discard it (the needle).”

Also, they emphasized that there is not education or training in the area of occupational health. They pointed out that there is a shortage of personal protective equipment (PPE) to be delivered, which hinders their protection because these could serve as barriers to prevent accidents. “The hospital does not do anything.” “We do not have any special disposal containers to put used needles.” “There is lack of protective barriers.” “We should have safety glasses and means for disposal of needles.” “If we have masks, we don’t have gloves, if we have gloves …then there is no mask.” “With the demand of patients that exist, the resources are not enough.” “At the university we receive the information on how to work, but here at hospital the reality is so different, we have to
work with what we have.” “The information and training on health and safety is essential in the hospital, however, it is not the priority of the hospital management.” “There are no training workshops, we are not provided with adequate containers to dispose needles. Sometimes we work with supplies, of a very low quality.” “We work sometimes with our nails.”

Another factor to be considered was the lack of information regarding waste management within the janitorial personnel. “For janitorial personnel handling biohazards is the same task as picking up regular trash.” “They should have adequate utility gloves to grab bags in order to avoid getting stuck.” “They carry the bags with waste using the public elevators.”

*Perceptions of the Nurses about Needlestick Injuries*

Thirty five nurses (29%) from all focus group shared the experience of a past needlestick injury in the last year, and the reactions generated by the accident as well as the possible causes of it. In all cases, there were several feelings that emerged from the accident such as fear, stress, crying, or guilty, followed by the action of applying first aid and finally searching for help or advice. Nursing staff often stated that the cause of the accident was associated mainly with recapping of used needles.

The large volume of patients, work overload and the accelerated procedures performed in different hospital areas were the main factors that might be responsible for this type of accident. Fear and tears were often the first reactions that emerged, followed by impotence and anger. “When I got stuck I was scared. The first thing I did was look for the patient records, checked for the blood tests that he had, and then when I saw that the test were fine I went to epidemiology service to report the accident.” “In my case I had a
very strong feeling... it was horrible; however, today I keep the doubt, thinking about it, I
got stuck on my finger because I was trying to recap the used needle. There was work
overload.” “A colleague of mine, who got stuck in the adult emergency room, got ill after
her patient died and no one knew what the patient died from. Apparently, her illness was
related to the needlestick injury. She was in therapy.” “I thought in the patient disease. I
was recapping the used needle.” “I also got stuck, I was stressed and went to the
epidemiology service, but I keep the doubt.” “I began to cry.” “It's an impact so strong
that one tries to be under control and not aggressive, but you cannot control yourself
because there are so many feelings and your mind becomes blank.” “The first thought is
that you are going to die.” “There is an issue that concerns me. Sometimes nurses got
stuck and even when you suggest them to report the accident, they deny it because the
patient’s diagnosis has nothing wrong. They only squeeze and wash the site of the
puncture.” “When I got a stuck I was scared because there are many diseases that I could
get. After that accident I never recap used needles.” “I was recapping needles for many
years until I heard that a colleague from other hospital got Hepatitis B from a needlestick
injury.”

Needlestick Injuries Prevention Strategies

The several preventive measures proposed by the different focus group participants
were organized in the following strategies: a) Engineering controls b) Administrative
controls and c) Organizational factors.

According to engineering controls, focus group participants stated that hospital
management staff has to purchase sharps disposal containers in sufficient quantities to
cover all hospital services. The purchases of safety devices (syringes and IV catheters) to
prevent needlestick injuries as well as adequate and timeless provision of personal protective equipment (PPE) were other suggestions made by nursing staff. “Hospital management has to incorporate new technologies.” “The hospital management has to buy sharp containers.” "We deserve better supplies to discard used needles."

Regarding administrative controls nurses highlighted the need to develop workshops for nurses and healthcare workers on a regular basis, on topics of needlestick injuries prevention, identification of risk factors and hazardous conditions at work, training in how to use and apply new safety devices, as well as aspects of law, regulations and technical standards on occupational health and safety. “To avoid needlestick injuries the hospital management should promote workshops and guidelines for the healthcare workers including janitorial personnel.” “First, educate the staff, emphasizing on safety issues and new developments. Do not leave us abandoned as they have done so far, and as a consequence of it each person seeks how to better resolve at the workplace.” “The orientation on safety issues applies to janitor staff. This is not only about to protect the nurses while the others continue sticking.” “I believe that it is difficult to eliminate the needlestick injuries at all but at least to reduce them.”

In the discussions, the nurses recognized they have a weak knowledge about the Venezuelan legal aspects on health and safety matters. Most of them were unaware about the existence of a figure named “preventive delegates” (e.g. safety committee) established by the Organic Law on Prevention, Conditions and Environment at Workplace (LOPCYMAT). Data from the pretest y posttest results (Table 17) showed that only 10% of nurses were aware about the existence of the LOPCYMAT and 22% did not know about the National Institute for Prevention, Health and Safety at Workplace.
(INPSASEL). In addition, only 36% knew of the existence of the Committee on Occupational Health and Safety in the hospital. "We have to reinforce the accomplishment of the law."

Among the organizational factors nurses pointed out: Increasing the number of nursing staff, improving the work environment, policies to prevent needlestick injuries, among others. “There should be a commitment to the institution as employers, to ensure the safety of its employees by improving hospital’s conditions and environment.” “The physical environment has to be adequate, especially regarding to poor lighting condition.” “To change policies or the personnel who is responsible for them.” “Improving the policies or change them because they are not being followed.” “Improve the hospital work conditions.” “To reduce overcrowding of patients and increase trained nursing staff, because most of the accidents are related with the number of patients that we have.” “(Administration) needs to follows up needlestick injuries cases.”

Second Level: Analysis of Findings

According to Wolcott (1994) this second level requires systematic and careful attention to the data to identify key factors and relationships. In order to develop this level, one of the Wolcott’s strategies is to use an analytical framework. Therefore, the purpose of this part is to analyze the factors of the description and categorization part developed in level one by integrating them into the PRECEDE component of the PRECEDE/PROCEED Model (PPM) (Green & Kreuter, 1999). This provides a framework to understand factors or circumstances surrounding nurses’ safety practices specifically related to recapping used needles.
In this study, the nurses’ desired health behavior was targeted as not recapping used needles. The factors that nursing staff identified in the focus group sessions were integrated into the PRECEDE component of the PPM framework of predisposing, reinforcing, enabling, and environmental factors (Green & Kreuter, 1999).

**Predisposing Factors**

Nursing staff’s opinions about recapping needles and needlestick injuries that might serve as predisposing factors for nurses' safe practices included nurses' knowledge, attitudes towards recapping, belief about needlestick injuries consequences, values towards patient care, personal and other health care workers safety and perceptions about recapping procedure.

In this study, nurses’ answers to the focus group questions illustrated that several of the nursing staff had knowledge about the risk of needlestick injuries and recapping needles as an unsafe practice, and at the same time, regarding the importance of disposing used needles into appropriate sharps containers to prevent bloodborne infections diseases. Some nurses shared the knowledge of the traumatic (disturbing) experience that resulted after an occupational needlestick and how this exposure influenced nursing staffs’ future behavior in the trend of not recapping used needles. Nurses' previous experience with needlestick injury and its consequences on safe practice were important issue extracted from the focus group sessions. These accidents may have occurred in nurses or their co-workers. This experience might increase nursing staff knowledge about bloodborne infections, and change nurses staffing attitude and perception towards the safety of practices previously not considered unsafe (e.g. recapping needles), in fact, actually several nurses believe that these practices were unsafe and therefore avoid them.
In contradiction/paradoxically, it emerged from focus group sessions that several nurses had lack of knowledge about Venezuelan occupational safety and health legislation/regulations and most of them were unaware about the existence of “preventive delegates” which main functions are inspection, control and evaluation of occupational safety and health conditions in the workplace. This situation could be considered a negative predisposing factor because lack of knowledge in this matter prevents nursing staff to demand for better working conditions.

The attitude assumed by nurses toward the safety of recapping used needles could change the recapping practice. Those nurses who perceive recapping as an unsafe behavior avoided this conduct. The reason why this might be perceived as unsafe included the potential risk of getting stuck when doing this practice or having already been stuck while doing it. In contrast, other nurses might perceive the recapping practice as a safer alternative to someone else who might be stuck if the needle is set down unsheathed in a place or thrown away in a plastic bag. Therefore, it is important to emphasize that these attitudes could be a facilitating/positive condition for some nurses and an obstacle/negative to safe practice for others.

If nurses believe that a potential consequence of a needlestick is to acquire a bloodborne pathogen infection, this belief may predispose those nurses towards safe practice. An example of this was the statements of some nurses who described the situation of health care workers who had Hepatitis B positive status. The connotation for that consequence influenced them towards not recapping needles.

Values about recapping used needles as a safety issue for nurses and other health care workers was a topic that emerged from the focus group sessions. For some nurses
recapping used needles is an unsafe procedure and then it is important to avoid this practice in order to prevent injuries for them. On the other hand, most of the nursing staff explained that recapping practice was a procedure used to protect not only themselves but also other health care workers (e.g. cleaning staff) and other persons such as patients or patient’s family members. Therefore, the value placed on personal safety about recapping was higher for some nurses while the value placed on the safety of health care workers and other people was higher for other nurses. Additionally, most of the nursing staff explained that a very important value for them was the good patient care they provide despite the less than optimal workplace conditions.

Perceptions that could influence the practice of not recapping used needles included the risk of getting a bloodborne infection from a needlestick. Some nurses described their fear and anxiety of getting a bloodborne disease from a needlestick and affirmed that these feelings influenced them in the routine of not recapping used needles.

The effect of a past needlestick injury may influence the predisposing factors for safe practice of hospital nurses. For example, there were nurses who knew the low risk of acquiring bloodborne diseases, specifically Hepatitis C or HIV from a needlestick injury and therefore these nurses were not motivated to stop recapping needles. However, other nurses who have had the experience of a needlestick or knew someone who has had one, perceived that the risk was significant and enough to influence them to not continuing the practices of recapping used needles.

**Reinforcing Factors**

According to Green and Kreuter (1999), "reinforcing factors include social support; peer influences; feedback and/or advice by health care providers; as well as physical
consequences of behavior (1999, p. 171). Rewards may reinforce positive behavior while punishments can lead to the extinction of a positive behavior, therefore, reinforcement may sustain the continuation of positive and negative behaviors.

In this study, there were significant examples of nurses who had experienced or knew someone who had experienced accidents and claimed that now they would never recap a needle again. Thus, the perception of past needlestick exposure appears to fit into the reinforcing positive factors, because a negative consequence of not using safe practices would be the potential for a needlestick injury.

Additionally, there was a situation that appears to fit into negative reinforcement factors to nurses’ safety practices. From focus group answers emerged that the hospital management’s attitude was not committed toward occupational safety and health policies to protect health care workers. Several nurses verbalized dissatisfaction on how hospital management leads the safety issues. Nurses had a very critical position regarding the hospital support in this aspect which ranged from inadequate safety climate, no policies concerning safety work conditions to lack of education and training in the area of occupational safety and health. According to nurses’ perception there are not policies/procedures to prevent needlestick injuries; or those exist but nursing staff does not have any information about them. In both cases the situation is concerning. Consequently, inadequate safety climate and absence of policies/procedures at MCH are negative reinforcement for nurses’ safety practices.

*Enabling Factors*

Often conditions of environment, enabling factors facilitate the performance of an action by individuals or organizations. These conditions include "availability,
accessibility and affordability of health care and community resources. Enabling factors also include new skills that a person, organization, or community needs to carry out a behavioral or environmental change” (Green and Kreuter, 1999, p. 167, 168). “Any characteristic of the environment that facilitates action and any skill or resource required to attain a specific behavior. Absence of the resource blocks the behavior; barriers to the behavior are included in lists of enabling factors to be developed” (Green and Kreuter, 1999, p. 505). Enabling factors are antecedents to behavior that allow a motivation to be realized.

Two subthemes of the categorization schema described in the first level of analysis for phase two fit into this group of enabling factors. The first subtheme included lack of availability and accessibility of safety devices (sharp containers and personal protective equipment) to hospital areas. Nurses in the study stressed that those safety devices not only need to be purchased by the hospital management but also these devices must be physically accessible to nurses. The second subtheme was related to skills and experience to perform routine procedures by nursing staff. There were several nurses who affirmed they had the ability and experience to carry out safe procedures but they got a needlestick injury because the accident was related to other circumstances that were out of their control such as physical work conditions, organizational factors and nurse/patient ratio. Obviously these subthemes were barriers to the goal behavior.

*Environmental Factors*

In this study, nurses described the circumstances surrounding recapping needles and needlestick injuries at the MCH. These circumstances were related to physical conditions such as lighting, handwashing facilities, and unsanitary conditions as well as
organizational climate regarding to a reduced nurse/patient ratio (work overload, overcrowded workplace) and occupational safety and health issues (lack of sharp containers, lack or deficiency of personal protective equipment). It is important to mention that several nurses stated lack of security in different hospital areas especially in the night shifts. The aggressive attitude from patients, patients’ family or coworkers was mentioned as very critical by nursing staff. Additionally, there were other situations stated by nurses that were more associated directly to the nurse/patient relationship such as distraction factors during job activities for example, lack of focusing, being called by someone else, and unexpected patient movement during procedures as well as unpredictable patient’s status. Regarding patient’s attitude it is rational to think that any unexpected movement is a potential hazard to a needlestick injury and then might be a barrier to nurses’ safe performance. In fact, several of the accidents related by nurses were caused by the unexpected patient’s movement during performance of a routine procedure. Another situation that was commented by nurses as obstacle to safe practice was the unpredictability of patient status. Several nurses recounted experiences where they found that the patient's status had changed (e.g., veins had collapsed and were hard to access, patient in very bad health condition), resulting in situations that made it more difficult to use safe practice. During the focus group sessions, nurses used the example of removing a port access needle from a port access device and the use of butterfly needle especially in children were the most dangerous procedures that they performed in the hospital setting. Many of these conditions were perceived as obstacles by nurses in their ability to perform safe practice, because of the very complex hospital work environment.
Relationships between Factors in the PRECEDE-PROCEED MODEL

The relationship between the predisposing and enabling factors emerged from the description and categorization part of the study (Figure 3). According to several examples, lack of knowledge about Venezuelan occupational safety and health legislation/regulation may affect the possibility to demand for preventive resources for safe practices. Also, what emerged from the data was that if nurses’ attitudes and beliefs maintain safety, this may affect personal skills in safe practices. But at the same time, enabling factors (e.g., lack of the availability and accessibility of sharp containers and personal protective equipment) influence negative nurses' attitudes against safe practices.

The relationship between reinforcing and predisposing factors was unidirectional according the results of this study (Figure 3). Predisposing factors may be influenced by reinforcing factors. Some nurses may have confident attitudes and beliefs about safety work practices, but may be influenced toward or against such use by positives reinforcing factors as previous experience with needlestick injuries (nurse or coworkers) or negative reinforcing factors such as hospital management’s attitude toward prevention of needlestick injuries or nurses who not having had a needlestick injury. It is important to point out that these experiences could influence knowledge, attitudes, belief and perceptions surrounding the circumstances of safe practices.

Reinforcing and enabling factors were influenced reciprocally (Figure 3). For example, the negative hospital management’s attitude toward safety and safety practices regarding to lack of availability and accessibility of preventive resources influenced negatively the nurses’ participation in a goal behavior. On the other hand, absence of sharps containers
and lack or deficiency of personal protective equipment could act as negative reinforcing factor for nurses’ safe practices.

Enabling and environmental factors were also influenced reciprocally (Figure 3). There were several examples from the data where physical conditions in the hospital environment as well as nurse/patient relationship factors influenced the ability of nurses to perform safe practice, even when skills to do it were present. Then, the environmental factors were not only influenced by but also could influence the enabling factors of nurses for safe practices.

In summary, the predisposing, reinforcing, enabling and environmental factors were influencing the actual and goal behavior (use of safe work practices) of nurses. Furthermore, predisposing factors were influenced by reinforcing factors (Figure 3). Predisposing and enabling factors were influenced reciprocally as well as reinforcing and enabling factors (Figure 3). Enabling and environment factors also were influenced reciprocally. Additionally, environmental factors and behavior were influenced reciprocally (Figure 3). The actual behavior described by nurses was influenced by predisposing, reinforcing, enabling, and environmental factors identified in this study. For some nurses, the actual behavior was the goal behavior of use safe work practices (e.g. not recapping). For others, it was not, as evidenced by unsafe practices (Figure 3).
Figure 3. Incorporation of Categorization scheme into PRECEDE component of PPM
According to Wolcott (1994), the third level “interpretation” is conducted to derive meanings from the findings. In order to develop this level, one of the Wolcott’s strategies to extend the analysis part was used (p. 40). In this study, relationships between predisposing, reinforcing, enabling and environmental factors found influencing the actual or goal behavior were developed from the results of the analysis part (Figure 3). Therefore, the purpose of this part was to interpret such relationships and their influences on safe practices of nursing staff from the Maracay Central Hospital who participated in the focus group sessions.

Predisposing and enabling factors were found to be influenced reciprocally in this study. That is, predisposing factors could positively or negatively influence enabling factors. Regarding the positive influence, nursing staff had predisposing factors related to knowledge, attitudes, beliefs, values and perceptions about needlestick injuries and its consequences; as well as safe practices that could positively influence the performance of safe routine procedures in order to achieve safe practices (goal behavior). For instance, if nurses have a positive attitude and belief to support safety and adequate knowledge about the consequences of a needlestick injury, it is feasible to think that these factors can be a positive motivation to continue doing safe procedures. This example was illustrated with several nurses’ comments obtained from the focus group sessions. In relation to the negative influence, one of the negative factors found was that nurses’ lack of information about Venezuelan occupational safety and health legislation/regulations that might contribute to lower levels of knowledge about this matter. This situation was a very important predisposing negative factor that could be influencing the hospital
management’s attitude to be passive toward safety and safe practices. It is feasible to infer that if nursing staff would have a clear understanding of their rights in the occupational health field, probably the hospital management’s attitude about occupational safety could be different in positive direction nurses’ ability toward achieving the goal behavior. But unfortunately, the reality was different and most of the nurses were engaged in the actual behavior (recapping needles). It is significant to point out that predisposing factors are the main factors on which all other factors may have their effect. In other words, if nurses and hospital management have high enough levels of motivation or commitment, less effort might be needed from the other factors to achieve the goal behavior.

How enabling factors influenced in predisposing factors was also demonstrated in positive and negative ways. An example of a positive factor was the nurses’ skill to perform safe procedures that could be a positive factor to influence strongly the attitudes, beliefs and perceptions about the use of safe practices. In the study, several nurses related that they knew about the techniques to perform safe procedures because this information was given in the university or college and may be they learned the right techniques to do safe procedures. If nurses can maintain these abilities, despite the less than minimal conditions in the hospital work environment, it is understandable, that predisposing factors can be influenced positively by the nurses’ ability, strengthening the goal behavior. With reference to negative factors, it was associated with how the lack of availability and accessibility of preventive resources could be a negative factor influencing in the nurses’ actual behavior. For example, if hospital management decides not to acquire sharps disposal containers for whatever reasons, this could possibly
negatively influence nurses’ attitudes, values and perceptions about safe practices. For instance, if there are not disposal sharp containers available in the hospital, some nurses will continue recapping needles because they may not perceive this procedure as a risk. In fact, the rationalization is that recapping needles is a “safe procedure” to protect themselves and other health care workers. Educational intervention is imperative to promote changes in the actual behavior of these personnel. The hospital management has to assume the administrative and legal responsibility for the prevention of exposures and on safety issues for nurses and other health care workers.

Reinforcing factors were found to influence predisposing factors in this study. There were positive and negative factors. Regarding the positive reinforcing factors, nurses or coworkers as result of a negative event (needlestick injury) or not getting a bloodborne infection disease after a needlestick injury could influence positively in their attitudes and beliefs to maintain safe practices. This situation was demonstrated in this study when several nurses explained that they changed their unsafe practices after a personal or colleague experience with needlestick injury or not getting a disease after getting stuck. It is possible to think that this negative experience become a positive influence toward goal behavior. The possibility that nurses have not had a needlestick injury after sustained safe procedures is another example of positive reinforcing factor that could positively influence in attitudes and beliefs. For example, if a nurse is using safe practices and as result of that she/he has never been stuck or has not acquired a bloodborne disease this could be considered a reward for sustaining the goal behavior (safe practices). Another positive factor found in the study was the nurses’ disapproval when other colleagues were doing unsafe practices and they advised them about the inconvenient of these procedures.
This “social support” is a type of peer influences that emerged from the discussion of focus group sessions and apparently it works in the hospital. Obviously, if nurses continue using safe practices that avoid them sustaining a needlestick or acquiring a bloodborne disease infection, this will impact their future behavior about safe practices of needles safety precautions (e.g., not recapping used needles and disposal of used needles into sharps containers). In summary, previous nurses’ experience of needlestick injury, the adverse consequence of a bloodborne disease and not having had a needlestick injury could positively influence the goal behavior.

Regarding the negative factors, all the reinforcing factors that appeared could be paradoxically negative threaten against achievement of the goal behavior. For example, not having had a needlestick was an evidence of negative reinforcement for nurses’ attitudes. It reasonable to think that if nursing staff never have had a needlestick injury and they continue recapping used needles why do they need to change this practice? For these nurses, this could be a reason to keep doing their duties in the same way that they have been working for years. Another example of a negative reinforcing factor could be a nurse who did not recap a used needle for whatever reason and left it at the patient’s bed or in any other place, resulting in either them getting stuck or a coworkers doing so later when picking it up. Consistently, in the study, most of the nursing staff expressed that recapping used needles was done to protect themselves and other coworkers (nurses, cleaning and maintenance staff). This example could be considered a negative reinforcing factor because nurses are/were prone to continue recapping as an unsafe practice despite of the risk of a needlestick injury and its consequences in order to protect others.
The passive hospital management' attitude toward safety and safety practices to prevent needlestick injuries play a roll very important to influence negatively the nurses’ attitudes and perceptions about safe practices (goal behavior). All the negative reinforcement mentioned above served to sustain the actual behavior.

One aspect that emerged from the analysis part, and it was incorporated into hospital management’s attitude, was related to the education and training as a necessary element of safe practices. Adequate or inadequate education and training about safety issues is a critical condition to change behavior. Once more the hospital management has the responsibility to change the situation. In summary, not having had a needlestick injury, as well as hospital management’s attitude and the criterion to protect others could negatively influence toward the goal behavior.

On the other hand, from the analysis part did not emerge how predisposing factors can influence reinforcing factor. However, it is possible to assume how these influences could occur in a positive and a negative way. In the first situation (positive way) would be nurses with a strong belief that it is possible to get a bloodborne pathogen infection from a needlestick could be motivated to continue safe practice. For example, if nurses know about a coworker who sustained a needlestick from recapping used needles and acquired Hepatitis B, it may positively influence the other nurses towards continuing their practice of not recapping, and consequently, it is possible to deduce that predisposing factors may positively influence reinforcing factors. Another example of a positive factor would be that nurses’ knowledge, attitudes, belief, values and perception about safe practices can be an influence to modify the hospital management’s attitude to support safe practices.

The negative way can be associated with the nurses’ lack of knowledge about
occupational legislation which does not allow them to actively demand support from the hospital management for safety procedures and practices. As a result of this, some nurses could maintain the actual behavior.

The relationships between reinforcing and enabling factors were demonstrated to be influenced in both directions. How enabling factors were influenced by reinforcing factors was found in positive and negative ways. The positive reinforcing factors of attitudes and behaviors of coworkers about previous experience with a needlestick injury, adverse consequences of recapping and not having had a needlestick injury could be factors to reinforce the goal behavior because nurses’ skills can be influenced to develop safe practices. For example, if nurses have not had needlestick injuries or have not acquired a bloodborne disease as result of getting stuck by a needle, this situation can be a positive reward for using safe practices and then be motivated to perform safe routine procedures. Another situation that was not found in this study but can be an example of positive reinforcing factor would be if hospital management had positive attitude around safety that promotes/encourages prevention issues, it is feasible that this might influence nurses toward the performance of safe routine procedures.

Otherwise, negative reinforcing factors such as hospital management’s attitude toward safe practices could be expressed in the lack of availability and accessibility of preventive resources (sharp containers and personal protective equipment) and also in the nurses’ skills to perform safe routine procedures. At the same time, not having had a needlestick injury could be a negative reinforcing factor because nurses may feel motivated to continue with the recapping used needles despite the risk. It is important to point out that the antecedent of not having had a needlestick injury can be a positive or negative
reinforcing factor and then this experience could reinforce some behavior, but it may or may not be the goal behavior. In summary, it is evident that all these factors could positively or negatively influence nurses toward desired behavior.

How enabling factors could influence reinforcing factors was also demonstrated in this study in a positive and negative way. In a positive way nurses’ skills to perform safe procedure could be a positive factors to influence in the positive reinforcing factors. As was mentioned to previously in the relationship between enabling factors and predisposing factors about nurses’ skills on how to perform safe procedures, these skills could positively influence the goal behavior because nurses would be aware of the adverse consequences of recapping needles and then are/were prone to use safe practices. For example, if a nurse is doing safe routine procedures it is possible that the reward for doing that would be not having had a needlestick and therefore not acquiring a bloodborne disease and then she/he is motivated to continue using safe procedures. In the negative way, the lack of availability and accessibility of preventive resources could be a negative factor influencing in the nurses’ actual behavior because nurses are still performing unsafe practices like recapping needles. For example, if hospital management does not acquire sharps containers, safety devices and personal protective equipment (PPE) to prevent needlestick injuries, it is feasible that this might influence in nurses toward unsafe practices (actual behavior). In the focus group sessions several nurses stated that they will continue recapping needles because of the lack of sharps disposal containers. Undoubtedly, the lack of availability and accessibility of containers in the MCH is one of the main obstacles to achieve the goal behavior.
Enabling and environmental factors were also influenced reciprocally. Environmental factors such as physical conditions, inadequate organizational climate and nurse/patient relationship were factors that negatively influenced in nurses’ ability to perform safe practice. It is important to emphasize that these environmental conditions could influence not only in the unsafe practices but also could be responsible for needlestick injuries.

In addition, lack of availability and accessibility of sharps disposal containers and personal protective equipment were factors that negatively influenced in the organizational climate as well as safe practices in the nurse/patient relationship. In summary, environmental and enabling factors are essential to maintain the actual behavior or to achieve the goal behavior. The negative influences of both situations were sufficiently explained by nursing staff in the focus group sessions.
CHAPTER SEVEN: DISCUSSION

This chapter is oriented to follow a discussion integrating the quantitative and qualitative components of this study. In the first section the most significant findings from the quantitative results are synthesized. In the qualitative section the discussion is framed around the first level of analysis of Wolcott methodology findings (Description and Categorization) and then PRECEDE component of the PPM, including predisposing, reinforcing, enabling and environmental factors. Finally, a brief comment about limitations and strengths of the study are presented.

Quantitative Findings

Female nurses were the largest group in the sample (Table 10). Nursing in Venezuela is primarily a female profession, despite the progressive incorporation of men. Regarding the educational level (Table 10), the result shows that nurses in the MCH have been professionalized in recent years, as has happened in other Venezuelan public hospitals. This information is similar to data found in other countries, especially in Latin America (Marchan, 2005).

Regarding the number of needlestick injuries sustained by nurses in the past year, in this study, 29% of the nurses studied reported that a needlestick injury had occurred in the last year (Table 11). In a study done in an India’s tertiary care hospital by Jayanth, Kirupakaran, Brahmadathan, Gnanaraj, and Kang (2009), 37% of nurses reported a needlestick injury in one year period. In a university hospital of Turkey, Mustafa, Elif, Aras, Sertac and Remz (2006) found that 68% of nurses were exposed to sharp or
needlestick injuries in the last year. Derek, Choe, Jeong, Jeon, Chae and An (2006) found in a study in a Korean hospital that NSIS were reported by 263 nurses (79.7%) in the previous 12-month period. Junco, Oliva, Barroso and Guanche (2003) found in research conducted in Intensive Care Units in La Havana, Cuba, that 39% of nurses had been injured in the last year. In a study carried out in home care nurses in California by Haiduven (2000b), 92% (48/52) of the nurses from three home care agencies had a needlestick injury in the last year. It is important to emphasize that although the results in this study were low when were compared with other studies, the needlestick injuries in nursing staff at the MCH remains as an issue of great concern and deserves better attention from health authorities. These data also show that needlestick injuries sustained at work are a frequent problem among nurses in different countries’ health care settings.

In terms of the percentage of nurses who experience NSIS compared to other HCWs, Saulat in a study done in 2005 in a hospital from Saudi Arabia showed that nurses had the higher number of all incidences of needlestick injuries at 65.8%. In a study done by Galindez and Haiduven (2004) in the MCH 30% (39/129) of health care workers reported sustaining a needlestick injury. Of those 39 workers, 25 (64%) were nurses. Likewise, Palucci (2003) in a study conducted in four hospitals in Brazil found that 50% of needlestick accidents were reported in nurses. According to data from the Maracay Central Hospital Surveillance for Needlestick Injuries for the years 2007 and 2008 (Table 20), of all injuries reported in health care workers, nursing staff represented 30% and 37% respectively. If the nursing students who reported NSIS are included, the percentages increased to 46% and 54% respectively. All these finding confirm that the
nurses are the occupational group among other health care workers at highest risk for needlestick injuries in hospital settings.

Concerning the question if the needlestick injuries were reported, in the study, all 35 (100%) nurses reported the accident at the time (Table 11), this result differs with the work of Junco et al., (2003) done in Havana, Cuba, noting that 96% did not report the accident. In work done by Martinez, Alarcon, Lioce, Tennesse and Wuilburn (2008), 80% of needlestick accidents were not reported in a population of 20,000 health care workers in 4 Venezuelan states. In the same report, health care workers expressed that the main reasons for not reporting the accident were they did not consider it important to report or did not know where to report it. In this sense, it is imperative to take actions to reduce the underreporting in order to have a true representation of the number of needlestick injuries, then to organize and develop programs to prevent accidents.

According to published studies the percentage of underreporting has ranged from 40% to 80%. Elmiyeh, Whitaker, James, Chahal, Galea, and Alshafi (2004) found in a study done in a US hospital that 80% of respondents were aware that needlestick accidents should be reported, but only 51% of those affected had reported all needlestick injuries. These data confirm that although doctors and nurses are aware of the benefits of early reporting, a culture of silence persists (Doebbeling, Vaughn, Beekmann, & Ferguson 2003). This “culture of silence” has to be broken in order to implement changes in the bloodborne disease transmission.

The mean number of years of nursing and the mean number of years of experience in the hospital (Table 12) show that the study group had work experience and had enough time working in the hospital to be familiar with procedures.
Concerning the number of hours worked daily and weekly (Table 12), these results are similar to Loli’s work (2000) which reported that nurses were working in public hospitals in Peru from 30 to 40 hours per week with 2 or 3 days off, while in private clinics work 40 to 48 hours per week with one day off. Research data indicate that at MCH the hours worked by nurses per day and per week are greater than the established by Venezuelan Labor Act (1997) regulations (36 hours per week) and thus the nurses are not following the provisions of 149-1997 report of the International Labor Office (ILO, 1997), which recommended reducing the hours to a maximum of 35 hours per week. According to Marin, Alves, Gir and Martins (2008) in a study done in Brazil hospitals found that a long work week entailed greater chances of producing needlestick injuries, which may result from the worker's longer exposure to risk situations, not only the fact that long work days can produce fatigue but also increase the risk of injury. The results showed that working 50 or more hours per week increased the chances of needlestick injuries (OR 2.47; CI: 1.07-5.67) and similar results were found for those working in mixed or in night shifts, as compared to those working only in regular daily shifts. Studies on needlestick and sharp injuries, involving nursing professionals, also have reported that the chances of being victims of this kind of injury are higher in mixed shifts (Smith, Mihashi, Adachi, Nakashima, & Ishitake, 2006). Alison, Rong, Geiger-Brown, and Lipscomb (2007), stated that hours worked per day, weekends worked per month, working other than day shifts, and working 13 or more hours per day at least once a week were each significantly associated with needlestick injuries. In summary, it is imperative that MCH authorities supervise this situation and modify it, because according to the international literature, the excessive hours of work may not only cause a negative impact on health, but also
become a factor in accidents caused by mental or physical fatigue. The percentage
difference between number of needles not recapped before and after the educational
strategy in all four departments (Table 13) was statistically significantly higher (< 0.001).
The same situation was demonstrated in each department (Table 14). The departments
with the greatest difference between pre and post-intervention were Obstetrics wards and
NICU. In accordance with these results (Table 16), the odd ratios at all four hospital
departments were less than 1, indicating a protective effect, demonstrating that the
educational strategy was associated with fewer recapped needles. The odd ratios in the
Obstetrics wards and NICU were the lowest. The statistical significance in all four
departments could be explained by stating that nurses changed work practices from more
instances of recapping to less instances of (recapping) after the educational strategy. This
intervention has had a positive effect on the behavior of the recapping activity. These
results are similar to studies of Marin et al., (2008) conducted in a tertiary hospital in
Brazil, which revealed that "recapped needles" were an important predictor for
percutaneous accidents among nursing professionals. In addition, Doebbeling et al.,
(2003) found that the handling of hollow needles was considered a risk factor for
percutaneous accidents (OR 1.02) among professionals in the healthcare field and not
recapping needles was identified as a protective factor (OR 0.74), after adjustment for
potential confounding factors.

The pretest applied in the educational strategy (Table 17) demonstrated a lack of basic
information on issues concerning to the ways to acquire a bloodborne viral infection. The
test scores improved significantly (Table 17) in the posttest. The comments expressed by
nursing staff reflect that they need education and training in aspects related to specific topics regarding bloodborne pathogens.

The lack of knowledge about laws, institutions for occupational health prevention as well as the existence of the occupational safety and health committee in the hospital by nursing staff participants in the educational strategy sessions was demonstrated with the low percentage of correct answers of the questions regarding these topics (Table 17).

The data about the Hepatitis B immunization (Table 18) showed a low percentage of nurses (38%) who had completed the series. These data contrast with those reported by Junco et al., (2003) in a report from Havana, Cuba that 367/412 (89%) respondents had completed the full immunization series with Hepatitis B vaccine. Similarly, Palucci and Carmo (2004) have published results where 84.8% of health care workers had the three doses with Hepatitis B vaccine. According to data presented by Martinez et al., (2008) in a cross sectional study conducted in 4 states of Venezuela, with a total of 20,000 health workers, found that compliance with the full series for Hepatitis B did not exceed 65%. These findings should call for reflection because the Hepatitis B vaccine is an excellent aid to prevent the disease and it complications. Additionally, this vaccine is distributed free to each health worker who applies for MCH Health Department of Immunization (Epidemiology) or Occupational Medicine Department. This situation might reflect the limited knowledge that nursing staff have about the consequences of acute disease (acute hepatitis) or long-term illness such as the development of liver cirrhosis or liver adenocarcinoma. In this aspect, both Departments, Epidemiology and Occupational Medicine, should to work together in order to implement a strategy to promote Hepatitis B vaccine immunization.
Table 19 illustrates that the number of NSIS in 2007 (130) had an increase of 22% when compared with 2006 (101). It is important to stress that this is the highest number reported in the last five years in the hospital. This value does not denote that the number of NSIS has increased; it is possible to think that this result is consequence of a better attitude/behavior of the personnel to report NSIS. However, for the year 2008, the information about NSIS decreased 18%. As was commented in the previous paragraphs, the underreporting is a very concerning situation that needs a major effort by hospital management to reduce.

It is important to highlight that in 2007 also was the year with the lowest percentage of NSIS in nursing staff (30%) when comparing with the other years (Table 20). In contrast, other health care workers had the highest percentage (54%) when also compared with other years.

Table 21 provides information about the number of needlestick injuries sustained by nurses from the departments studied and nurses from other units or departments not included in the study. For both years, the data show that nurses from other units had the highest percentage of NSIS with 55% (33/60) and 57% (34/60) respectively. In contrast, nurses from the departments studied had 45% (27/60) and 43% (26/60) respectively of the all NSIS.

Of the all nurses that sustained NSIS, in 2007 and 2008, 26% (31/120) came from the AER department (Table 22). These data are in concordance with other works where operating room and ER are the departments with highest incidence of NSIS (Perry et al. 2005), but at the same time the results from this study differs from a study done in
Europe where NSIS were most likely to occur in patient rooms and the operating room (Sulsky et al., 2005).

The rates of needlestick injuries and occupied hospital beds were around 22, 15, 19, 24, and 16 needlestick injuries per 100 occupied hospital beds during 5 years (Table 23). This data are lower than the average suggested by the EPINet system of 26 needlestick injuries per 100 occupied beds per year for teaching hospitals, (US, EPINet, 2001).

According to Jagger (2001), these rates give an idea of the institutional needlestick experience, which can then be used to follow NSIS levels over time. At the same time, it is possible to compare the rates with other institutions, however, according to the author hospital management has to be aware because the rates can be affected by a number of factors, including the level of needlestick underreporting and the types of patients the hospital treat.

Table 24 provides the rates of NSIS in all health care workers, nursing staff from other units and nurses from the departments studied. The data were similar for 2007 and 2008, however, it is important to highlight that of the 13 NSIS in nurses by 100 hospital occupied beds, 5.7 and 5.5 NSIS respectively, almost a half of the events came from nurses from the departments participating in the study. Obviously, as was showed in the table 22, the AER department played a main role in this rate.

The information provided in Table 25 shows the rate of NSIS when was calculated using as denominator the total of beds (158) in the departments participating in the study (Table 4), it is important to notice that the results show values higher when compared with the data show in Table 24. For both years, from rates of 5.7 and 5.5, the rate of NSIS increases to 17 and 16 NSIS by 100 occupied beds. Although both rates are in the
average according to EPINet values, the 3 fold increase when the denominator was changed could mean that NSIS in nurses from the departments participating in the study need to be follow across the time in order to compare the new NSIS rates.

Qualitative Findings

Circumstances Related to Recapping of Used Needles and Needlestick Injuries

Environmental factors.

a1) Physical conditions. Regarding the results of the qualitative section it is important to note that environmental factors were one of the aspects most commented upon by nursing staff. Several nurses expressed that the working conditions in the MCH were less than the minimal necessary to accomplish their duties. This situation has been reported in other works. Borges (1998), suggests that in many Venezuelan hospitals work environments (emergencies, hospitalization areas, surgical and medical wards among others), health care workers do not have handwashing facilities because they are inadequate (do not having running water, malfunction of faucets), or there is lack of them. At the same time there is absence of soap and paper towels to accomplish the main practice of asepsis and antisepsis in order to reduce exposure to biological hazards. This information confirms the comments of the nursing staff from the focus group sessions about the physical work conditions at the MCH specifically related to handwashing facilities.

According to Tomasina, Bozzo, Chaves, and Pucci (2008) in a work done in the Hospital Clínicas, a surgical center in Uruguay, the most important results revealed lack of favorable working conditions in terms of heat, air conditioning, ventilation and lighting. Physical, chemical and biological risks determine a complex profile of burden that affects the workers, who considered it as an important risk for their health. Regarding
acute lesions, accidents caused by sharp implements and traumas were the most outstanding.

Marchant (2005), conducted an analysis case of organizational climate in Chile’s hospitals, found that the "space, physical environment and infrastructure," has been one of the worst variables evaluated, showing a general dissatisfaction with the physical and environmental work conditions (p.138). It is important to highlight, based on the comments expressed by nurses in the focus group sessions, the variable of physical space and infrastructure of the hospital under study are not the most appropriate for carrying out their activities. The conclusion is that when work space is not large enough nor properly equipped for its functionality there are not the proper environmental conditions for working. As a consequence the work performance is not the optimal. In other words, if the working conditions can be improved, the workers performance will be better.

In order to establish the level of job satisfaction, a study was done by Fernandez and Paravic (2003) in public and private Hospital Centers in the Province of Concepción, Chile. The results showed that physical working conditions stand out as a dissatisfaction factor in the case of hospital nurses, especially those working for the public area.

In summary, there are several studies that establish a clear relationship between physical working conditions, job satisfaction and likelihood of needlestick injuries at hospital settings.

\( a_2 \) Organizational Climate Factors. The organizational climate is one of the determinants factors of the organizational processes, management change and innovation. The nursing staff in the focus group sessions related that not only the physical working conditions but also the organizational climate were important matters. Regarding
organizational climate factors nurses stated that stress, shortage of nurses, work overload, and violence among others play a very important role in the unsafe workplace conditions as well as in the incidence of needlestick injuries.

According to Rodriguez (1998), the organizational climate has been defined as "the perception that members of an organization have about the more significant characteristics that describe and differentiate from other organizations (p.1)”, which influences in the behavior of organizational nursing staff. The term is also refers to the social atmosphere of a company or organization that specifies and determines the degree of well-being and satisfaction to be found in it (Gonzalez-Roma, & Peiro, 1999).

Concerning organizational climate and needlestick injuries there are several studies around the world that establish a close relationship between these two variables.

The American Nurses Association (ANA) announced the findings of the 2008 Study of Nurses’ Views on Workplace Safety and Needlestick Injuries, an independent nationwide survey of more than 700 nurses. According to the latest research, (64%) of U.S. nurses say needlestick injuries and bloodborne infections remain major concerns, and 55% believe their workplace safety climate negatively impacts their own personal safety.

According to Clarke (2007), although individual behaviors influence risks of sharps injuries and other occupational accidents, organizational factors appear to provide important context for safety by influencing the immediate working conditions under which potentially risky tasks are undertaken. The same author stated that mechanisms are not altogether clear, but work environments and cultures appear to affect worker safety not only in health care, but in other industries as well. In conclusion, nurses working in hospitals with better working environments were at lower risk of sharps injuries. In the
same direction, Stone, Yunling, and Gershon, 2007, in a study done in nurses of New York City hospitals concluded that organization climate (OC) is significantly associated with the health and well-being of hospital nurses.

As was commented by Clark, et al., (2002) in a study carried out in US hospitals, nurses working on hospital units with poorer work climates and lower staffing levels were substantially more likely to report the presence of risk factors associated with needlestick injuries. The same authors suggested that remedying problems with understaffing, inadequate administrative support, and poor morale in hospitals may turn out to be the most important steps in building a safer health care system.

In a study done by Mark, Hughes, Belyea, Chang, Hofmann and Bacon (2007), and conducted in 281 medical surgical units in 143 general acute care hospitals in the United States, work engagement and work conditions were positively related to safety climate, but not directly to nurse back injuries or needlesticks. The positive work engagement and work conditions contribute to enhanced safety climate and can reduce nurse injuries.

1. Stress. Stress was one of the most common factors cited by nursing staff in the focus group sessions. They associated the stress with other workplace factors that were present in the hospital. Nurses in this study stated that this problem is affecting their daily work activities. Most of the comments emphasized that stress is linked to the poor organizational climate existing in the different departments. However, the most relevant aspect was that nurses perceived the stress as one of the circumstances related to needlestick injuries.

The National Institute for Occupational Safety and Health (NIOSH, 2008) defines occupational stress as "the harmful physical and emotional responses that occur when the
requirements of the job do not match the capabilities, resources, or needs of the worker" (p.1). Nearly everyone agrees that job stress results from the interaction of the worker and the conditions of work. Views differ, however, on the importance of worker characteristics versus working conditions as the primary cause of job stress. These differing viewpoints are important because they suggest different ways to prevent stress at work.

Stressors common in health care settings include the following: inadequate staffing levels, long work hours, shift work, role ambiguity, and exposure to infectious and hazardous substances. In general, studies of nurses have found the following factors to be linked with stress: work overload, time pressure, lack of social support at work (especially from supervisors, head nurses, and higher management), exposure to infectious diseases, needlestick injuries, exposure to work-related violence or threats, sleep deprivation, role ambiguity and conflict, understaffing, career development issues, dealing with difficult or seriously ill patients. Occupational stress has been a long-standing concern of the health care industry and some studies indicate that health care workers have higher rates of substance abuse and suicide than other professions and elevated rates of depression and anxiety linked to job stress (NIOSH, 2008). In addition to psychological distress, other outcomes of job stress include burnout, absenteeism, employee intent to leave, reduced patient satisfaction, and diagnosis and treatment errors (NIOSH, 2008).

The American Nurses Association (ANA, 2008), showed that 84% of nurses of the 700 nurses who participated in the survey reported that workplace stress levels impact workplace safety. Higher nurses workloads are associated with burnout and job
dissatisfaction, precursors to voluntary turnover that contribute to the understaffing of nurses in hospitals and poorer patient outcomes (Vahey, Aiken, Sloane, Clarke, & Vargas, 2004).

More than 41 million workers in the European Union are actually suffering stress at work (one in three in the fifteen member countries (Rodriguez and Vazquez, 2008). According to a study done by the European Agency for Safety and Health at Work, the economic cost of absenteeism and sick leave generating by this situation is over 20,000 million euros a year (Rodriguez and Vazquez, 2008). It is feasible to understand that the situation about stress in the European workforces can be extrapolated to the health care sector, as illustrated, in a study done by Mcvicar (2003), to identify nurses’ perceptions of workplace stress. In this literature search from 1985 to 2003 conducted in the UK, the most relevant findings were workload, leadership/management style, professional conflict and emotional cost of caring as the main sources of distress for nurses for many years. Lack of reward and shift working may also now be displacing some of the other issues in order of ranking. The conclusions stated that stress intervention measures should focus on stress prevention for individuals as well as tackling organizational issues.

Gil-Montes (2002) stated that the nursing profession by their unique characteristics, shortage of staff, work overload, shift work, relationships with patients and family problematic, among others) generate chronic stress, and being one of the occupations with the highest incidence of “burnout syndrome." Work overload has a special impact as a source of chronic stress in nursing.

Obviously, the association between stress and needlestick injuries is one of the aspects linked to this study. But stress is also related to nurses’ health. In a literature review done
by McNeely (2005) found that the general complacency or tolerance for stress in the profession and perhaps as well in society minimizes the importance of this issue for nurses’ health. Although several studies show that chronic stress may result in increased morbidity and mortality and also other studies find that nurses bear increased risk of certain diseases, the potential link between chronic stressful nursing work and lasting health consequences has not been established.

1.2) Shortage of Nurses and Work Overload. The nursing staff expressed that a shortage of nurses and work overload are conditions that affect not only the quantity of care but also the quality. Most of the comments in this study were associated to the hospital as an old institution that was created for a specific population 30 years ago. But the population has increased and the number of beds and personnel has remained the same as in the past. Consistently these aspects were mentioned as possible causes of needlestick injuries as well as unsafe practices.

According to the PAHO publication 2007, the Region has 3,580,000 nurses, for an average of 42 per 100,000 population. Recently (2000-2004) this rate has increased at an annual pace of 0.20 for nurses. Positive growth of health human resources is being maintained but the increase tends to be smaller. In the period 1980-1992, the annual average growth in the number of nurses throughout the Region was 8.2% with the figures falling in 1992-2000 to 2.7%. In the period of 2000-2004, the trend became more marked, with annual average growth of 0.8% for nurses. These values indicate that the drop in the number of nurses is considerably largest when is compared with the physicians. In the same report, it was stated that the rate of nurses was high in the United States (97.2 per 10,000 population), with nurses outnumbering physicians in a ratio of 3 to 1 in the U.S.,
Canada and some Caribbean countries. The concentration of nursing personnel in the Region is clear, in 2004, 83% of nurses worked in the United States and Canada. In Venezuela there are approximately 1,200,000 health care workers and there are 7.9 nurses per 10,000 population (PAHO, 2004). These data from PAHO reflect that the shortage of nurses is an international situation as least in the American Region.

According to ANA 2008 study, the majority of nurse participants in the survey (89%) said that work loads impact workplace safety. A work done in the US by Rogers, Hwang, Scott, Aiken, and Dinges (2004) found that working 50 hours or more per week increased the likelihood of percutaneous accidents 2.4 times. Similar results were found for those who worked in rotating shifts or on night shift, when compared with those who worked only at the daytime shift. A study of sharps-related accidents nurses also put in evidence that the probability of experiencing this type of injury has increased in rotating shifts (Smith et al., 2006). Mustafa et., al., (2006) in a university hospital of Turkey, studying the association between long hours of work and needlestick injuries in nurses found that working for more than 8 hours per day was significant statistically (p < 0.05). The conclusion of this study was that the unwanted effects of working long shifts and subsequent fatigue may contribute to the number of needlesticks injuries in this category of personnel.

Curting (2003) in a literature review of nurse staffing and effects on patient outcomes found data that can help to determine what is, appropriate staffing. Ratios are important. In fact, a consensus seems to be emerging supporting a range of from 4 to 6 patients per nurse in most acute care hospital inpatient settings, with no more than one to two patients per nurse in areas of higher risk patients’ care. However, ratios must be modified by the
nurses’ level of experience, the organization’s characteristics, and the quality of clinical interaction between and among physicians, nurses, and administrators.

Palucci (2003) found in hospitals in Brazil that extended work schedules of many nurses who begin their work already tired, inappropriate forms of work organization and extra activities to be executed were factors associated with needlestick injuries. Palucci and Carmo (2004) found in other Brazilian hospitals that the factors associated with needlestick injuries were: work overload, poor quality of disposal materials, inappropriate needles devices, professional negligence, aggression of patients, lack of attention and recapping needles. Similarly the authors Do, Ciesielski, Metler, Hammett, Li, and Fleming (2003) and Rapparini (2006), refer other factors may be associated with the occurrence of percutaneous injuries associated to the conditions under which work is performed, such as lack of training, work overload, and lack of personal protective equipment. Additionally, there are the mechanical factors related to the procedures performed, such as recapping used and the lack of sharps disposal containers.

Havlovic, Lau and Pinfield (2002) expressed that extended work schedules per week lead to an increased likelihood of accidents, which may be increased from a worker's exposure time to risk, and also by the fact that extended work schedules may promote fatigue and increase the risk of accidents.

In a cross-sectional study of 1,500 nurses employed on 40 units in 20 hospitals, poor organizational climate and high workloads derivate from short staffing were associated with 50% to 200% increases in the likelihood of needlestick injuries among hospital nurses (Clarke, et al., 2002). These results show a relationship between short staffing and needlestick injuries. Nurses from units with low staffing and poor organizational climates
reported twice as many needlestick injuries than nurses on well-staffed units. Thus, adequate staffing is not only safer for patients and prevents medical errors but it is also safer for nurses. Exposures to bloodborne pathogens (including needlesticks) were found in one study to be more common at the beginning and end of shifts (Macias, Hafner, Brillman, & Tandberg, 1996).

These findings corroborate with those presented in Table No. 12, where the group of nurses in the MCH had a mean of daily and weekly hours worked over labor regulations. The numbers of working hours in this study group could be a cause of accidents in the hospital. Furthermore, there is a correlation between the factors identified by different authors and the comments expressed by nurses in the focus group sessions as causes of accidents by needlestick injuries in the departments studied.

Regarding the results found in this study, it is not only a problem with the shortage of nurses but also a problem linked to multitasking functions. This coincides with the results of Marchant (2005), concerning the assessment of the "staffing" and "division of functions" which was also negative in their study. People believe that the current staffing levels, either in quantity, quality or distribution units and functions, are inadequate. Poor distribution of personnel creates multitasking, which prevents them from developing the technical and professional tasks originally assigned, with consequent dissatisfaction stems from the above.

1.3) Violence. One of the problems that emerged from focus group sessions in this study was related to the violence at the hospital, mainly during the night shifts. Nurses stated that it is common having violent episodes coming from patients’ family members or from external aggressors, as well as from other colleagues, and reasons why they do not feel
secured. They expressed that the hospital management has to adopt additional security measures to guarantee the protection of the employees while at workplace.

NIOSH (2002) defines workplace violence as violent acts (including physical assaults and threats of assaults) directed toward persons at work or on duty (p. 1, 2). Examples of violence include the following: 1) Threats: expressions of intent to cause harm, including verbal threats, threatening body language, and written threats. 2) Physical assaults: attacks ranging from slapping and beating to rape, homicide, and the use of weapons such as firearms, bombs, or knives. 3) Muggings: aggravated assaults, usually conducted by surprise and with intent to rob.

According to the Department of Labor Statistics (USBLS, 2002), the data indicate that hospital workers have a high risk of experiencing violence in the workplace. Nowadays more than 5 million U.S. hospital workers from many occupations perform a wide variety of duties. They are exposed to many safety and health hazards, including violence. Recent data indicate that hospital workers are at high risk for experiencing violence in the workplace. According to estimates of the Bureau of Labor Statistics (USBLS, 2002), 2,637 nonfatal assaults on hospital workers occurred in 1999 a rate of 8.3 assaults per 10,000 workers. This rate is much higher than the rate of nonfatal assaults for all private sector industries (2 per 10,000 workers).

In order to identify the magnitude of potential risk factors for violence within a major occupational population, a study was conducted by Gerberich et al., (2004). In 6300 Minnesota licensed registered (RNs) and practical (LPNs) nurses the findings show that non-fatal physical assault and non-physical forms of violence are frequent among both RNs and LPNs; such violence is mostly perpetrated by patients or clients. Hesket et al.,
(2003), in a study in the Canadian provinces of Alberta and British Columbia found that the violence was associated to the emotional abuse and its sources from patients, families, coworkers and physicians. These findings illustrate how important is to understand that hospitals are not always healthy workplaces and may increasingly be stressful and hazardous ones.

As was related in the previous paragraph, the hospitals as a workplace are not invulnerable to the violence, and are of concern for health care workers including nursing staff.

*Hospital Policies to Prevent Needlestick Injuries*

For this topic, the comments from the nursing staff about the hospital management policy were very negatives. Hospital management has the legal and administrative responsibility of implementing programs for occupational safety and health for healthcare workers. The Venezuelan laws establish that both public and private sectors must accomplish Policies and Regulations in order to develop safe places for workers and designed to prevent occupational diseases or accidents related to work. Healthcare organizations can improve staff safety by investing in programs with approaches to minimize risks, (needlestick injuries among others), providing protective equipment (sharp disposal containers, personal protective equipments and safety needles devices) as well as promoting educational programs to ensure compliance with Standard Precautions. This situation can be exemplified by the study done by Vaughn et al., (2004), in all non-federal hospitals in Iowa and where results show that a visible management support for staff is extremely important for safety and health for health care workers.
Perceptions of Nurses about Needlestick Injuries and Recapping Used Needles

Several nurses explained that recapping used needles was a preventive measure to protect them and other coworkers. This way to think might be related to the notion that nurses have a protective instinct towards others and always have in mind to recap the needle to prevent harm to others. It is important to mention that this protective instinct goes back to very beginning of the nursing profession in 1860, when Florence Nightingale changed the nursing job to a fully professional level. Paradoxically the nursing staff was aware that recapping used needles is an unsafe practice (not to be done) but they explained that they did it to be safe.

In the literature review there was not found any documents that illustrate the emotional impact of needlestick injuries by contaminated needles, however, the author found a video of NIOSH where there are two stories of American nurses who after their needlestick accident had seroconversion to HIV and HCV. In both cases, the participants expressed details about the events of the accident and their mood state during and after the accident (IAES, CORPOSALUD, PAHO, WHO, NIOSH, 2008). This is a powerful tool that might be employed to use as a needlestick preventive strategy in HCWs.

According to Junco et al., (2003), the perception of risk from sharp objects, a vital element is the level of knowledge about the regulations on injury prevention for these objects. Similarly they expressed that the lack of adequate means of protection in Cuba health institutions is conditioned by the actual economic conditions that may be a limiting factor for its reality.

Regarding the previous paragraph, the scenario for Venezuela is different because this nation has oil producers with enough financial resources that are not invested in safety
and health programs. Concha (2009) affirms that Venezuela in the last 10 years has obtained no less than 350 billion dollars regarding to the oil business, in opinion of the former Director of the Venezuelan Central Bank.

It is important to note that sharp injuries of health workers is not just a problem with infection or disease, but carries significant and prolonged emotional impact, when they are exposed to injuries, even in the absence of a serious infection. This impact is particularly severe when the injury causes exposure to HIV, although there is now excellent treatment with retroviral drugs, healthcare workers as well as coworkers and family members are affected emotionally.

**Needlestick Injuries Prevention Strategies**

The different preventive measures suggested by the nursing staff on how to avoid needlestick injuries were in general very similar to those found in the literature. These measures support nurses’ knowledge about the problem and the means to prevent it.

According to Wilburn and Eijkemans (2004), the most effective means of preventing the transmission of bloodborne pathogens is to prevent exposure to NSIS. Primary prevention of NSIS is achieved through the elimination of unnecessary injections and elimination of unnecessary needles. The implementation of education, Universal Precautions, elimination of needle recapping, and use of sharps containers for safe disposal have reduced NSIS by 80%, (CDC, 1997 & Jagger 1996) with additional reductions possible through the use of safer needle devices. Control measures to prevent NSIS following the traditional hierarchy of controls from most effective to least effective include (ANA, 2002; Foley & Leyden, 2005): a) Elimination of hazard-substitute injections by administering medications through another route, such as tablet, inhaler, or
transdermal patches, for example. Remove sharps and needles and eliminate all unnecessary injections. Jet injectors may substitute for syringes and needles. Other examples include the elimination of unnecessary sharps such as towel clips and using needleless intravenous (IV) systems; b) Engineering controls such as needles that retract, sheathe, or blunt immediately after use. These devices, after a decade of technologic advances, are widely available in North America and Europe and required by law in the United States; c) Administrative controls-policies and training programs aimed to limit exposure to the hazard. Examples include Universal Precautions, allocation of resources demonstrating a commitment to HCWs safety, a needlestick prevention committee, an exposure control plan, and consistent training; d) Work practice controls-examples include no recapping, placing sharps containers at eye level and at arms’ reach, checking sharps containers on a schedule and emptying them before they’re full, and establishing the means for safe handling and disposing of sharps devices before beginning a procedure; e) Personal protective equipment (PPE) barriers and filters between the worker and the hazard. Examples include eye goggles, face shields, gloves, masks, and gowns.

Experts agree that safety devices and work practices alone will not prevent all sharps injuries (Davis, & AHA, 1999). Significant declines in sharps injuries also require: education, a reduction in the use of invasive procedures (as much as possible), a safe work environment, and an adequate staff-to-patient ratio. These are parts of something called multi-component prevention approaches. One report detailed a program to decrease needlestick injuries that involves simultaneous implementation of multiple interventions: formation of a needlestick prevention committee for compulsory in-service
education programs; out-sourcing of replacement and disposal of sharps boxes; revision of needlestick policies; and adoption and evaluation of a needleless IV access system, safety syringes, and a prefilled cartridge needleless system (Gershon, Pearse, Grimes, Flanagan & Vlahov, 1999). This strategy showed an immediate and sustained decrease in needlestick injuries, leading researchers to conclude that a multi-component prevention approach can reduce sharps injuries.

These preventive measures are a necessary investment to preserve the health of the health care worker. Health management should make every effort to take preventive measures in health and safety. To illustrate the situation is what happened in the Aragua State in 2005. There were a reported and registered 260 cases of sharps accidents in workers in the health sector that required antiretroviral treatment with three drugs during one month which resulted in an investment total equivalent to $18,130.00 (CORPOSALUD, 2006).

Another example that illustrates terms of cost, according to the American Hospital Association AHA, (1999) one case of severe infection caused by bloodborne pathogens can generate $1 million for testing and monitoring among other things. Costs for monitoring high-risk exposure are almost $3,000 per injury caused by needles, if the HCW does not acquire a bloodborne pathogen infection. Some brands of needles with safety devices only cost 28¢ more than the common ones. California hospitals expect to save more than $100 million annually after the implementation of the legislation requiring use of safety devices (ANA, 1999). It is important to state that in both examples the money spent on treatments might well be used to invest in preventive health and safety.
The PRECEDE Component

In this section the discussion is framed around the PRECEDE component of the PPM, including predisposing, reinforcing, enabling, and environment factors.

Predisposing Factors

In this study, according to the findings of the quantitative and qualitative parts, it is feasible to say that despite the nurses’ positives attitudes and beliefs regarding recapping as well as the favorable results obtained after the educational strategy, recapping activities continue to be a routine procedure in some nurses’ daily practice. There are several reasons that could explain this behavior; it can be ranked from individual domain (attitudes, beliefs, values, perceptions) to the environment factors (physical and organizational climate). Regarding the individual domain, nurses’ perception of the risk could be influencing needle recapping. It appears that there is not agreement between the nurses’ knowledge about the potential hazard of this procedure, the Standard Precautions recommendation and the perception of risk regarding recapping theme. In this study, most of the nurses believed that recapping needles is an unsafe practice and so did not do so. However, paradoxically, for other nurses recapping used needles was a way to protect them and coworkers especially cleaning and maintenance staff because they believe that leaving an unsheathed needle is unsafe, therefore they would recap it.

These findings are in agreement with a study done by Whitby and McLaws (2002) in an Australian Hospital where it was shown that nurses have a culture of care, part of which is to protect their peers from unsafe practices. Furthermore, the perceived risk of infection following a needlestick injury varies across the population of nurses, despite them all working within the same environment.
Another study done in a hospital of Nigeria (2006) by Sadoh, Fawole, Sadoh, Oladimeji, and Sotiloye, showed that the compliance with UP recommendation about recapping also varied between health care workers, for example, trained nurses were more compliant than doctors. They are more likely to admit that they resheath used needles manually than nurses. For above examples, risk perception can act as a facilitator of safe practices in some situations and as an obstacle in others.

According to the nursing staff, it appeared that knowledge of self or other's experience serves as a predisposing factor toward the goal behavior of safe practices. In a study comparing medical students who had and had not been stuck by a used needle, Shalom, Riback, & Froom (1995), argued "those who experienced a needlestick while recapping were more likely to believe that recapping is more dangerous than the risk of downstream injuries" (as cited in Haiduven 2000b p. 847).

Ippolito et al., (1997) found that within the factors associated with the occurrence of accidents with sharp material between the nursing staff were mainly the recapping used needles, which are considered inappropriate and opposes Universal Precautions. It is important to emphasize that predisposing factors might need to be reevaluated periodically to determinate changes in attitudes, beliefs or perceptions that need to be corrected to maintain the level of commitment required to achieve the goal behavior. One way to change behavior is through education, but in order for education to be effective, as was mentioned by Bastable that the three domains of learning, cognitive, affective, and psychomotor, must be addressed (as cited in Haiduven, 2000b, p. 220). Knowledge is the target for the cognitive domain, skills in the psychomotor domain, and attitudes and beliefs in the affective domain (Haiduven, 2000b).
Reinforcing Factors

Positive reinforced behavior tends to be repeated while negative reinforced behaviors tend to be inhibited (Borkoswki, 2005). Employees learn to do the right thing by avoiding unpleasant situations. Peters argued that the positive and negative reinforcement, rewards, and punishments and their effect on health care worker safety behaviors, have been reported in other occupational settings (as cited in Haiduven, 2000b, p. 221). Peters reports that incentives have been demonstrated to positively influence safety compliance, while disciplinary action has not been found to increase compliance.

The positive influence of a positive event, nurses not having a needlestick injury, is a reward to keep doing safe procedures. Alternatively, the positive influence of a negative event on future safe practice of hospital nurses, not recapping after sustaining an injury, was demonstrated in this study. On the other hand, hospital management’s attitude was an example of negative reinforcing factor that influences the actual behavior or the undesired behavior.

The lack of education and training on safe issues was one of the most frequently reported aspects by nursing staff as a need to ensure that safe practices would be used in order to prevent needlestick injuries. However, the hospital management does not have regulations about the frequency and topics to be discussed. The influence of this matter could be affecting the attitudes as well the ability to perform routine procedures (see Figure 1). There are several ways to prevent needlesticks injuries such as adherence to Universal Precautions, safer disposal of clinical waste such as needles, and the raising of awareness among healthcare workers of the risks of needlestick injuries.
According to CDC Workbook for Designing, Implementing, and Evaluating a Sharps Injury Prevention Program (CDC, 2004) education and training of healthcare personnel is another important element of a sharps injury prevention program. However, CDC stated that healthcare workers are “adult learners” and then the process to learn is different from children because adults have existing knowledge, beliefs, and attitudes that influence what they take from or contribute to a learning opportunity. Unfortunately, much of the education and training of healthcare personnel is more typical of traditional schooling and is provided in the context of meeting regulatory requirements (CDC, 2004). As such, there is often a resistance or lack of personal motivation to attend lectures or view videotapes or other self-directed teaching tools. In the end, a requirement is met but learning may not have taken place (CDC, 2004). It is possible that for this reason, the effect of training on needlestick injuries prevention or compliance with Standard Precaution (formerly Universal Precautions) has varied.

In several studies the effectiveness of educational intervention has been positive to increase safety knowledge and performance (Burke, Sarpy, Smith-Crowe, Salvador, & Islam, 2006). Krishnan and Murphy (2006) found greater knowledge regarding management of exposures to blood and body fluids following face to face training than other educational interventions in a group of healthcare workers (medical and dental practices). In a work done by Trape-Cardoso and Schenck (2004), the authors found that after administrative interventions, engineering controls, and educational modules, there was a significant decrease in percutaneous injuries among medical and dental students and to nursing staff over the 5-year period.
According to Elliott, Keeton, and Holt (2005), findings on a study done in medical students show that with intensive teaching and self-learning programs, it is possible to improve the knowledge and therefore reduce the number of needlestick injuries. The work of Suchitra and Devi (2007) found that education has a positive impact on retention of knowledge, attitudes and practices in all categories of staff. There is a need to develop a system of continuous education for all types of staff.

Searching in the literature, there are some studies that used recapping needle rates as an outcome measure. One example is the study done by Ribner in 1990 where he developed an educational program that reported the rate of needle recapping in health care workers, in conjunction with emphasis on appropriate disposal procedures. Over 12 months, the rate of recapping needles used for venipuncture and for percutaneous medication injections fell from 61% to 16%. Reevaluation of the rate of recapping eight months later showed a continuation of these lowered rates. He also affirms that needlestick injuries were too few in numbers during the study period to detect any change accompanying the decreased recapping rate.

It is important to highlight that in the studies where education was effective, it was combined with other interventions as was mentioned by Haiduven (2000b). For instance, convenient placement of sharps containers, communication of needlestick injury data to employees among others, as was found in the study of Haiduven et al., (1992, and 1995). This educational process has to be repeated at regular intervals to produce a booster effect (Haiduven et al., 1995).
Enabling Factors

Lack of availability and accessibility of sharp containers, needle safety devices, personal protective equipment, and safety support from the hospital were reported to be negative enabling factors by nurses in the study. It is obvious that this factor is one of the most relevant in this investigation because if the institution does not have a positive attitude to purchase equipment for prevention, the nursing staff and other healthcare workers are at risk to acquire bloodborne diseases as well as to not comply with Standards Precautions. These findings are in opposition to other studies where positive safety climate and institutional support significantly influenced compliance with safe procedures and Universal Precautions in the health care work environment (Clark et. al., 2002, Gershon et al., 1999).

According to Gershon, et al., (2000), organizations with strong safety cultures consistently report fewer injuries than organizations with weak safety cultures. This happens not only because the workplace has well-developed and effective safety programs, but also because management, through these programs, sends cues to employees about the organization's commitment to safety. In a study done in one healthcare organization linked measures of safety culture with both employee compliance with safe work practices and reduced exposure to blood and other body fluids, including reductions in sharps related injuries (Gershon, 1996).

These investigations corroborate the concept that strong management commitment to safety issues are characteristics of successful safety programs in occupational settings.
Environmental Factors

These factors were widely explained in the discussion of circumstances related to needlestick injuries and recapping used needles. The working environment of the nurses’ hospital emphasizes the importance of the effect of the environment on the actual and goal behavior. Hospital management has to understand that there are environmental factors affecting the safety of nursing staff and other health care workers in order to design interventions to modify and improve it, removing obstacles or reinforcing facilitators to safe practice in any occupational setting.

Stone, Clarke, Cimiotti, and Correa (2004), in a literature review, reported that monitoring and improving the working conditions of nurses are likely to improve the quality of health care by decreasing the incidence of many infectious diseases.

Limitations and Strengths of the Study

Regarding Aims

An aim of this study was to obtain estimates of the incidence of needlestick injuries in nurses from the selected departments, but the author could not achieve this objective because the data were too few. Additionally, the data from 2004 to 2006 from the Maracay Central Hospital did not allow to the researcher to obtain the number of nurses with NSIS discriminated by the departments studied. For the year 2007 and 2008 the data used was from CORPOSALUD Occupational Safety and Health Department. Another aim related to report the results of the study to nurses and hospital management, was partially achieved. The results were analyzed and discussed with the authorities but is still in the process to be presented to nurses. The authorities were very interested in the results, but at the same time, very concerned because they do not manage their own
budget. This comes from the Ministry of Health and they might not be able to buy the sharps disposal containers and other safety devices.

Study Design

The study design did not include use of control groups. This may have strengthened the design of the study and should be considered for future studies.

As was commented in the methodology section, the study was based on a before and after design. The number of needles was counted before the focus group sessions started (November 2006-February 2007) and were counted after the educational strategy finished (October 2007). The time invested during the after phase (November 2007-February 2008) could have influenced the increase in the number of no recapped needles found in the last weeks of the recollection part (Table 6). It is possible that during that time the information provided in the education strategy had been forgotten and so the nursing staff began to recap used needles again. This situation is possible to find because the learning/training process have to be reinforced periodically in order to keep the goal behavior. The frequency of educational/training program implemented by the hospital management has to be periodic to avoid the extinction process.

Focus Group

Sample Selection

As was mentioned in the methodology chapter, a convenience sample (purposeful sampling) of nurses was used from each department involved in the study. The focus group technique is characterized by homogeneity; participants have something in common, in this case experience on Maracay Central Hospital tasks. In this aspect, the representativeness of the sample was enhanced because the characteristics of nursing
staff who were in the focus group did not differ from other hospital’s nurses. In fact, the sample's demographic characteristics results were similar to other studies done in the same hospital and for the information obtained from the MCH nurses’ office (Table 8) that illustrates the representative nature of data. The selection of the nurses to participate in the focus group was made by the person who was designated in each department by the author, thus the major limitation of the sampling plan could be the lack of moderator control in selection of the subjects.

**Methodological Issues**

The potential bias of the investigator as moderator in influencing the responses of the participants is a potential limitation in any type of qualitative study. However, in this study, this threat was minimized by adhering to the original questions in the twelve focus group (Appendix H); not making judgmental comments; not correcting the participants' responses; and attempting to minimize personal movements, particularly head nodding (Krueger, 2000). The same introduction (Appendix F) was read in all focus group sessions.

**Operative Issues**

According to focus group experts, these sessions had to be performed in a comfortable and permissive environment in order to enhance the discussion. However, in this study, the focus group sessions and educational strategies were developed in the same place within the working hours of nurses. The dynamics of work of the nursing staff did not allow focus group to be held away from the daily activities or work environment to avoid distractions or interruptions as well work pressure that prevent the performance of the discussions. However, it was not possible and hence the duration of each focus group and
educational sessions had a maximum of two hours. Therefore, despite this limitation, the objectives of the discussion were achieved and the participants relayed personal experiences.

**Limited Previous Qualitative Studies**

There are few studies in the literature that have used qualitative methodology of focus group to establish the factors associated with needlestick injuries and recapping used needles. In this sense, it was difficult to find studies to compare with this study. The only study found was the doctoral dissertation of Haiduven (2000b) where she studied the circumstances surrounding blood exposures and needle safety practices in home health care nurses. The author considers that more studies in the health field can be done using this methodology but not only to be used in the diagnosis or descriptive section but as well as in the development of intervention strategies. However, for the author, the experience was invaluable because it was possible to investigate in depth aspects of the everyday life of a group of health care workers with many needs.
CHAPTER EIGHT: CONCLUSIONS AND IMPLICATIONS

In this section, the major conclusions of this study are summarized, recommendations and implications for clinical practice articulated and areas for future studies suggested.

The major findings in this study were:

1. The participation of nursing personnel in the focus group sessions was fundamental to corroborate that needlestick injuries in the MCH are not associated exclusively with individual risk behaviors or personal protection. It was evident that these accidents are strongly influenced by the physical environment in which nurses are forced to work and perform their work, as well as the organizational climate of the hospital. The needle recapping activities continue to be a routine procedure in the some nurses’ daily practice. Therefore, the hospital management can not underestimate the importance of evaluating the work environment (physically and organizationally).

2. The educational strategy implemented after the focus group sessions was successful, according to the finding showed in Tables (13, 14, and 16), where the numbers of recapped needles were lower after the educational strategy.

3. The odd ratios obtained in the four departments could indicate that the educational strategy was an excellent intervention for reducing the recapping practices. The 53% of decrease of no recapped needles showed that this type of intervention should be developed periodically for the prevention of needlestick injuries. It is important to emphasize the fact that only one meeting of two hours of
length/duration could achieve positive changes, showing that nursing staff is motivated to change in order to improve safe practices despite the working conditions.

4. The positive response of nursing staff in the focus group sessions allowed not only obtaining information important for the study but at the same time it was an important space for nurses’ communication to share work and personal experiences about recapping used needles and needlestick injuries. In all focus group sessions nursing staff stated the need to have other opportunities like these to share experiences and knowledge. For these reasons, the focus groups should also be considered as an intervention. These groups allowed to nurses to raise awareness about the recapping used needles and needlestick injuries as important problems that need to be faced by health authorities and health care workers from the Maracay Central Hospital.

5. The PRECEDE component of PPM allowed the investigator to obtain useful information about hospital nurses’ actual behavior (unsafe practices) and the goal behavior (safe practices). Concerning the findings regarding predisposing, reinforcing, enabling and environmental factors, it appeared that these factors could have positively or negatively influenced the hospital nurses attitudes and beliefs regarding recapping activities (Figure 3).

Implications/Recommendations for Clinical Practice

It is possible that findings from this study may be used to design interventions to change not only the nurses’ safe practices but also the environmental conditions at the
Maracay Central Hospital. The following recommendations for improving work practice were developed based on the information obtained from the nurses' comments:

**Organizational/Administrative**

1. Engage hospital management in creating a positive safety climate:
   a) Improving physical conditions (handwashing facilities, poor lighting, and unsanitary conditions).
   b) Improving organizational climate (stress, shortage of nurses, work overload, violence).
   c) Acquiring safe products (e.g. sharps disposal containers, and personal protective equipment).
   d) Incorporating new devices such as needles that retract, sheathe or blunt after use.

2. Involve nurses and hospital management in development of policies, procedures, and guidelines regarding needlestick injuries and other occupational safety issues.

3. Include nurses and other health care workers from the hospital in the creation, development and implementation of a needlestick injuries prevention committee. This committee would require active participation from all members. The committee’s charge would be the responsibility of evaluating the circumstances of all blood exposures in each hospital department for purposes of complying with the regulations about bloodborne pathogens as well as for designing interventions for prevention of future injuries.
Educational/Training

1. Advocate/suggest that hospital management periodically update the departments’ nurses on the risks of acquiring a bloodborne infection from a needlestick injury. The information available from the CDC, NIOSH, OSHA and the National Institute of Prevention, Health and Safety of Work (INPSASEL) can be used for this purpose.

2. Promote continuing education within different hospital departments about safe practices, and aspects about Venezuelan Occupational Safety and Health legislation among others. In this aspect, nursing staff from each department can suggest additional topics that would be of interest for those personnel.

3. Develop practice scenarios simulating the environmental conditions of the hospital as well as needlestick accidents. Conduct sessions to troubleshoot potentially hazardous situations and to develop strategies for manipulating the environment as well as needlestick injuries. For these activities videos, lectures, poster, health care workers’ personal experiences etc. can be used.

4. Include health care workers in research in the health and safety field.

Future Research

Results of this study have numerous implications for future research in safe practice for health care workers in Venezuelan public hospitals. The descriptive nature of this study provided valuable information regarding circumstances surrounding recapping as a cause of needlestick injuries in Maracay Central Hospital nurses. Future research must be conducted to add to this preliminary information, replicate in other hospital departments, and extend the findings to other settings in Maracay and Aragua health care centers.
where safe practice is the goal health behavior. Hospital management and CORPOSALUD as main health authorities in Aragua State can/may participate actively in these future research.

According to the results of this study, the nursing staff’s attitudes about recapping are linked mainly to the lack of sharps disposal containers. It could be interesting to be study what would be the effect in the attitude of nursing staff about recapping after the sharps disposal containers are available at hospital departments. The rationalization for this topic is related to healthcare personnel who have difficulties changing long-standing practices.

Another aspect to be investigated is the method of disposal of sharps disposal containers, and what it’s the impact on the outdoor environment will be. The MCH has two incinerators but according with the information obtained from the chief of cleaning and maintenance department, they are actually not working appropriately.

The increasing number of needlestick injuries in the nursing students as well as in the medical students is a very concerning issue based on the implication of these findings. The students are working at the hospital, where there are several factors that influence the needlestick accidents, but the legal responsibility about any consequence of a needlestick and sharp exposure (bloodborne disease) is directly linked to the University of Carabobo as the teaching institution. Therefore, it is very important to investigate the factors or circumstances related to needlestick injuries in these groups.

The PROCEED component of the PPM was not used in this study. However, from the PRECEDE component (predisposing, reinforcing enabling and environmental factors) emerged valuable information from the nursing staff’s comments, that can be utilized as a base for future research. PROCEED component should be used to assess/identify the
policies, regulations and organizational factors that may influence safe practices in nursing staff and other health care workers (Figure 4). The figure 4 shows the possible relationship between the different phases of the PROCEED component and how these constructs would influence in the PRECEDE factors as well as in the nurses’ behaviors (use of safe practices). For example, it would be important to assess/identify if the MCH management has policies, procedures and regulations about occupational safety and health issues and how these aspects would influence the PRECEDE component as well as in the nurses’ behavior regarding the use of safe practices. Additionally, from this study several aspects of organizational factors were identified by participants in the focus group sessions such as shortage of nurses and work overload, stress, and violence. Therefore, in future research the model will need to include other organizational factors that might influence the behavior of nurses in terms of safe practice. Other research should be related to study in depth the factors that were mentioned in this study.

Maracay Central Hospital nurses work in a very complex environment. The findings showed that there are several negative factors regarding recapping used needles. This practice can generate needlestick injuries that are a serious risk of potential transmission of bloodborne pathogens (Hepatitis B, C and HIV) after a needle accident in nurses and other health care workers. For this reason, it is essential that those negative factors have to be removed in order to prevent future exposure incidents. In this aspect, nurses and hospital management have to engage in the commitment to work together in the occupational and health field to ensure compliance with safe work practices.
Figure 4. Potential Use of PROCEED Component of the PPM for Future Research
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APPENDICES
APPENDIX A: Recommended Post Exposure Prophylaxis for Exposure to Hepatitis B

TABLE 3. Recommended postexposure prophylaxis for exposure to hepatitis B virus

<table>
<thead>
<tr>
<th>Vaccination and antibody response status of exposed workers*</th>
<th>Source HBsAg positive</th>
<th>Source HBsAg negative</th>
<th>Source unknown or not available for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unvaccinated</td>
<td>HBIG(^1) x 1 and initiate HB vaccine series(^6)</td>
<td>Initiate HB vaccine series</td>
<td>Initiate HB vaccine series</td>
</tr>
<tr>
<td>Previously vaccinated</td>
<td>No treatment</td>
<td>No treatment</td>
<td>No treatment</td>
</tr>
<tr>
<td>Known responder**</td>
<td>HBIG x 1 and initiate vaccination or HBIG x 2(^8)</td>
<td>No treatment</td>
<td>If known high risk source, treat as if source were HBsAg positive</td>
</tr>
<tr>
<td>Known nonresponder*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibody response unknown</td>
<td>Test exposed person for anti-HBs(^1)</td>
<td>No treatment</td>
<td>Test exposed person for anti-HBs</td>
</tr>
<tr>
<td>1. If adequate,** no treatment is necessary</td>
<td></td>
<td></td>
<td>1. If adequate,(^4) no treatment is necessary</td>
</tr>
<tr>
<td>2. If inadequate,(^*) administered HBIG x 1 and vaccine booster</td>
<td></td>
<td></td>
<td>2. If inadequate,(^*) administer vaccine booster and recheck titer in 1–2 months</td>
</tr>
</tbody>
</table>

* Persons who have previously been infected with HBV are immune to reinfecion and do not require postexposure prophylaxis.

\(^1\) Hepatitis B surface antigen.

\(^6\) Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly.

\(^7\) Hepatitis B vaccine.

** A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs ≥10 mIU/mL).

\(^8\) A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs < 10 mIU/mL).

\(^9\) The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

\(^4\) Antibody to HBsAg.

APPENDIX B: Recommended HIV Pericutaneous and Mucous Membrane Post Exposure Prophylaxis

<table>
<thead>
<tr>
<th>Exposure type</th>
<th>HIV-Positive Class 1*</th>
<th>HIV-Positive Class 2*</th>
<th>Source of unknown HIV status†</th>
<th>Unknown source‡</th>
<th>HIV Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less severe*</td>
<td>Recommend basic 2-drug PEP</td>
<td>Recommend expanded 3-drug PEP</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors§</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIV-infected persons is likely</td>
<td>No PEP warranted</td>
</tr>
<tr>
<td>More severe*</td>
<td>Recommend expanded 3-drug PEP</td>
<td>Recommend expanded 3-drug PEP</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP** for source with HIV risk factors§</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIV-infected persons is likely</td>
<td>No PEP warranted</td>
</tr>
</tbody>
</table>

* HIV-Positive, Class 1 — asymptomatic HIV infection or known low viral load (e.g., <1,500 RNA copies/mL). HIV-Positive, Class 2 — symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of post-exposure prophylaxis (PEP) should not be delayed pending expert consultation, and because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

† Source of unknown HIV status (e.g., deceased source person with no samples available for HIV testing).

‡ Unknown source (e.g., a needle from a sharps disposal container).

§ Less severe (e.g., solid needle and superficial injury).

** The designation "consider PEP" indicates that PEP is optional and should be based on an individualized decision between the exposed person and the treating clinician.

¶ If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.

* More severe (e.g., large-bore hollow needle, deep puncture, visible blood on device, or needle used in patient's artery or vein).

APPENDIX B: Continued

<table>
<thead>
<tr>
<th>Exposure type</th>
<th>HIV-Positive Class 1</th>
<th>HIV-Positive Class 2</th>
<th>Source of unknown HIV status*</th>
<th>Unknown source†</th>
<th>HIV-Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small volume**</td>
<td>Consider basic 2-drug PEP</td>
<td>Recommend basic 2-drug PEP</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP† for source with HIV risk factors††</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP†† in settings where exposure to HIV-infected persons is likely</td>
<td>No PEP warranted</td>
</tr>
<tr>
<td>Large volume††</td>
<td>Recommend basic 2-drug PEP</td>
<td>Recommend expanded 3-drug PEP</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP†† for source with HIV risk factors††</td>
<td>Generally, no PEP warranted; however, consider basic 2-drug PEP†† in settings where exposure to HIV-infected persons is likely</td>
<td>No PEP warranted</td>
</tr>
</tbody>
</table>

* For skin exposure, follow-up is indicated only if there is evidence of compromised skin integrity (e.g., dermatitis, abrasion, or open wound).
† HIV-Positive, Class 1 — asymptomatic HIV infection or known low viral load (e.g., <1,500 RNA copies/mL). HIV-Positive, Class 2 — symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of postexposure prophylaxis (PEP) should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.
‡ Source of unknown HIV status (e.g., deceased source person with no samples available for HIV testing).
§ Unknown source (e.g., splash from inappropriately disposed blood).
** Small volume (i.e., a few drips).
†† The designation, “consider PEP,” indicates that PEP is optional and should be based on an individualized decision between the exposed person and the treating clinician.
†‡ If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.
†§ Large volume (i.e., major blood splash).

APPENDIX C: PRECEDE-PROCEED MODEL

PRECEDE-PROCEED

Good afternoon and welcome to the session today. Thank you for taking the time to discuss about recapping needles. My name is Luis Galindez and I am the researcher who is conducting the focus group for this project. I am a Ph.D. student at the University of South Florida (USF) at Tampa. I am interested in hearing your viewpoints and opinions on issues relating recapping needles at the Maracay Central Hospital. I will be asking a variety of questions for the group to discuss.

I will be reading this introduction and the discussion questions. I plan to meet with two other groups, and I want to be sure to say the same thing to each group.

The purpose of these focus group is to get input on what factors are associated with recapping needles and how do you think that this situation can be modified to protect nurses and other health care workers in the hospital. This research is being conducted jointly with the University of Carabobo.

I am not employed by your hospital and I do not receive funding from it or any other health institution from Aragua or Venezuela. This is a study that is serving as my doctoral dissertation from the University of South Florida, Tampa, and is funded partially by the CODECIH of the University of Carabobo.

There are no rights or wrong answers to any of the questions I will ask today. However, people may have different points of view. Please feel free to share your point of view, even if it differs from what others have said. Please feel free to expand on what others have said.

My role in this focus group is to serve as a facilitator. I will ask questions for the group to discuss. I will be accompanied by Victor Loreto who is a researcher from the University of Carabobo. Victor will help clarify any issues they think are unclear.

Before we begin, let me remind you of some ground rules. Because this is a research project, we will be tape recording this session. Therefore, you will need to speak up, and only one person should speak at a time. I don't want to miss any of your comments.

Please do not disclose anything during the discussion that is personal and/or confidential. Please don't discuss what was said during the discussion outside of the focus group. During the discussion, please don't refer to anyone's name. My goal is to preserve your confidentiality. As stated in the consent form that you signed, the tapes will be held by the researchers in a locked cabinet.

This session will last approximately 2 hours, and we will not take a formal break. Feel free to get up at any time if you need to, but please do so quietly.

We will start by going around the table and having you introduce yourselves. The tape will not be started until after these introductions.
APPENDIX D: Continued

Modelo de introducción para la reunión del grupo focal
Estudio del reencapuchado en agujas usadas y heridas por pinchazos en el Hospital Central de Maracay, (HCM) Aragua Venezuela

Introducción del moderador

Buenos días y bienvenidos a la sesión de hoy. Gracias por tomar parte de su tiempo para asistir a esta reunión. Mi nombre es Luis Galíndez y soy el investigador quien conducirá las reuniones con los grupos focales en este estudio. Soy estudiante de doctorado en la Universidad del Sur de la Florida (USF) en Tampa. Estoy interesado en oír sus opiniones y puntos de vista en aspectos relacionados con la reinserción de la tapa plástica en agujas usadas y heridas por pinchazos en el HCM.

Leeré esta introducción así como las preguntas para la discusión. Mi plan es reunirme con otros grupos y deseo estar seguro de decir lo mismo en cada grupo.

El propósito de estos grupos focales es obtener información sobre cuales son los factores asociados con el reencapuchado en agujas usadas y heridas por pinchazos y como ustedes piensan que esta situación pueda ser modificada para proteger la salud de los trabajadores en este hospital.

Yo no trabajo para este hospital y no recibo financiamiento ni de esta ni de otra institución de salud del estado Aragua o de Venezuela. Este es un estudio que sirve para mi tesis doctoral en la (USF) y es financiada parcialmente por la Universidad de Carabobo (UC).

No existen respuestas correctas o incorrectas en ninguna de las preguntas que se harán hoy. Sin embargo, ustedes pueden diferir en puntos de vista. Por favor, compártanlos con nosotros aún cuando sean diferentes. A la vez profundice en comentarios hechos por otros compañeros (as).

Mi rol en esta reunión es servir de facilitador. Haré las preguntas al grupo para establecer la discusión. Estaré acompañado el Licenciado Víctor Loreto es investigador de la UC. Víctor ayudará a clarificar cualquier aspecto que ustedes consideren no lo esta debidamente. Víctor también tomará apuntes de la discusión.

Ante de comenzar, permítanme recordarles algunas reglas básicas para la reunión. Debido a que esto es una investigación, esta sesión será grabada. Por lo tanto, ustedes deberán hablar en voz alta y solamente una persona podrá hablar a la vez. Yo no quiero perderme ninguno de sus valiosos comentarios.

Por favor, no revele nada durante la discusión que sea personal o confidencial. Por favor, no comente afuera del grupo focal lo que se dijo durante la discusión. Durante la discusión, por favor, no mencione nombres de ninguna persona. Mi objetivo es prevenir y preservar su confidencialidad. Como esto escrito en el documento de consentimiento que usted firmó, las cintas de grabación serán guardadas por el investigador en un gabinete con cerradura.

Esta sesión durará aproximadamente 2 horas, no habrá un receso formal. Puede levantarse en cualquier momento pero por favor hágalo en silencio.

Empezaremos con una ronda alrededor de la mesa y cada quien se presentará. La grabación no comenzará hasta que se terminen las presentaciones individuales.

Alguna pregunta? Comencemos!
APPENDIX E: Field Notes Form Used in Focus Group Sessions in English and Spanish

FIELD NOTES FORM USED IN FOCUS GROUP

Information about the Focus Group

Date of Focus Group: ____________ Location: _____________________

Number of Participants: ____

Moderator Name: _______________________________

Assistant Name: _______________________________

Time started: ________ Time ended: ___________

Responses to Questions

1) "Before we get into specific questions about recapping needles and needlesticks injuries in the hospital, we would like to get a better understanding of the conditions under which you work every day. Please describe conditions or circumstances that are present in the hospital work environment."

Potential follow-ups:

Describe the physical set-up (e.g. lighting, beds, electrical outlets, hand washing facilities).

Describe organization factors (safety climate, policies and procedures, work assignments, planning time, education)

Brief Summary/ Key Points:
Notable Quotes:
Comments/Observations

2) Please describe your current system for disposing of used needles in this hospital

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations
APPENDIX E: Continued

3) What circumstances or procedures do you think can contribute to needlestick injuries in this hospital?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

4) Describe any recent exposure incidents involving bloodborne pathogens that could have been prevented in this hospital.

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

5) Do you recap used needles? What influences a health care worker’s decision to recap needles in this hospital?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

6) Think back to a time when you may have had to recap a needle or place a used needle in something other than a sharp container. Tell us what happened? What particular circumstances do you think influenced this action?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

7) How do you think that recapping needles can be eliminate or controlled in this hospital?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

8) Please describe polices and procedures used by this hospital to avoid needlesticks injuries.

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations
9) What is the most important thing you would do to assure that work is done safely?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations

10) Any other comments?

Brief Summary/Key Points:
Notable Quotes:
Comments/Observations
ESQUEMA USADO PARA LA TOMA DE NOTAS EN LA SESIONES DE LOS GRUPOS FOCALES

Información acerca del grupo focal

Fecha del grupo focal: ___________ Departamento: _____________________
Número de participantes: ____
Nombre del Moderador: _______________________________
Nombre del Asistente: _______________________________
Tiempo de inicio: ________ Tiempo de finalización: ___________

Respuestas a las preguntas:

1. Antes de introducirnos en las preguntas específicas acerca del reencapuchado de agujas usadas y heridas por pinchazos en el hospital, nos gustaría obtener un mejor conocimiento de las condiciones bajo las cuales ustedes trabajan todos los días. Por favor describa condiciones o circunstancias que están presentes en el ambiente laboral hospitalario.

   Por ejemplo: describa aspectos físicos (iluminación, número de camas asignadas, lavamanos cercanos etc.)

   Describa factores organizacionales tales como (clima de seguridad, políticas y procedimientos, asignación de tareas, duplicidad de tareas, planificación del tiempo de trabajo, entrenamiento o cursos de actualización, etc.)

   Resumen/ Palabras claves:
   Notables Acotaciones:
   Comentarios/Observaciones:

2. Por favor describa el procedimiento actualmente utilizado en el hospital para desechar las agujas usadas.

   Resumen/ Palabras claves:
   Notables Acotaciones:
   Comentarios/Observaciones:
3. Que circunstancias o procedimientos piensa usted puedan contribuir a pinchazos por agujas en el hospital?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

4. Describa algún incidente reciente en un personal de enfermería que involucre a microorganismos (patógenos) transmitidos por sangre que haya podido ser prevenido en el hospital.

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

5. Usted reinserta la tapa plástica en agujas usadas? Que factor o factores pudieran influenciar a una enfermera (o) la decisión de reinserta la tapa plástica en el hospital?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

6. Piense retrospectivamente si usted ha tenido un accidente por pinchazo al reinsertar la tapa plástica en agujas usadas. Que pensó en el momento del accidente? Cual fue su reacción inmediata? Como manejo la situación? Que circunstancia en particular piensa usted pudiera haber influido en ese accidente?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

7. Como piensa usted que la reinserción de la tapa plástica en agujas usadas pueda ser eliminada o controlada en el hospital?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:
APPENDIX E:  Continued

8. Por favor describa políticas o procedimientos usados por el hospital para evitar heridas por pinchazos.

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

9. De acuerdo a su criterio cual seria lo más importante para asegurar que el trabajo que usted realiza se haga con seguridad?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:

10. Algún comentario adicional que desean hacer?

Resumen/ Palabras claves:
Notables Acotaciones:
Comentarios/Observaciones:
APPENDIX F: Sample Cover Letter Used for Member Checks in English and Spanish and Sample of Materials Used for Member Checks in Spanish

SAMPLE COVER LETTER USED FOR MEMBER CHECKS

Date:

Dear participant,

As a result of your participation in the original set of focus group sessions for this study, you are being requested to give your opinions on the study’s preliminary findings. This will be done in a one-hour discussion between you and Luis Galindez. You will be asked to give written and verbal feedback to some written materials from the study.

This procedure is called “member checking” and its purpose is to measure the trustworthiness of the findings from focus group sessions. The purpose of this discussion is to review the findings for factual and interpretative accuracy.

Thank you very much for agreeing to participate in this member check. Should you have any questions, please call Luis Galindez at 0412-3450609.

Luis Galindez, MD, MPH
Principal Investigator
CARTA DE PRESENTACIÓN PARA LOS MIEMBROS REVISORES

Fecha:

Estimado (a) participante,

Como resultado de su participación en la discusión de los grupos focales en el presente estudio, usted ha sido seleccionada (o) para emitir su opinión acerca de los resultados preliminares. Esto se realizará con una reunión de una hora de duración entre usted y mi persona. Se le solicitará que aporte información tanto escrita como verbal de algunos de los materiales escritos del estudio.

Este procedimiento se denomina “miembros revisores” y su propósito es medir la veracidad de los hallazgos aportados por ustedes en la reunión de los grupos focales. El propósito de esta discusión es revisar los resultados para su precisión interpretativa.

Muchas gracias por aceptar participar como miembro revisor. Si usted tiene alguna pregunta, por favor contácteme al teléfono 0412-345-0609.

Luis Galindez MD, MPH
Principal Investigator
APPENDIX F:  Continued

SAMPLE OF MATERIALS USED FOR MEMBER CHECKS

Instructions for Review of Findings

1. After reading this summary of findings, please give your judgment of the overall credibility of these findings.

_______________________________________________________________________  
_______________________________________________________________________  
_______________________________________________________________________  

2. Is there anything you think was missed? If so, please add here:

_______________________________________________________________________  
_______________________________________________________________________  
_______________________________________________________________________  

3. Is there anything you would like to add? If so, please do so here.

_______________________________________________________________________  

MUESTRA DEL MATERIAL USADO POR LAS PERSONAS REVISORAS DEL RESUMEN DE LOS GRUPOS FOCALES

Instrucciones para revisión de los resultados

1. Después de leer el resumen de los resultados, por favor, emita su opinión acerca de la representatividad de estos hallazgos. Usted como participante en el grupo focal considera que estos resultados son cónsonos y reales con lo expresado y discutido por el grupo en la sesión respectiva.

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

2. Hay algo que se haya omitido de la discusión? Si es así, por favor agréguelo aquí:

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________

3. Le gustaría agregar algo? Si es así, por favor añádalo aquí:

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
Resumen Preliminar de los hallazgos obtenidos en la reunión con los grupos focales

Los factores asociados al reencapuchado y a los accidentes por pinchazos en el Hospital Central de Maracay fueron organizados en tres principales áreas y en cada una de ellas está el resumen de los temas comentados por ustedes.

**Ambiente de Trabajo. Condiciones físicas:** Deficiencia de iluminación, problema de déficit de lavamos, lavamanos dañados, problema de aseo del hospital, problemas con la luz eléctrica.

**Condiciones organizacionales:** Exceso de pacientes con respecto al número de camas existentes, déficit de personal de enfermería, Exceso de trabajo, stress, ausencia de vigilancia, violencia.

**Políticas hospitalarias para la prevención de los pinchazos:** ausencia de política en materia de prevención, ausencia de equipos para desechar agujas usadas, falta de equipos de protección personal, falta de motivación por parte de la directiva hospitalaria para la prevención de accidentes por pinchazos.

**Percepción del personal de enfermería ante los accidentes por pinchazos:** relatos de experiencias personales de accidentes por pinchazos por reencapuchado de agujas u otras causas, relatos de otras experiencias de compañeras o compañeros de trabajo, relatos de otras u otros compañeros de enfermedades infecciosas asociadas a pinchazos.
Medidas preventivas para evitar el reencapuchado y los accidentes por pinchazos: técnicas y de formación: adquisición de equipos para el descarte de las agujas usadas, dotación adecuada y oportuna de los equipos de protección personal, incorporación de nuevas tecnologías como las agujas retractiles, realización de talleres de capacitación y de adiestramiento en forma periódica sobre bioseguridad, identificación de factores de riesgos laborales y condiciones peligrosas, entrenamiento en equipos con nuevas tecnologías de seguridad, talleres con aspectos relacionados con leyes, reglamentos y normas técnicas sobre la materia de Salud y Seguridad Laboral. Organizativas administrativas: incorporación de personal, mejoramiento del ambiente de trabajo, políticas para el seguimiento de accidentes por pinchazos.

MUCHAS GRACIAS POR SU VALIOSA COLABORACION
APPENDIX G: Study Phases

Phases of the study about recapping used needles and needlestick injuries in the Maracay Central Hospital

<table>
<thead>
<tr>
<th>Study Phases</th>
<th>Duration</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>First</strong></td>
<td></td>
<td></td>
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<tr>
<td>Diagnosis period</td>
<td>6 months (November 2006-April 2007)</td>
<td>Focus group sessions&lt;br&gt;➢ Demographic questionnaire&lt;br&gt;➢ Discussion of the questions&lt;br&gt;Visits:&lt;br&gt;➢ The departments to collect the containers with the used needles</td>
</tr>
<tr>
<td>To gain understanding about predisposing factors of knowledge, attitudes, beliefs, values, &amp; perceptions of nurses that influence motivation for a behavior (recapping)&lt;br&gt;To collect data that can be used as baseline for evaluation purpose:&lt;br&gt;• demographic &amp; work data&lt;br&gt;• # of recapping used needles&lt;br&gt;• # of needlestick injuries in each of the department selected</td>
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<tr>
<td><strong>Second</strong></td>
<td></td>
<td></td>
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<tr>
<td>Implementation/Intervention period</td>
<td>5 months (Jun-October 2007)</td>
<td>Educational strategy sessions&lt;br&gt;➢ Discussion of the material&lt;br&gt;➢ Application of test (pre &amp; post)</td>
</tr>
<tr>
<td>To develop an educational intervention program at the selected departments</td>
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<tr>
<td><strong>Third</strong></td>
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<tr>
<td>Follow up/Evaluation period</td>
<td>4 months (November 2007 – February 2008)</td>
<td>Visits:&lt;br&gt;➢ The departments to collect the containers with the used needles</td>
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<tr>
<td>To evaluate the educational strategy</td>
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APPENDIX H: Focus Group Questions in English and Spanish

Focus Group Questions

1. "Before we get into specific questions about recapping needles and needlesticks injuries in the hospital, we would like to get a better understanding of the conditions under which you work every day. Please describe conditions or circumstances that are present in the hospital work environment."

Potential follow-ups:

   Describe the physical set-up (e.g. lighting, beds, electrical outlets, hand washing facilities).

   Describe organization factors (safety climate, policies and procedures, work assignments, planning time, education)

2. Please describe your current system for disposing of used needles in this hospital

3. What circumstances or procedures do you think can contribute to needlestick injuries in this hospital?

4. Describe any recent exposure incidents involving bloodborne pathogens that could have been prevented in this hospital.

5. Do you recap used needles? What influences a health care worker’s decision to recap needles in this hospital?

6. Think back to a time when you may have had to recap a needle or place a used needle in something other than a sharp container. Tell us what happened? What particular circumstances do you think influenced this action?

7. How do you think that recapping needles can be eliminate or controlled in this hospital?

8. Please describe polices and procedures used by this hospital to avoid needlesticks injuries.

9. What is the most important thing you would do to assure that work is done safety?

10. Any other comments?
APPENDIX H: Continued

**Preguntas a los Grupos Focales**

1. Antes de introducirnos en las preguntas específicas acerca del reencapuchado de agujas usadas y heridas por pinchos en el hospital, nos gustaría obtener un mejor conocimiento de las condiciones bajo las cuales ustedes trabajan todos los días. Por favor describa condiciones o circunstancias que están presentes en el ambiente laboral hospitalario.

   Por ejemplo: describa aspectos físicos (iluminación, número de camas asignadas, lavamanos cercanos etc.)

   Describa factores organizacionales tales como (clima de seguridad, políticas y procedimientos, asignación de tareas, duplicidad de tareas, planificación del tiempo de trabajo, entrenamiento o cursos de actualización, etc.)

2. Por favor describa el procedimiento actualmente utilizado en el hospital para desechar las agujas usadas.

3. Que circunstancias o procedimientos piensa usted puedan contribuir a pinchos por agujas en el hospital?

4. Describa algún incidente reciente en un personal de enfermería que involucre a microorganismos (patógenos) transmitidos por sangre que haya podido ser prevenido en el hospital.

5. Usted reinserta la tapa plástica en agujas usadas? Que factor o factores pudieran influenciar a una enfermera (o) la decisión de reinserta la tapa plástica en el hospital?

6. Piense retrospectivamente si usted ha tenido un accidente por pincho al reinsertar la tapa plástica en agujas usadas. Que pensó en el momento del accidente? Cual fue su reacción inmediata? Como manejó la situación? Que circunstancia en particular piensa usted pudiera haber influido en ese accidente?

7. Como piensa usted que la reinserción de la tapa plástica en agujas usadas pueda ser eliminada o controlada en el hospital?

8. Por favor describa políticas o procedimientos usados por el hospital para evitar heridas por pinchos.

9. De acuerdo a su criterio cual seria lo más importante para asegurar que el trabajo que usted realiza se haga con seguridad?

10. Algún comentario adicional que quieran hacer?
Focus group Questions Demographic and Exposure Information

**Dear Participant:** We are interested in the demographic characteristics of participants and would greatly appreciate a few moments of your time to complete this brief survey. For each question you answer, please check all choices that apply, when applicable.

**NOTE:** As with all portions of this study, this information will not be used to identify particular participants and identities will kept anonymous. You may fill in all, part or none of these questions, as you see fit.

1. Age in years at next birthday: __________
2. Sex: ____ Female  _____ Male
3. Education received:________________________________________________
4. What is your job position: ___Professional nurse ___Licensed Nurse __ Nurse aid ___Student nurse
5. What unit or department do you work in? __________________________
6. Number of years of experience (specialty) __________
7. Number of years of experience in this hospital (organization) __________
8. Number of years in position __________
9. During an average day, in the past 6 months, how many hours do you work? __________
10. What is your schedule of duty? _____ 7-1 (morning) ____ 1-7 (evening) ____ 7-7 (night)
11. During an average week, in the past 6 months, how many hours do you work? __________
12. Are you currently working in any other healthcare settings in addition to the hospital?  ____ Yes  ____ No  if yes, please specify______________________

**Exposure questions:**
13. In the past 12 months, have you been injured by sharp object, such as a needle or scalpel that was previously used in a patient? ____ Yes  ____ No

If yes, how many blood/body fluid exposures did you sustain during this time period? ______
For how many of these exposures did you complete/submit a blood/body fluid exposure reports? ____
APPENDIX I: Continued

Preguntas a los participantes de los Grupos Focales
Información Demográfica y de Exposición

Estimado Participante: Nosotros estamos interesados en algunos datos personales de los participantes y apreciaríamos que usted se tomara algunos minutos de su tiempo para responder este breve cuestionario. Para cada pregunta que usted responda, por favor revise todas las opciones que aplican en caso de ser necesario. Usted puede responder todas o ninguna de las preguntas, de acuerdo con su criterio.

1. Edad: ___________  2. Sexo: _________ Femenino           _________ Masculino

3. Nivel educativo: ___________________________________________________

4. ¿Cual es su posición de trabajo?: _____ Enfermera profesional.
   _____ Estudiante de Enfermería. _____ Auxiliar de Enfermería

5. En que departamento o unidad trabaja actualmente?____________________

6. Años de trabajo en el área de la enfermería?_____________________________

7. Años de trabajo en el hospital?_____________________________________

8. Años de trabajo en el cargo actual_____________________________________

9. Durante un día promedio, en los últimos 6 meses, Cuantas horas ha trabajado usted?______

10. Durante una semana promedio, en los últimos 6 meses, Cuantas horas ha trabajado usted?______

11. Cual es actualmente su turno de trabajo?  _7-1 (mañana) __1-7 (tarde) __7-7 (noche)

12. Trabaja usted en otro hospital o clínica? ___Si ___No. Especifique__________

Preguntas de exposición

13. En los últimos 12 meses, ha tenido usted heridas por pinchazos con objetos punzantes como agujas o scalps que hayan sido previamente usados en un paciente? _____ Si _____ No. Si su respuesta es afirmativa cuantos eventos tuvo usted durante ese periodo__________

Reporto usted el accidente? _____ Sí _____ No

NOT A: Como todas las partes de este estudio esta información no será usada para averiguar su identificación y por lo tanto se mantendrá el anonimato. ¡Muchas gracias!
APPENDIX J:  CORPOSALUD Needlestick Injuries Surveillance Report Data Sheet

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1. Center
2. I.D
3. Age
4. Sex
5. Date of accident
6. Hour of Accident
7. Profession
8. Unit
9. Object
10. Exposure
11. Procedure
12. Source
## APPENDIX K: Data Sheet of Used Needles at the Departments Studied

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<th>Before educational strategy</th>
<th>After educational strategy</th>
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<tr>
<th>Feb.</th>
<th>Rn</th>
<th>Nrn</th>
<th>Tn</th>
<th>% Nrn</th>
<th>Feb.</th>
<th>Rn</th>
<th>Nrn</th>
<th>Tn</th>
<th>% Nrn</th>
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Rn = recapped needles  
Nrn = no recapped needles  
Tn = total needles  
% Nrn = percentage of no recapped needles
Necesitamos tu compromiso
para tu protección y la de los demás compañeros de trabajo

¿Qué debemos hacer?

Usar equipos seguros para descartar agujas o material cortopuzante

Realizar cursos periódicos de capacitación sobre seguridad en el ambiente laboral

Conocer aspectos legales sobre la prevención de accidentes en los ambientes de trabajo

Promover la inmunización contra la hepatitis B

Factores relacionados con el reencapuchado de agujas usadas y heridas por pinchazos en el personal de enfermería del Hospital Central de Maracay 2006-2008

Investigador: Luis J. Galindo A.
Asistente de Investigación: Licenciado Víctor Loreto
Tutora: Dra. Donna Haiduven Universidad del Sur de la Florida (USF)

Gracias por cuidar de aquellos que cuidan a otros

Maracay - Aragua - 2007
¿Qué estamos estudiando?

Los factores relacionados con la reinserción de la tapa plástica en agujas usadas y las heridas por pinchazos en el personal de enfermería del Hospital Central de Maracay. Esto es importante porque una mejor comprensión de estos factores permitiría desarrollar intervenciones adecuadas para su control o eliminación.

¿Por qué?

A nivel mundial, el personal de enfermería que utiliza agujas en sus prácticas cotidianas tiene el mayor riesgo de presentar lesiones por pinchazos, seguido por personal de laboratorio, médicos, odontólogos personal de mantenimiento y otros trabajadores de la salud tales como estudiantes de enfermería, de medicina y de postgrado.

Estos accidentes pueden provocar infecciones graves o mortales de patógenos transmitidos por vía sanguínea tales como el virus de la hepatitis B, hepatitis C y/o el virus de inmunodeficiencia humana.

¿Para qué?

Para que todo el equipo de salud incluyendo el personal directivo hospitalario y de CORPOSALUD, busquen las soluciones necesarias para prevenir daños a la salud como resultado de la exposición a accidentes por pinchazos por agujas usadas.

Para motivar a las autoridades competentes a diseñar políticas preventivas en materia de salud ocupacional para los trabajadores del sector salud en el ámbito nacional.

Sabias que...

- Los accidentes por pinchazos representan 2 millones de exposiciones en el mundo cada año.
- El porcentaje a nivel mundial del subregistro de accidentes por pinchazos se ubica entre 30-80%.
- De los trabajadores de la salud infectados por heridas por pinchazos a nivel mundial: 40% son por hepatitis B, 40% hepatitis C y por VIH 4.4%.
- El riesgo de infección de hepatitis B (6-30%) es la más alta comparada con la hepatitis C y el VIH.
- La reinserción de la tapa plástica representa la principal causa de pinchazos en los países en vías de desarrollo.
- En muchas partes del mundo a pesar de existir una vacuna contra la hepatitis B con una efectividad del 95%, más del 80% de trabajadores de la salud no están vacunados.
- Dentro de los principales obstáculos del subregistro de accidentes por pinchazos tenemos:
  - Miedo a ser despido (o)
  - Falta de conciencia sobre el riesgo de infecciones
  - Falta de garantía de confidencialidad
  - Énfasis en el cuidado del paciente
  - Falta de entrenamiento sobre los procedimientos para reportar
  - No disponibilidad del tratamiento post-exposición
- Existen equipos seguros para desecho material corto punzante.
- La Ley Orgánica de Prevención, Condiciones y Medio Ambiente de Trabajo (LOPCYMAT) tiene como objetivo garantizar condiciones de seguridad, salud y bienestar en un ambiente de trabajo adecuado y propicio.
- El Instituto Nacional de Prevención, Salud y Seguridad Laborales es el organismo encargado de ejecutar la Política Nacional de Salud y Seguridad Laboral en el Trabajo (www.inpsasel.gov.ve).
- Es derecho de los empleadores y de los trabajadores formar el comité de seguridad y salud laboral destinado a la consulta regular y periódica de las políticas, programas y actuaciones en materia de seguridad y salud en el trabajo.
APPENDIX M: Venezuelan Organic Act and the Regulation of Organic Act
APPENDIX N: Organic Law Articles Discuss in the Educational Strategy

Artículos discutidos en la estrategia educativa en el Hospital Central de Maracay

Ley Orgánica de Prevención, Condiciones y Medio Ambiente de Trabajo (LOPCYMAT)

1. Objeto de la Ley (art. 1)

2. Instituto Nacional de Prevención, Salud y Seguridad laborales (INPSASEL, art. 18)

3. Competencias del INPSASEL (art. 18)

4. Delegados o delegadas de prevención (art. 41)

5. Comité de Seguridad y Salud Laboral (art. 46)

6. Derechos de los trabajadores y las trabajadoras (art. 53)

7. Deberes de los trabajadores y las trabajadoras (art. 54)

8. Derechos de los empleadores y empleadoras (art. 55)

9. Deberes de los empleadores y empleadoras (art. 56)
APPENDIX O: American Nurses Association (ANA) Recommendation about NSIS in English and Spanish

SAFE NEEDLES
SAVE LIVES

Prevention is the best way to avoid exposure, and safer needle devices are the best tools for prevention.

If you sustain a needlestick injury:

IMMEDIATELY
✓ wash the wound with soap and water
✓ report to Employee Health or the ER for evaluation and treatment
✓ alert your supervisor
✓ identify and document source patient who should be tested for HIV, hepatitis B, hepatitis C - hospital may have to seek consent
✓ be tested immediately and confidentially for HIV, hep. B, hep. C

FOLLOW-UP
✓ get post-exposure prophylaxis (PEP) when source patient is unknown or tests positive for:
  ✓ hep. B: if vaccinated no treatment, but if unvaccinated get HBIG and initiate HB vaccine series
  ✓ HIV: start prophylaxis within 2 hours of exposure
  ✓ hep. C: no treatment, but consult your physician about experimental PEP
✓ get confidential follow-up testing at 6 weeks, 3 months, 6 months and, depending on the risk, at 1 year
✓ receive monitoring and follow-up of PEP toxicity
✓ receive counseling and education from Employee Health
✓ take precautions to prevent exposing others (safe sex)
✓ For more information call 1-888-448-4911 National Clinicians PEP Hotline

For information about ANA’s Safe Needles Save Lives campaign visit www.needlestick.org and call 1-800-274-4262 for membership information.
APPENDIX O: Continued

Agujas seguras salvan vidas*

La prevención es la mejor vía para evitar infecciones.

Si usted presenta un accidente por pinchazo:

En forma inmediata:
- Lavar la herida con agua y jabón.
- Reportar rápidamente ante su supervisor el accidente por pinchazo.
- Asistir a la Emergencia de Adultos o al Servicio de Epidemiología para evaluación y tratamiento.
- Identificar la fuente (paciente) a quien deberá extraerle sangre para exámenes de Hepatitis B, Hepatitis C y VIH.
- Practicarte en forma inmediata los exámenes de VIH, Hepatitis B, y Hepatitis C
- Si la fuente (paciente) es desconocida o si resulta positivo:
  - Hepatitis B: si estás vacunada (o) no requiere tratamiento, pero si no estás vacunada (o) colocar Inmunoglobulina específica (IGHB) e iniciar esquema de vacunación contra HB.
  - VIH: cumplir tratamiento post exposición dentro de las dos horas de exposición.
  - Hepatitis C: no hay tratamiento, pero consulta con especialistas sobre la profilaxis post exposición de tipo experimental.

Seguimiento:
- Pruebas de sangre a las 5 semanas, 3, 6 meses y dependiendo del riesgo al año.
- Recibir monitoreo y seguimiento de toxicidad del tratamiento profiláctico.
- Recibir asesoría y educación del Servicio de Salud Ocupacional del empleador.
- Tomar precauciones para prevenir la exposición de otros (sexo seguro).

Para prevenir accidentes:
- Implementar o utilizar las Precauciones Universales:
  o Lavarse las manos.
  o Evitar la reinserción de la tapa plástica en agujas usadas.
  o Recolección y disposición segura de objetos corto punzantes.
  o Cumplir con el esquema de vacunas contra el virus de la Hepatitis B.
- Utilización adecuada de los equipos de protección personal.
- Trabajar con el comité de seguridad y salud del Hospital Central de Maracay para proponer soluciones que mejoren las condiciones de trabajo y las prácticas seguras de trabajo y así disminuir o eliminar los accidentes por pinchazos.

* Traducción realizada por el Dr. Luis Galíndez del material de la Asociación Americana de Enfermería. www.needlestick.org
APPENDIX P: INPSASEL and CATDIS Pamphlet
APPENDIX Q: Pretest and Post-test Applied in the Educational Strategy

Proyecto “Factores relacionados con la reinserción de la tapa plástica en agujas usadas y con heridas por pinchazos en el personal de enfermería del Hospital Central de Maracay 2006-2008”

PRETEST

Esta prueba constituye parte de la actividad del proyecto de investigación y tiene como objetivo obtener información acerca de su conocimiento sobre los accidentes laborales por pinchazos, la reinserción de la tapa plástica en agujas usadas, inmunizaciones y aspectos legales vigentes en Venezuela. Esta prueba es completamente ANONIMA para garantizar la confidencialidad. Consta de dos tipos de preguntas, las cerradas con opción de selección múltiple y las de respuesta afirmativa o negativa según corresponda. Le agradecemos su colaboración y muchas gracias.

1. Los accidentes por pinchazos son riesgos importantes por cuanto sus consecuencias pudieran ser muy graves para la salud del trabajador
   a. Cierto
   b. Falso
   c. No sabe
   d. No contesta

2. Cual de estos virus tiene más facilidad de transmisión después de una exposición a sangre contaminada:
   a. Virus de inmunodeficiencia humana (VIH)
   b. Virus de la Hepatitis C
   c. Virus de la Hepatitis B
   d. Todos tienen la misma probabilidad

3. Cual considera usted es el porcentaje a nivel mundial del subregistro de accidentes por pinchazos:
   a. 10-20%
   b. Menos del 10%
   c. Entre un 30 al 80%
   d. Es incalculable

4. La Hepatitis B puede ser adquirida a través de contacto casuales tales como abrazos o darse la mano:
   a. Siempre
   b. Usualmente
   c. Nunca
   d. No estoy segura (o)

5. El virus de la Hepatitis B puede causar cáncer de hígado:
   a. Siempre        b. Usualmente

   c. Algunas veces   d. Nunca
APPENDIX Q: Continued

6. La efectividad de la vacuna de la Hepatitis B en la prevención de la enfermedad en personal a riesgo es:
   1. Siempre efectiva
   2. Usualmente efectiva
   3. Nunca es efectiva
   4. No estoy segura

7. La reinserción de la tapa plástica en agujas usadas es un procedimiento:
   a. Que se puede utilizar de rutina ya que no representa riesgo alguno
   b. Es una causa importante de pinchazos
   c. Inseguro para el personal
   d. Las opciones b y c son ciertas

8. Dentro de las causas del subregistro de los accidentes por pinchazos tenemos:
   a. Miedo a ser despedida
   b. Falta de conciencia sobre el riesgo de infecciones
   c. Falta de entrenamiento sobre los procedimientos para reportar
   d. Todas son razones validas para no reportar

9. Antes de las sesiones de los grupos focales con el Dr. Galíndez, conocía usted la existencia de equipos de seguridad para desechar material cortopuzante?:
   Si________ No_______ No estuve en el grupo focal_______

10. Conoce usted la Ley Orgánica de Prevención, Condiciones y Medio Ambiente de Trabajo (LOPCYMAT).
   Si_______ No_______

11. Conoce usted acerca del Instituto Nacional de Prevención, Salud y Seguridad Laborales (INPSSL): 
    Si_______ No_______

12. Existe en este hospital comité de seguridad y salud laboral:
   a. Si
   b. Existe pero no esta funcionando actualmente
   c. No
   d. No se

13. Por favor indique si usted ha recibido la vacuna contra la Hepatitis B:  
    Si _______ No _______

14. Si su respuesta fue afirmativa a la pregunta anterior, por favor especifique cuantas dosis recibió?
   a. Solo la primera dosis  b. Primera y segunda dosis  c. Las tres dosis
APPENDIX Q: Continued

Proyecto “Factores relacionados con la reinserción de la tapa plástica en agujas usadas y con heridas por pinchazos en el personal de enfermería del Hospital Central de Maracay 2007”

POST TEST

1. Los accidentes por pinchazos son riesgos importantes por cuanto sus consecuencias pudieran ser muy graves para la salud del trabajador
   a. Cierto
   b. Falso
   c. No sabe
   d. No contesta

2. Cual de estos virus tiene más facilidad de transmisión después de una exposición a sangre contaminada:
   a. Virus de inmunodeficiencia humana (VIH)
   b. Virus de la Hepatitis C
   c. Virus de la Hepatitis B
   d. Todos tienen la misma probabilidad

3. Cual considera usted es el porcentaje a nivel mundial del subregistro de accidentes por pinchazos:
   a. 10-20%
   b. Menos del 10%
   c. Entre un 30 al 80%
   d. Es incalculable

4. La Hepatitis B puede ser adquirida a través de contacto casuales tales como abrazos o darse la mano:
   a. Siempre
   b. Usualmente
   c. Nunca
   d. No estoy segura (o)

5. El virus de la Hepatitis B puede causar cáncer de hígado:
   a. Siempre
   b. Usualmente
   c. Algunas veces
   d. Nunca

6. La efectividad de la vacuna de la Hepatitis B en la prevención de la enfermedad en personal a riesgo es:
   a. Siempre efectiva
   b. Usualmente efectiva
   c. Nunca es efectiva
   d. No estoy segura (o)

7. La reinserción de la tapa plástica en agujas usadas es un procedimiento:
   a. Que se puede utilizar de rutina ya que no representa riesgo alguno
   b. Es una causa importante de pinchazos
   c. Inseguro para el personal
   d. Las opciones b y c son ciertas

8. Dentro de las causas del subregistro de los accidentes por pinchazos tenemos:
   a. Miedo a ser despedida (o)
   b. Falta de conciencia sobre el riesgo de infecciones
   c. Falta de entrenamiento sobre los procedimientos para reportar
   d. Todas son razones válidas para no reportar
APPENDIX R: IRB Approval Application

December 7, 2005

Luis Galindez, MD
14303 Wedgewood Ct. Apt. 109
Tampa, FL 33613-3021

RE: Approved Application for Initial Review

IRB#: 104241

Title: Factors Associated with Recapping Needles and Needlestick Injuries in Health Care Workers at the Maracay Central Hospital, Aragua, Venezuela, 2006

Study Approval Period: November 30, 2005 to November 29, 2006

Dear Dr. Galindez:

On November 30, 2005, Institutional Review Board (IRB) reviewed and APPROVED your Application for Initial Review for the afore noted protocol. It was the determination of the IRB that your study qualified for expedited review based on the federal expedited category number six (6) and seven (7). Your English and Spanish Informed Consent Form were also approved. Approval is granted for the period indicated above.

Please note, if applicable, the enclosed informed consent/assent documents are valid during the period indicated by the official, IRB-Approval stamp located on page one of the form. Valid consent must be documented on a copy of the most recently IRB-approved consent form. Make copies from the enclosed original.

Please reference the above IRB protocol number in all correspondence regarding this protocol with the IRB or the Division of Research Compliance. In addition, we have enclosed an Institutional Review Board (IRB) Quick Reference Guide providing guidelines and resources to assist you in meeting your responsibilities in the conduction of human subjects research. Please read this guide carefully. It is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to the Human Research Protections Program. If you have any questions regarding this matter, please call 813-974-9343.

Sincerely,

Paul G. Stiles, J.D., Ph.D.
USF Institutional Review Board

Enclosures: (If applicable) IRB-Approved, Stamped Informed Consent/Assent Documents(s)

IRB Quick Reference Guide

Cc: Angie Reagan, USF IRB Professional Staff
    Dr. Donna Haldoven
    TAO II University of Carabobo, Venezuela
The following information is being presented to help you decide whether or not you want to take part in a minimal risk research study. Please read this carefully. If you do not understand anything, ask the person in charge of the study.

Title of Study:

Factors associated with recapping needles and needlestick injuries in nurses at the Maracay Central Hospital, Aragua, Venezuela, 2006.

Principal Investigator:

Luis Galindez is a candidate for a Ph.D. degree at the University of South Florida (USF), College of Public Health, and Department of Global Health. Dr Donna Haiduven is his advisor. In partial fulfillment of the degree requirements, he is conducting a study between recapping needles and needlestick injuries in health care workers at the Maracay Central Hospital, a Venezuelan public hospital.

Study Location(s):

You are being asked to participate because you are a nurse who works at the Maracay Central Hospital, a Venezuelan public hospital.

General Information about the Research Study:

The purpose of this research study is to gain an understanding of the factors surrounding with recapping needles and needlestick injuries. This research is partially funded by the University of Carabobo (Venezuela). The information gained in this study may help others in developing safer work practices.

Plan of Study:

If you agree to participate, the following will occur:

- You will participate in a two hour discussion (focus group session) regarding recapping needles and needlestick injuries. The focus group to which you are being invited will be conducted at hospital outside of regular working hours and will last for approximately two hours. A series of open-ended questions relating to
APPENDIX S: Continued

experiences in needlestick hospital injuries will be directed to the group. An interviewer will moderate, listen, and observe the discussion. One or two research assistants will observe the discussion, take notes, and ask questions to clarify certain issues.

- You will receive a letter from Luis Galindez notifying you of the time and place of the focus group session.
- During the focus group session, an audio tape will be made of the discussion.
- Before the session starts, you will be asked to complete a short questionnaire about your education and work experience.

Payment for Participation:

You will not be paid for your participation in this study.

Benefits of Being a Part of this Research Study:

Although you may not receive any direct benefit from this research, the information that is obtained from the focus group may be used to help health care workers perform their jobs in a safer way. These potential benefits to you cannot be guaranteed.

Risks of Being a Part of this Research Study:

- Some of the focus group questions may touch on personal or sensitive experiences, such as a blood exposure in yourself or a co-worker. You may choose not to discuss anything that you do not want to talk about.
- If you choose, you can leave the focus group session at any time.
- The session will be tape recorded, but no individual names will be mentioned on the tapes. All of the information obtained from you during the session will be kept confidential. The tapes and discussion notes will be stored in a locked cabinet. Only the study investigators will have access to them.
- After the focus group, the tapes will be transcribed into written form. In addition, the researchers will listen to the tapes and extract common themes and attitudes expressed.

Confidentiality of Your Records:

- Participation in research may mean a loss of privacy. Therefore, a potential risk to you is some loss of privacy by participating in a group discussion of your attitudes.
and opinions. All participants will be asked, in a group setting, about their personal work experience and opinions. The researchers will ask you and the other people in the group to use only first names during the session. Your individual responses will be heard by others who are present in the group. This might pose some risk to you if your responses are shared by others outside of the focus group. Therefore, please do not disclose anything during the focus group discussion that is personal and/or confidential. Please don't discuss what was said during the discussion outside of the focus group. The goal is to preserve everyone's confidentiality. However, the researchers cannot guarantee that everyone will keep the discussions private.

- Your privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the Department of Health and Human Services, and the USF Institutional Review Board may inspect the records from this research project.

- Your responses will remain confidential. There will be no identifying information retained on the written transcripts of the focus group session. No attempts will be made to link information on the transcripts to individual subjects. The results of the focus group will be reported in summary form, not individual responses.

- Your employer will only see a summary report and will not be able to identify individuals involved in the focus group. No information by which you can be identified will be released or published.

- The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you in any way.

**Volunteering to Be Part of this Research Study:**

- Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive, if you stop taking part in the study.

**Questions and Contacts:**

- If you have any questions about this research study, contact Luis Galindez at 0412-3450609.
• If you have questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Compliance of the University of South Florida at (813) 974-5638.

Consent to Take Part in This Research Study:

By signing this form I agree that:

I have fully read or have had read and explained to me this informed consent form describing this research project.

I have had the opportunity to question one of the persons in charge of this research and have received satisfactory answers.

I understand that I am being asked to participate in research. I understand the risks and benefits, and I freely give my consent to participate in the research project outlined in this form, under the conditions indicated in it.

I have been given a signed copy of this informed consent form, which is mine to keep.

Signature of Participant   Printed Name of Participant   Date
Consent to Take Part in this Research Study

It’s up to you. You can decide if you want to take part in this study.

I freely give my consent to take part in this study. I understand that this is research. I have received a copy of this consent form.

________________________ ________________________ ___________
Signature Printed Name Date
of Person taking part in study of Person taking part in study

________________________ ________________________ ___________
Signature of Witness Printed Name of Witness  Date
of Person taking part in study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect.

The person who is giving consent to take part in this study

- Understands the language that is used.
- Reads well enough to understand this form. Or is able to hear and understand when the form is read to him or her.
- Does not have any problems that could make it hard to understand what it means to take part in this study.
- Is not taking drugs that make it hard to understand what is being explained.

To the best of my knowledge, when this person signs this form, he or she understands:

- What the study is about.
- What needs to be done.
- What the potential benefits might be.
- What the known risks might be.
- That taking part in the study is voluntary.

________________________ _______________________________________
Signature of Investigator Printed Name of Investigator Date
or authorized research investigator designated by the Principal Investigator
APPENDIX S:  Continued

Propuesta de Forma de Consentimiento

Universidad del Sur de la Florida

Consentimiento de Participar en una investigación

La siguiente información le está siendo presentada para ayudarle a decidir si desea o no participar en una investigación con riesgo mínimo. Por favor lea cuidadosamente. Si usted no entiende algo, pregúntele a la persona encargada del estudio.

Titulo del estudio:

- Factores asociados con la reinserción de la tapa plástica en agujas usadas y heridas por pinchazos en el personal de enfermería del Hospital Central de Maracay, Aragua, Venezuela 2006.

Principal Investigador:

Luis Galíndez es un estudiante de Ph.D. en la Universidad del Sur de la Florida (USF) en la ciudad de Tampa, en el Departamento de Salud Global del Colegio de Salud Publica. La Dra. Donna Haiduven es su tutora. Como actividad parcial de sus requerimientos para la obtención de su título, él está conduciendo un estudio sobre los factores que conllevan a la reinserción de la tapa plástica en agujas usadas y heridas por pinchazos entre los trabajadores de la salud del Hospital Central de Maracay un hospital público venezolano.

Sitio del estudio:

Usted está siendo solicitado para participar por cuanto usted es enfermera (o) del Hospital Central de Maracay.

Información General acerca de la investigación:

El propósito de esta investigación es obtener una mejor comprensión de los factores relacionados con la reinserción de la tapa plástica en las agujas usadas y heridas por pinchazos. Esta investigación es parcialmente financiada por la Universidad de Carabobo, Venezuela. La información obtenida en este estudio pudiera servir a otros trabajadores de la salud a desarrollar prácticas seguras en el trabajo.

Plan de estudio:

Si usted está de acuerdo en participar, la metodología será la siguiente:
El grupo principal al cual se le está invitando será conducido en el hospital fuera de las horas regulares de trabajo. Una serie de preguntas abiertas-cerradas referentes a experiencias con respecto a la reinserción de la tapa plástica en las agujas usadas y heridas por pinchazos en el hospital será dirigida al grupo. Un entrevistador moderará, escuchará, y observará la discusión. Uno o dos asistentes de investigación observarán la discusión, tomarán notas y harán preguntas para clarificar ciertos aspectos con respecto a la reinserción de la tapa plástica en las agujas usadas y heridas por pinchazos.

Usted recibirá una carta de Luis Galíndez quien le notificará la fecha y el lugar de la sesión del grupo principal.

Durante la sesión del grupo principal, se realizará una grabación sobre la discusión.

Antes de comenzar la sesión se le pedirá completar un cuestionario corto sobre su nivel de educación y experiencia profesional.

**Remuneración por su participación:**

Usted no recibirá pago alguno por su participación en este estudio.

**Beneficios por ser parte de este estudio**

Aunque usted pueda no recibir algún beneficio directo de esta investigación, la información que es obtenida de los grupos principales pudiera ser usada para ayudar a otros trabajadores de la salud a realizar su trabajo en una manera más segura. Estos potenciales beneficios no pueden ser garantizados a usted.

**Riesgos por ser parte de esta investigación:**

- Algunas de las preguntas del grupo principal pueden tocar experiencias personales o aspectos muy sensibles sobre antecedentes de accidentes laborales por pinchazos referentes a usted como a un compañero (a) de trabajo. Usted puede elegir no discutir cualquier aspecto sobre el cual no desee hablar.

- Si usted desea puede retirarse de la sesión del grupo principal en cualquier momento.

- La sesión será grabada, pero no se mencionará ninguno de los nombres individuales en las cintas. Toda la información obtenida sobre usted durante la sesión será mantenida en forma confidencial. Las cintas y las notas de la discusión serán almacenadas en un gabinete con cerradura. Solamente los investigadores del estudio tendrán acceso a dicho material.
• Después que las sesiones de los grupos principales finalicen, las cintas serán transcritas en forma escrita. Además, los investigadores escucharán las cintas y extraerán temas comunes y las actitudes expresadas por cada uno de los miembros del grupo principal.

Confidencialidad de sus registros:

• La participación en la investigación puede significar una pérdida de su privacidad. Por lo tanto, un riesgo potencial participando en una discusión del grupo, es una cierta pérdida de la privacidad de sus actitudes y opiniones. A todos los participantes se les preguntará en forma grupal acerca de su experiencia profesional y opiniones personales. Los investigadores invitarán a que los participantes se presenten solo con su nombre durante la sesión. Sus respuestas individuales serán oídas por otras personas que estarán presentes en el grupo. Esto le puede plantear cierto riesgo si sus respuestas son compartidas por otras personas ajenas al grupo de trabajo. Por lo tanto, por favor no divulgue nada que sea personal o confidencial durante la discusión del grupo principal. De igual forma no divulgue lo comentado durante la discusión fuera del grupo principal. El objetivo es preservar la privacidad de las opiniones de cada uno de los participantes. Sin embargo, los investigadores no pueden garantizar que cada una de las personas presentes en el grupo mantenga las discusiones en privado.

• Su privacidad y los registros de la investigación serán mantenidos en forma confidencial de acuerdo a lo establecido por ley. Personal autorizado de la investigación, empleados del Departamento de Salud y Servicios Humanos y el Comité Institucional para la revisión de investigaciones de la Universidad del Sur de la Florida (USF) pueden inspeccionar los registros de este proyecto.

• Sus respuestas seguirán siendo confidenciales. No habrá información que identifique a una persona del grupo principal. La confidencialidad será mantenida en las transcripciones escritas de la sesión del grupo principal. No se hará ningún intento de vincular la información sobre las transcripciones a los temas individuales. Los resultados de los grupos principales serán divulgados en forma de resumen, respuestas no individuales.

• Su empleador tendrá solamente un resumen del informe y no podrá identificar a individuos participantes en los grupos principales. No se divulgará ni será publicada ninguna información por la cual usted pueda ser identificado(a).

• Los resultados de este estudio pueden ser publicados. Sin embargo, sus datos podrían ser combinados con los datos de otras personas en la publicación. Los datos publicados no incluirán su nombre o ninguna otra información que pudiera identificarlo a usted bajo ninguna manera.
Voluntariedad para ser parte de esta investigación:

- Su decisión de participar en esta investigación es completamente voluntaria. Usted es libre de participar en esta investigación o retirarse en cualquier momento. No habrá penalidad o perdida de beneficios que usted tiene derecho a recibir, si dejase de formar parte del estudio.

Preguntas y contactos:

- Si usted tiene alguna pregunta acerca de la investigación, contacte a Luis Galíndez al teléfono 0412-345-0609.

- Si usted tiene preguntas acerca de sus derechos como persona quien esta participando en una investigación, usted puede contactar a la División de Cumplimiento de Investigación de la Universidad de la Florida (USF) al teléfono (813) 974-5638.

Consentimiento para tomar parte en esta investigación:

Firmando este documento, yo estoy de acuerdo que:

- He leído ampliamente o se me ha leído y explicado este documento describiendo los aspectos principales de esta investigación.

- He tenido la oportunidad de hacer preguntas a las personas encargadas de esta investigación y he recibido respuestas satisfactorias.

- Entiendo que estoy siendo solicitado para participar en la investigación. Entiendo los riesgos y beneficios, y libremente doy mi consentimiento para participar en la investigación antes mencionada en este documento, bajo las condiciones indicadas en el mismo.

- He recibido una copia firmada de este documento, la cual es mi propiedad y podré conservarla.

Fecha ___________  Firma del participante del estudio _______________
**Declaración del Investigador**

Yo le he explicado cuidadosamente a la persona la naturaleza de esta investigación. Yo por este medio certifico que para mi entender la persona firmante este documento comprende la naturaleza, demanda riesgos y beneficios envueltos en la participación en esta investigación.

<table>
<thead>
<tr>
<th>Firma del Investigador o investigador autorizado designado por el Investigador Principal</th>
<th>Nombre del Investigador</th>
<th>Fecha</th>
</tr>
</thead>
</table>

Consentimiento a participar en este estudio de la investigación

Esta es su elección. Usted puede decidir si desea participar en este estudio.

Doy libremente mi consentimiento para participar en este estudio.

Entiendo que ésta es una investigación.

He recibido una copia de esta forma de consentimiento.

<table>
<thead>
<tr>
<th>Firma de la persona quien participará en el estudio</th>
<th>Nombre completo</th>
<th>Fecha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firma del testigo</td>
<td>Nombre completo del testigo</td>
<td>Fecha</td>
</tr>
</tbody>
</table>
Declaración de la persona que obtiene el consentimiento

He explicado cuidadosamente a la persona que participará en el estudio lo que él o ella pueden esperar del mismo.

La persona quién está dando consentimiento para participar en este estudio

• Entiende el lenguaje utilizado
• Lee bastante bien para entender este documento. O puede oír y entender cuando se le lee el documento.
• No tiene ningún problema algo que se le dificulte entender lo que significa participar en este estudio.
• No está tomando medicamentos que pudieran hacer difícil entender lo que se está explicando.

De acuerdo a mi entender, cuando esta persona firma esta forma de consentimiento, él o ella comprende:

• Sobre que trata el estudio
• Qué se necesita hacer
• Cuales podrían ser los beneficios potenciales del estudio
• Cuales podrían ser los riesgos
• Su participación en este estudio es voluntaria

________________________ ____________________________   ___________
Firma del Investigador   Nombre completo del Investigador   Fecha

________________________  ____________________________   ___________
Firma del testigo   Nombre completo del testigo     Fecha
About the Author

Luis J. Galindez A. received a medical degree from the University of Carabobo, Venezuela in 1980 and a Master of Science (MS) in Occupational Health from the Institute of Occupational Health in Cuba. In 2004, he entered in the Ph.D. program at the University of South Florida after culmination of a M.S. in Public Health.

He has been a full professor in the Public Health Department at the University of Carabobo since 1986. Since 2007, he has been the Director of the Center for the Study of Worker’s Health at the University of Carabobo. In Jun 2006, Dr. Galindez and Dr. Haiduven presented a poster in the 33rd Annual Education Conference and International Meeting of the Association for Professional in Infection Control (APIC) in Tampa, Florida entitled “Circumstances Surrounding Needlestick/ Sharp Injuries among Healthcare Workers in a Venezuelan Public Hospital.”, which was the basis for his dissertation.