

**UNIVERSITI SAINS MALAYSIA**



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**PREVALENCE OF NEEDLE STICK INJURIES  
AMONG NURSING STUDENTS FROM  
SCHOOL OF HEALTH SCIENCES  
UNIVERSITI SAINS MALAYSIA**

**by**

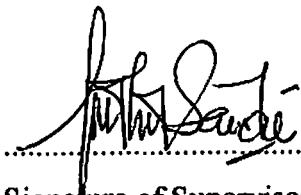
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**Dissertation submitted in partial fulfillment of  
the requirements for the degree  
of Bachelor of Health Sciences (Nursing)**

**April 2009**

## CERTIFICATE

This is to certify that the dissertation entitled Prevalence of Needle Stick Injuries among Nursing Students from School of Health Sciences, Universiti Sains Malaysia is the bonafide record of research work done by Nor Akmal Bt Masor @ Ibrahim (87441) during the period of July 2008 to April 2009 under my supervision. This dissertation submitted in partial fulfillment for the degree of Bachelor of Health Sciences (Nursing). Research work and collection of data belong to Universiti Sains Malaysia.



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**PREVALENCE OF NEEDLE STICK INJURIES AMONG NURSING  
STUDENTS FROM SCHOOL OF HEALTH SCIENCES,  
UNIVERSITI SAINS MALAYSIA**

**ABSTRACT**

Nursing students face the threat of needle stick injuries (NSIs) with the consequent risk of acquiring blood borne infections during their clinical training. The aim of this cross sectional study was to explore the prevalence of NSIs among nursing students and to find out the level of knowledge, attitude and practice regarding NSIs. About 132 of nursing students were selected randomly from four batches of nursing students at School of Health Sciences, Universiti Sains Malaysia. Data were processed using SPSS version 12.0. The data were then analyzed using descriptive statistic and Pearson Chi Square to answer the research questions. The findings showed that the prevalence of NSIs among nursing students was high with 47 incidences (35.6%). Only 34% of the incidences were reported by the students. The level of knowledge regarding NSIs among nursing student was high ( $M = 45.23$ ,  $SD = 2.73$ ). Level of attitude regarding NSIs was at the positive level of attitude ( $M = 3.91$ ,  $SD = .49$ ). Level of practice regarding NSIs was at the moderate level ( $M = 2.76$ ,  $SD = .31$ ). There were no statistically significant associations between the level of knowledge, attitude and practice with the prevalence of NSIs among the nursing students ( $p < .05$ ). Overall, this study showed that nursing students are at high risk of needle stick injury during their clinical activities. Therefore, some preventive strategies should be taken by the university and hospitals to avoid the occurrence of

**these problems. Nursing students also must be aware and always perform the correct nursing practice by following the guidelines of universal precaution effectively.**

**PREVALENS KECEDEeraan TERCUCUK JARUM DALAM KALANGAN  
PELAJAR-PELAJAR KEJURURAWATAN DARI PUSAT PENGAJIAN  
SAINS KESIHATAN, UNIVERSITI SAINS MALAYSIA**

**ABSTRAK**

Pelajar kejururawatan sememangnya terdedah kepada risiko kecederaan tercucuk jarum yang boleh membawa kepada penularan penyakit bawaan darah semasa mereka menjalani latihan klinikal. Kajian keratin rentas ini dijalankan untuk mengkaji prevalens kecederaan tercucuk jarum suntikan dalam kalangan pelajar-pelajar kejururawatan serta mengetahui tahap pengetahuan, sikap dan amalan yang berkaitan dengan kecederaan tercucuk jarum suntikan di kalangan mereka. Seramai 132 orang pelajar kejururawatan dari Pusat Pengajian Sains Kesihatan, Universiti Sains Malaysia telah dipilih secara rawak sebagai subjek dalam kajian ini. Maklumat kajian ini telah diproses menggunakan SPSS versi 12.0 dan dianalisis menggunakan kajian deskriptif dan ujian Pearson Chi Square untuk menjawab persoalan kajian. Hasil kajian mendapati 47 (35.6 %) orang pelajar kejururawatan pernah mengalami kecederaan tercucuk jarum namun hanya 34% daripada insiden tersebut yang dilaporkan. Hasil kajian juga menunjukkan bahawa tahap pengetahuan pelajar berkaitan kecederaan tercucuk jarum berada di tahap yang tinggi ( $M = 45.23$ ,  $SD = 2.73$ ). Tahap sikap pelajar juga berada di tahap yang positif ( $M = 3.91$ ,  $SD = .49$ ). Tahap amalan pelajar pula berada di tahap yang sederhana ( $M = 2.76$ ,  $SD = .31$ ). Hasil kajian ini juga mendapati tiada perkaitan antara tahap pengetahuan, sikap dan amalan pelajar dengan prevalens kecederaan tercucuk jarum suntikan di kalangan pelajar kejururawaratan ( $p < .05$ ). Kajian ini telah menunjukkan bahawa pelajar

kejururawatan berisiko tinggi untuk mendapat kecederaan tercucuk jarum suntikan semasa menjalani latihan klinikal. Oleh itu, beberapa langkah pencegahan dan strategi perlu diambil kira oleh pihak universiti dan hospital untuk mengatasi masalah ini. Di samping itu, pelajar kejururawatan juga mestilah peka dan mengamalkan praktis kejururawatan mengikut prosedur yang betul berdasarkan apa yang telah disarankan dalam panduan pencegahan universal secara lebih efektif.

# CHAPTER 1

## INTRODUCTION

### 1.1 `Background of the Study

Needle stick injuries (NSIs) in healthcare settings are global issue that needs to be focused especially among health care workers (Zafar, Aslam, Nasir, Meraj & Mehraj, 2008). Health care workers (HCWs) who use needles or may be exposed to needles are at increased risk of needle stick injuries (Talaat, Kandeel, El-Shoubary, Bodenschatz, Khairy, Oun & Mahoney, 2003).

Needle stick injuries pose the highest risk for the transmission of blood-borne pathogens (Mark, Hughes, Belyea, Chang, Hofmann, Jones & Bacon, 2007; Talaat, Kandeel, El-Shoubary, Bodenschatz, Khairy, Oun & Mahoney, 2003; Osborn, Papadakis & Gerberding, 1999). Transmission of blood-borne pathogens can occur from the accidental needle sticks or from improper disposal of needles and syringes (Zafar, et al., 2008; Moro, Moore, Balcacer, Montero, Diaz, Gomez, Garib & Weniger, 2007; Gurubacharya, Mathura & Karki, 2003; Clarke, Sloane & Aiken, 2002; Alam, 2002). The risk of the transmission depends on the number of patients with that infection in the health care facility and the precautions taken by the HCWs while dealing with these patients (Leliopoulou et al., 1999). The primary significance of the diseases that could be transmitted by the blood-borne pathogens to HCWs are hepatitis due to either Hepatitis B virus (HBV) or Hepatitis C virus (HCV) and acquired immunodeficiency syndrome



(AIDS) due to human immunodeficiency virus (HIV) (Gurubacharya, Mathura & Karki, 2003; Alam, 2002).

In the United States (US), 800, 000 of the approximately 5.6 million HCWs suffer NSIs each year (Alam, 2002). Surveillance from University of Virginia's Exposure Prevention Information Network (EPINet) system reported that an average hospital, HCWs incur approximately 30 NSIs per beds per year and annually, at least 1,000 HCWs are estimated to contract serious infections from NSIs and sharps injuries (Alam, 2002). These injuries result in at least 1,000 new cases of health care workers diagnosed with HIV, hepatitis C, or hepatitis B every year in the USA (BandolierExtra, 2003).

NSIs among hospital nurses have been identified as a top safety concern of work-related injuries in the US (Mark, Hughes, Belyea, Chang, Hofmann, Jones & Bacon, 2007; Shelton & Rosenthal, 2004). Nurses sustain the highest percentage of sharps injuries, which may be due to staff carelessness and inexperience, patient uncooperativeness, frequent recapping of needles and inadequate knowledge or supplies (Clarke, Sloane & Aiken, 2002).

At Hospital Universiti Sains Malaysia (HUSM), Kelantan, a statistic about NSIs showed the increasing trend of NSIs among the HUSM staffs including doctors, nurses and nursing students (refer table 1.1). This statistic showed that not only nurses and doctors sustain NSIs in the ward, nursing students are also at high risk for NSIs and the other occupational hazards during their clinical practice in the ward same with the other health care professionals (Logan, 2002).

Table 1.1: Number of NSIs and the total of incidences among nursing students, doctors and nurses at HUSM from the year of 2000 until 2007 (n = 340).

Year	Number of NSIs			Total of incidences
	Nursing Students	Nurses	Doctors	
2000	9	19	22	50
2001	8	17	16	41
2002	15	18	10	43
2003	16	9	13	38
2004	10	10	17	37
2005	14	15	23	52
2006	12	17	21	50
2007	12	7	10	29
<b>Total</b>	<b>96</b>	<b>112</b>	<b>132</b>	<b>340</b>

*Resource: Hospital's Infection Control and Epidemiology Unit, HUSM (2008)*

## 1.2 Problem Statement

Nurses sustain more incidences of NSIs than other health care groups because nurses perform more bedside procedures than other workers (Leliopoulou et al., 1999; Shah, Bener, Al-Kaabi, Al-Khal & Samson, 2006). Nursing students were particularly at high risk for NSIs while at internship in hospital and were twice as likely to experience a sharp-related injury as trained nurses because nursing students lack of technical expertise and inexperience (Yang, Liou, Chen, Yang, Wang, Chen & Wu, 2007; Wang, Fennie, He, Burgess & Williams, 2002). In developing countries, excessive handling of contaminated needles, high patient demand for injections and lack of safe needle and sharp containers enhance the risk of occupational transmission to serious infection of blood borne pathogens (Sagoe-Moses, Pearson, Perry & Jagger, 2001).

The annual number of occupational infections has decreased 95% since hepatitis B vaccine became available in 1982, from more than 10,000 in 1983 to less than 400 in 2001 (Wang, Fennie, He, Burgess & Williams, 2002). However, of healthcare workers who become infected from accidental NSIs, approximately 85% become chronic carriers of hepatitis C (InviroMedical.com, 2009). It is possible that thousands of nurses and other clinicians have occupationally acquired hepatitis C through blood borne pathogen exposure and remain unaware of their disease. Khuri-Bulos, Toukan, Mahafzah, Al-Adham, Faori, Khader and Rumeilah (1997) in their three year study of Jordan University Hospital staff stated that 248 of the staff had suffered injury from sharps, of which 34.6% from them were nurses. Of those nurses who suffered NSIs, 34 of them were found positive for Hepatitis B antigen and 8 of them were infected with Hepatitis C virus. This situation has shown that the incidence of NSIs can bring to the serious infection of blood borne diseases. It is estimated that 80% of HCW exposure to HIV occurs through NSIs and the National Institute for Occupational Safety and Health (NIOSH) estimates that approximately 800,000 NSIs occur annually in the hospital setting alone. The risks of pathogen transmission from infected persons to health care workers through an injury with a sharp object, such as with a needle stick injury have been estimated to be 6% to 30% for HBV, 0.5% to 2% for HCV, and 0.3% for HIV (Rogers & Goodno, 2000).

At HUSM, there is one unit called Hospital's Infection Control and Epidemiology Unit which is responsible in receiving the report of NSIs, monitoring the incidences of NSIs in the hospital's area and promote campaigns, programs and the other strategies under infection control to the staffs or any HCWs at HUSM. Based on the data of NSIs from Hospital's Infection Control and Epidemiology Unit (2008), every year, the trend of

NSIs incidences is still high among the HUSM's staffs including among the nursing students whose were having academic training at HUSM (refer table 1.1).

From a cross survey regarding the incidence of NSIs among the 195 nursing students from School of Health Sciences, there were about 13 nursing students who had an experience of NSIs during practicing the injection procedure in the Nursing Skill Laboratory at School of Health Sciences (Lyn, J.C. 2008, pers.com, 16 September). In the laboratory, they are safe from the blood borne pathogens because the injection needle is applied to the manikins and not onto the patients as in the clinical setting. However, if carelessness still occurred and that incidence had happened again in the clinical setting, there is high possibility of them to get the transmission of blood borne pathogens through NSIs (Yang, Liou, Chen, Yang, Wang, Chen and Wu, 2007).

Data about the incidences of NSIs that happened at HUSM (please refer table 1.1) did not provide the actual number of NSIs that has happened because not all incidences were reported by the victims. Only incidences that were reported and documented in the incident form were recorded by Hospital's Infection Control and Epidemiology Unit. Therefore, there is possibility that the actual number of NSIs incidence is higher than the recorded incidences (Alam,, 2002; Ng, Lim, Chan & Bachok, 2002; Gillen, McNary & Lewis, 2003; Elimiyeh, et al., 2004). According to a study by Perry, Robinson and Jagger (2004), about 42% of the nurses did not report their incidences of NSIs. A study by Alam (2002) also showed that 93% of the respondent with history of NSIs never reported the incidence for further treatment.

Unlike HIV and HBV, there are no immunization or chemoprophylactic interventions currently available to reduce the risk of infection after exposure to HCV

(CDC, 2001). Preventing NSIs from happening at the early stage can be cost effective measures because the budget for post-exposure treatment of NSIs is quite high. According to American Nurses Association (ANA) (2004), the cost for follow up for a high risk exposure is almost \$3,000 per needle stick per injury, even though there is no infection that occurs. This means that the prevention of NSIs is very cost effective than the cost of post exposure treatment (Ramsay, 2004).

The awareness regarding the importance of reporting NSIs should be emphasized among the HCWs and the newcomers especially among the nursing students. All HCWs including the nursing students should know about the policy of NSIs in their clinical setting. This is because, any victim of NSIs either HCWs or others ought to report the incidence immediately for post-exposure treatment as to prevent the transmission of the diseases from the resources or from the patients.

Therefore, a specific study about NSIs is very useful in order to explore about this incidence especially among the nursing students. Moreover, some studies of NSIs has been done in Malaysia. However, those studies only focused on medical students not on nursing students. In this study, the researcher is interested to explore about the prevalence of NSIs and the other three factors which are level of knowledge, attitude and practice regarding NSIs among nursing students from School of Health Sciences, Universiti Sains Malaysia (USM). These three factors which are level of knowledge, attitude and practice need to be empowered by nursing students as an early preparation and prevention for them from NSIs before they are qualified and working as a nurse.

In this study, researcher used the conceptual framework that was adapted from the study by Norsayani and Noor Hassim (2003). According to Norsayani and Noor Hassim

(2003), there were three factors that will determine the way of preventing NSIs which are: 1) Individual factor, 2) Psychosocial factor, and 3) Organizational factor. For individual factors, it include the aspects of socio-demographics factor, level of knowledge regarding blood-borne disease, level of knowledge regarding universal precautions and level of practice regarding universal precautions. While psychosocial factors include the aspects of attitude of the risk related to NSIs. Then, the organizational factor includes the aspect of the organizational policy regarding NSIs. The combination of these three factors will influence the individual to practice universal precautions and continue with preventing NSIs from occurring. However, in this study, researcher wanted to assess the three main factors that could be contributing to the prevalence of NSIs which are the level of knowledge, attitude and practice regarding NSIs.

### **1.3 Objectives of the Study**

The general objective of the study is to explore about the prevalence of needle stick injuries (NSIs) among nursing students from School of Health Sciences, Universiti Sains Malaysia (USM).

#### **1.3.1 Specific Objectives**

The specific objectives for the study are:

1. To determine the prevalence of NSIs among the nursing students.
2. To determine the level of knowledge, attitude and practice regarding NSIs among the nursing students.
3. To examine the association between the level of knowledge, attitude and practice regarding NSIs with the prevalence of NSIs among the nursing students.

## **1.4 Research Questions**

Research questions of the study are:

1. What is the prevalence of NSIs among the nursing students?
2. What is the level of knowledge, attitude and practice regarding NSIs among the nursing students?
3. Is there any association between the level of knowledge, attitude and practice regarding NSIs with the prevalence of NSIs among the nursing students?

## **1.5 Hypothesis**

There are three hypotheses in this study. With 95% of confidence interval (CI) and the value of  $\alpha = .05$ , null hypothesis ( $H_0$ ) will be accepted if  $p$ -value is  $> .05$  and null hypothesis ( $H_0$ ) will be rejected if  $p$ -value  $< .05$ .

### **Knowledge regarding NSIs**

$H_0$  = There is no association between the level of knowledge regarding NSIs the prevalence of NSIs among nursing students.

$H_A$  = There is an association between the level of knowledge regarding NSIs with the prevalence of NSIs among nursing students.

### **Attitude regarding NSIs**

$H_0$  = There is no association between the level of attitude regarding NSIs with the prevalence of NSIs among nursing students.

$H_A$  = There is an association between the level of attitude regarding NSIs with the prevalence of NSIs among nursing students.

## **Practice regarding NSIs**

$H_0$  = There is no association between the level of practice regarding NSIs with the prevalence of NSIs among nursing students.

$H_A$  = There is an association between the level of practice regarding NSIs with the prevalence of NSIs among nursing students.

## **1.6 Definition of Terms (Conceptual)**

### **Needle Stick Injuries (NSIs)**

NSIs is defined as a percutaneous injury that is caused by hollow bore needles (the type of needle used for giving injections or drawing blood), which has a bore where the blood or body fluids can remain inside it after used (BandolierExtra, 2003).

### **Prevalence of NSIs**

The prevalence of NSIs is referred as the percentage of NSIs incidence that occurred in the population. The percentage is calculated from the total number of the incidences divided with the total number of the sample then, multiplied with 100% (Norsayani & Noor Hassim, 2003).

### **Knowledge Regarding NSIs**

Knowledge is defined as the concepts and relationships that are assumed to be exist (LearnThat.com, 2004). In this study, knowledge regarding NSIs will include the aspects of blood-borne diseases, universal precaution and the policy of reporting NSIs.

### **Attitude Regarding NSIs**

Attitude is defined as a mental position or perception or a state of feeling or emotion toward a fact (Merriam-Webster.com, 2008). Attitude is a predisposition to act



in a certain way towards some aspect of one's environment, including other people. Attitude can be positive or negative and can affect the behavior of an individual (Johnston & Dixon, 2006). In this study, attitude regarding NSIs is defined as the perception regarding NSIs which includes the aspects of blood borne diseases and the universal precaution.

### **Practice Regarding NSIs**

Practice is defined as the exercise of the profession or knowledge of how something is usually done (WordReference.com, 2008). In this study, practice regarding NSIs is referred to a customary way of behavior regarding NSIs either it can increase the risk of NSIs or decrease the risk of NSIs.

## **1.7 Significance of the Study**

This proposed study can provide the contributions to nursing education, nursing administration and nursing practice.

### **Nursing Education**

The findings of this study will provide the prevalence of NSIs among the nursing students in the clinical setting. If the prevalence of NSIs among the nursing students is high, whereas the level of knowledge among them is still low, some plans could be done to help the nursing students to increase their level of knowledge regarding NSIs. Then, the nursing educators also can help to solve this problem through the nursing curriculum by reinforcing and empowering the nursing students regarding the universal precaution, prevention of NSIs and the policy of NSIs in their lesson.

## **Nursing Administration**

By using the findings of this study, nursing administrator also can serve an effective administration and revise the strategies that have been used in order to prevent NSIs especially at the clinical setting. If the findings show that the prevalence is high, the nursing administrator should reinforce and plan more effective strategies in order to reduce the prevalence of NSIs such as explanation to the staffs and nursing students about the written protocol or policies regarding NSIs in the clinical setting, provide appropriate and effective continuous nursing education to all staffs and nursing students regarding NSIs, put up educational related posters about the awareness of NSIs in the wards or other clinical areas and publish the data of prevalence and the findings of recent studies regarding NSIs to the staffs and nursing students as a way to increase their knowledge and awareness regarding NSIs.

## **Nursing Practice**

The findings of this proposed study will create awareness among nurses and nursing students to perform the correct practice and obey the protocol that has been stated in the regulation procedure by National Institute for Occupational Safety and Health (NIOSH). When administering the medication which include preparing the medications and giving the injection, nurses and nursing students should practice the safer step and must not recapping the needles after used. The needles that have already been used also must be disposed into the sharp bin safely without recapping. All staffs and nursing students should be familiar with the universal precaution and always practice the guidelines proposed in universal precaution for their safety and prevention from blood borne diseases caused by NSIs.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter will explain about the prevalence of needle stick injuries (NSIs), knowledge regarding NSIs, attitude regarding NSIs, practice regarding NSIs and the conceptual framework of NSIs.

#### **2.2 Prevalence of NSIs**

Needle stick injuries is defined as a percutaneous injury that is caused by hollow bore needles (the type of needle used for giving injections or drawing blood), which has a bore where the blood or body fluids can remain inside it after used (Norsayani & Noor Hassim, 2003). According to MedicineNet.com (2008), NSI is defined as a penetrating stab wound from a needle (or other sharp object) that may result in exposure to blood, body fluids or other fluids like medications. While Abu-Gad and Al-Turki (2001) in their study about NSI was defined NSIs as penetrating wound with an instrument that is potentially contaminated with blood or body fluid of another person or source. In addition, needle stick injuries also defined as the injuries that are caused by needles such as hypodermic needles, blood collection needles, intravenous (IV) stylets and needles used to connect parts of intravenous delivery system (Shen, Jagger & Pearson, 1999).

Hollow bore needle is the type of needles used for giving injections or withdrawing the blood. This needle is also implicated as a device that most often

associated with the transmission of blood borne pathogens infections. This is because the blood remaining inside the bore of the needle after used contains a larger volume of viruses than the relatively small amount of blood remaining on the outside of a solid core needle such as a suture needle. Therefore, hollow bore needles pose a higher risk of blood borne pathogens infections to the health care workers (Slater, Whitby & McLaws, 2007; Norsayani & Noor Hassim, 2003).

A needle stick injury has continued to be an important public health concern (Zafar, et al., 2008). It is a common occupational hazard for hospital personnel (Naing, Ahmad & Kamaruzaman, 1999). According to Abu-Gad and Al-Turki (2001), needles accounted the causes of more injuries among health care workers which about 86.2 %. National Institute of Occupational Safety and Health (NIOSH) reported the average rate of NSIs among health care workers (HCWs) in general is .18 NSIs per health care worker per year (Perry, Robinson & Jagger, 2004).

Nursing staff are the most frequently injured in NSIs incidence (Occupational Safety and Health Administration (OSHA), 2008; Shelton & Rosenthal, 2004). Hospital nurses are at particularly high risk for contracting blood-borne infections, as most of their NSIs involve devices that are very efficient at transmitting pathogens, such as hollow bore needles (Talaat, Kandeel, El-Shoubary, Bodenschatz, Khairy, Oun & Mahoney, 2003; Alam, 2002). Shiao, et al. (2002) also noted that exposure rates per clinical hours worked showed that nursing students were at particularly high risk for NSIs during their practice.

Tabak, Shiaabana and Sasha (2006) in their study regarding the health belief of hospital staff and the reporting of needle stick injury reported that, among the hospital

staff, nurses had the highest rate of needle stick injury. Khuri-Bulos, Toukan, Mahafzah, Al-Adham, Faori, Khader and Rumeilah (1997) in their three year study of Jordan University Hospital staff stated that 248 of the staff had suffered injury from sharps, of which 34.6 % from them were nurses. Of those who suffered NSIs, 34 of 62 were found positive for Hepatitis B antigen and 8 of 13 were infected with Hepatitis C virus.

Rabaud, Zanea, Mur, Blech, Dazy, May and Guillemin (2000) stated that nurses are at most risk for NSIs because they regularly deal with the situations that have high risk for injury like giving injection. Lack of compliance to the universal precaution which also can cause NSIs among nurses may also vary according to the setting of the workplace, rural or urban. Furthermore, study by Elimiyeh, et al. (2004) has shown that nurses working in rural settings were 2.7 times more likely to be exposed to body fluids than their counterparts in urban settings even when no differences in knowledge, compliance or practice barriers were found.

### **2.3 Knowledge Regarding NSIs**

Knowledge regarding NSIs is defined as the concepts and relationships that are assumed to exist in the aspects of regarding needle stick injuries (LearnThat.com, 2004). There are associated factors with the occurrence of NSIs which are individual factors, patients' factor, the device factor and the management factor. Examples of the individual factors are lack of knowledge about blood borne disease, about the universal precaution and about the awareness of management policy regarding NSIs.

According to a study by Naing, Ahmad and Kamaruzaman (1999), all of their respondents were educated about universal precaution and were given hepatitis B

immunization. However, NSIs is still high. The role of education and advice to make students more safety conscious is an important factor to reduce the injury rate. The incidence of NSIs might be reduced by education and awareness about the danger and the risk of this type of injury, of hepatitis B and HIV infections. From a study by Tabak, et al. (2006), only 17 % of the hospital staff was aware of the risk of HCV transmission by puncture of a contaminated object. Besides, Yang, Liou, Chen, Yang, Wang, Chen and Wu, (2007) in their study reported that nursing students generally acquire limited knowledge from school curricula about prevention of blood borne infections associated with injuries and health care worker acquire limited education about blood borne infections from hospital.

### **Knowledge Regarding Blood borne Pathogens**

Blood borne pathogens are pathogenic microorganisms that are presence in human blood and can cause disease in humans. These pathogens include Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and others (OSHA, 2008; Mehrdad & Leila, 2006; Elimiyeh, et al., 2004; Patterson, Novak, Mackinnon & Ellis, 2003; Shiao, McLaws, Huang & Guo, 2002; Fletcher, 2000). Research also has suggested that around two thirds of seroconversions disease following NSIs will occur among nursing staff (Shiao, Guo & McLaws, 2002). As such, nurses clearly shoulder a significant NSIs burden in many parts of the world including Asia (Phipps, Honghong, Min, Burgess, Pellico & Watkins, 2002; Smith, Wei & Wang, 2004).

Regarding Hepatitis B, there is a vaccine to prevent this disease that must be offered to all HCWs and given to children at birth. American Nurses Association (ANA) strongly recommended that all HCWs be vaccinated since it is the best means of

prevention. The transmission of this disease occurs via blood and body fluids. It can be spread via unprotected sex with an infected partner, IV drug use and mother child transmission. People who are at high risk for HBV are HCWs and public safety workers, hemodialysis patient, people with multiple sex partner, IV drug users, men who have sex with men and infants born to infected mother (CDC, 2003; ANA, 2004).

On the other hand, Hepatitis C (HCV) also has become a great concern for nurses. Hepatitis C is a serious disease of the liver and can be fatal. It is a silent epidemic. There could be thousands and thousands of nurses with occupationally acquired Hepatitis C who simply does not know it. Hepatitis C also is most common chronic blood borne infection because it can lead to liver failure and liver cancer. 80 % of people infected with HCV are asymptomatic of the symptoms like jaundice, fatigue, dark urine, abdominal pain, loss of appetite and nausea. Furthermore, HCV can be transmitted by sexual transmission. Surprisingly, the virus of this disease is the most frequent infection resulting from NSIs with a transmission rate of 2.7 % - 10 %. There is no vaccine for the treatment of Hepatitis C (CDC, 2003; ANA, 2004; InviroMedical.com, 2009).

Of healthcare workers who become infected from accidental NSIs, approximately 85% become chronic carriers of hepatitis C. The transmission rate of hepatitis C from an accidental needle stick is 1 to 10 percent. It is possible that thousands of nurses and other clinicians have occupationally acquired hepatitis C through bloodborne pathogen exposure and remain unaware of their disease. Hepatitis C carriers have the potential to spread the disease to others including their partners and close family members, thereby making widespread hepatitis C transmission a serious societal consequence of NSIs (InviroMedical.com, 2009).

According to ANA (2004), the transmission rate of occupationally acquired HIV remains very low (3 % or 1 in 300). Many nurses throughout the world are living with occupational acquired AIDS and many have died from it. The risk of transmission can increase up to 5 % (a 1 in 20 chance) if the needle is contaminated by an HIV-infected patient with a high viral load. The majority of infections have resulted from injuries of hollow bore needles. The body fluids of most concern for HIV transmission are: blood, semen, vaginal fluid, breast milk and other body fluids containing blood. There is no vaccine for HIV. Only new medications were found that can slow the development of HIV/AIDS. Treatment for post exposure of HIV transmission should be started within 2 hours of exposure (ANA, 2004).

The risk of transmission from the patient to the healthcare worker of Hepatitis C is about 3%, hepatitis B is about 30% and HIV is about 0.3%. Whether the infection will occur depends on the viral load of the patient and the amount of blood that passes from one to the other (Tabak, et al., 2006; Elimiyeh, et al., 2004; Goldman, 2002). OSHA estimates that 5.6 million workers in the healthcare industry and related occupations are at risk of occupational exposure to blood borne pathogens. Students who are exposed to needles in their clinical activities are at increased risk of acquiring NSIs which may lead to serious blood borne pathogen infections (Norsayani & Noor Hassim, 2003). The average risk of HIV infection after a NSIs or cut exposure to HIV-infected blood is 0.3 percent (CDC, 2003).

Gurubacharya, Mathura and Karki (2003) and Alam (2002) have revealed that knowledge of HCWs regarding NSIs was associated with the prevalence of NSIs. Zafar et al. (2008) has reported that NSIs was higher among HCWs but they also noted that the



overall knowledge regarding blood borne diseases, vaccination and post exposure prophylaxis control was also high among the HCWs. In their study, about 86 % of HCWs sustained NSIs were aware of NSIs prevention protocols and more than 88 % of them knew the risk of getting Hepatitis B, Hepatitis C and HIV from NSIs.

### **Knowledge Regarding Universal Precaution**

According to Centers for Disease Control and Prevention (CDC), Universal precautions are a set of precautions designed to prevent transmission of HIV, HBV and other blood borne pathogens among health care workers when providing first aid or health care with the consideration that blood and certain body fluids of all patients are potentially infectious. Universal precautions apply to blood, other body fluids containing visible blood, semen, and vaginal secretions. Universal precautions also apply to tissues and to the following fluids like cerebrospinal, synovial, pleural, peritoneal, pericardial and amniotic fluids. Universal precautions do not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomitus unless they contain visible blood. Universal precautions do not apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable (CDC, 2001).

Universal precautions involve the use of protective barriers such as gloves, gowns, aprons, masks, or protective eyewear, which can reduce the risk of exposure of the health care worker's skin or mucous membranes to potentially infective materials. All HCWs should adhere to universal precaution, including the appropriate use of hand washing, protective barriers and care in the use and disposal of needles and other sharp instruments (CDC, 2001). Implementation of universal precaution contributes to

decreased parenteral injuries which represent the most important source of significant occupational exposure to blood (Wang, Fennie, He, Burgess & Williams, 2002).

Since infected patients could not be identified by readily observable or identifiable demographic characteristic, universal precautions were recommended for use with all patients (Shiao, McLaws, Huang & Guo, 2002). Students who did not follow correct procedures regarding Universal Precautions would not be protected from injury even though their knowledge was good (Norsayani & Noor Hassim, 2003). According to Osborn, et al. (1999), instruction on universal precaution was not sufficient but the students must be proficient in the safe conduct of clinical procedures. Logan (2002) suggested in their study that universal precaution procedures must be introduced in the preclinical years and constantly reinforced during each clinical posting in order to make sure that the students always remember the guidelines of the correct practice and avoid from doing any mistakes during their clinical posting.

Study by Naing, Nordin and Musa (2001) reported that nurses in the younger age group and with less working experience had better knowledge of Universal Precaution. In addition, nurses' awareness of their own noncompliance may further interfere with full use of precautions. Yet another factor may be HCW's belief that touching is related to healing and personal protective equipment may interfere with patient relationships (Perry, et al., 2004).

### **Knowledge Regarding Reporting of NSIs**

At any work environment, there must be a standards policy that evaluate and treat HCWs in accordance with the latest post exposure treatment, the needs for reporting, prophylaxis treatment and the guidelines from CDC. Before an exposure occurs, the

management of that institutions must evaluate the risk assessment of NSIs, provide confidential testing for HIV, Hepatitis B and Hepatitis C, provide access to post exposure treatment and prophylactic medications within two hours of exposure and provide counseling, education and follow-up testing for up to one year after exposure (ANA, 2004).

If there is an incidence of NSIs happens, a victim must take the following actions immediately which are: 1) Wash the injured area with soap and water, 2) Alert the supervisor of that place and initiate the injury reporting system, 3) Get tested immediately and confidentially for HIV, Hepatitis B and Hepatitis C infections, 4) Get the post exposure prophylactic treatment in accordance with CDC guidelines when the source or patient status is unknown or positive for HIV, HBV or HCV (ANA, 2004).

However, mandatory post exposure treatment although theoretically simple, presents a complex moral, ethical and legal dilemma. That's why the exact reason for underreporting remained unclear. Those who become infected are at risk of being uncompensated and deprived of gainful employment. Unless specific infective incidents can be identified, neither employer nor insurance company is likely to be generous (Elmiyeh, et al., 2004).

The possible explanation of compliance of duty to report the NSIs might be due to hospital policy which encouraged reporting, the role of hospital's contamination prevention team and increased awareness of the risks of infection transmission (Tabak, et al., 2006).

## **2.4 Attitude regarding NSIs**

Attitude regarding NSIs is defined as a mental position or perception or a state of feeling or emotion toward a fact about NSIs like preventing and reporting the incidence (Merriam-Webster.com, 2008). From the study done by Elmiyeh, et al. (2004), about 74 % of the respondents had sustained such an injury during their careers. Only 51 % of those affected reported all NSIs. Doctors were less likely to report the injuries than nurses because they think of low perceived risk of transmission of infections. The exact reason for under reporting remains unclear.

There is also a possibility that the actual number of NSIs incidence is higher than the recorded incidences (Elimiyeh, et al., 2004; Gillen, McNart & Lewis, 2003; Alam, 2002; Ng, Lim, Chan & Bachok, 2002). According to a study by Perry et al. (2004), about 42% of the nurses didn't report their incidences of NSIs. A study by Alam (2002) also showed that 93% of the respondent with history of NSIs never reported the incidence for further treatment.

From a study by Norsayani and Noor Hassim (2003), only about 35.6% of NSIs incidence was reported. The major reason for not reporting the incidents were the feeling that the exposure was not dangerous because the patient was not a blood borne pathogen carrier, they were not aware that the incident should be reported and did not know where to report the case. Aside from significant personal consequences experienced, follow-up testing, treatment and ongoing costs also represent expensive management issues (Smith, Choe, Jeong, Jeon, Chae & An, 2006).

## **2.5 Practice regarding NSIs**

Practice regarding NSIs is defined as the exercise of the profession or knowledge of how something is usually done or a customary way of behavior regarding NSIs either it can increase the risk of NSIs or decrease the risk of NSIs (WordReference.com, 2008). According to a study by Norsayani and Noor Hassim (2003) about “Study on Incidence of Needle Stick Injury and Factors Associated with This Problem among Medical Students”, the result showed that the students who had NSIs (cases) had lower score in the practice of Universal Precautions than non-cases ( $p < .05$ ). The lower the score for the practice of universal precaution will show the higher number of episodes of NSIs.

There are some activities that associated with the majority of NSIs which are administering injections, withdrawing blood, recapping needles, disposing of needles, handling trash and dirty linen (downstream injuries) and while attempting to transfer blood or other body fluids from a syringe to a specimen container (such as a vacuum tube) and misses the target (Norsayani & Noor Hassim, 2003). NSIs also related to poor practice by not complying with universal precautions concerning the consequences of NSIs.

The incidence of NSIs was high during taking off the cap and recapping the needle after used. The problem which arose during taking off the cap might be due to the mechanical design of the needle which caused difficulty in opening the cap and students might have accidentally injured themselves (Norsayani and Noor Hassim, 2003).

According to OSHA’s Blood Borne Pathogen Standards, recapping a needle is prohibited in order to reduce the risk of transmission of blood-borne pathogens. A study done by Naing, Ahmad and Kamaruzaman (1999) showed that 67.4% of the students

recapped needles after used. About 60.7% of the Accident and Emergency Department staff in Kuala Lumpur Hospital recapped needles after used and this showed that even health care workers who have more experience than students also carried out wrong practice.

## **2.6 Conceptual Framework of NSIs**

In this study, researcher used the conceptual framework based on the conceptualization of NSIs incidence that adapted from the study by Norsayani and Noor Hassim (2003). According to Norsayani and Hassim (2003), there are three factors that will determine the way of preventing NSIs which are: 1) individual factor, 2) psychosocial factor, and 3) organizational factor. For individual factor, it includes the aspects of sociodemographic's factor, level of knowledge about blood-borne disease, level of knowledge about universal precautions and level of practice regarding universal precautions. While psychosocial factor includes the aspects of attitude and perceptions of the risk related to NSIs. Then, the organizational factor includes the aspect of the organizational policy regarding NSIs. The combination of these three aspects will influence the individual to practice universal precautions and continued with preventing NSIs from happen.

In this study, there are only three factors that will focus by the researcher which are: 1) Knowledge, 2) Attitude, and 3) Practice. The combination of these three factors will influence the individual to practice universal precautions and preventing NSIs from happen (refer Figure 2.1).