

Sharps Injuries among Nurses in a Thai Regional Hospital: Prevalence and Risk Factors

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Abstract

Background: Sharps injuries (SIs) are one of the most serious occupational accidents among nurses due to the possible severe consequences, such as the transmission of infectious diseases and inducing of mental impairment.

Objective: To discover the prevalence of SIs among nurses in a regional hospital in Thailand and to identify factors associated with SIs.

Methods: A cross-sectional study was conducted in 2011. Stratified random sampling was used to select the respondents, with wards as the strata and the number of nurses selected proportional to the size of the ward nurse population. 261 self-administered questionnaires were distributed to nurses who used needles, syringes or other sharp medical equipment in their work. Data were analyzed using chi-square tests, correlation analysis and multiple logistic regression analysis.

Results: The prevalence of SIs for the previous 12 months was 55.5% among the 250 nurses who returned a completed questionnaire. Of these, 91.1% were with blood. Needles (52.8%) were the main cause of SIs. The reporting rate of SIs to the hospital was 23.8%. SIs had a significant association with each of marital status, work duration, work department, attitude regarding SI prevention, and preventive management. Using multiple logistic regression analysis, attitude was found to be the strongest predictor of SIs when adjusted for other factors. Nurses who had negative attitudes towards prevention of SIs were nearly two times more likely to have SIs than those with positive attitudes (adjusted odds ratio=1.86; 95% CI: 1.03–3.38).

Conclusion: The study showed a high prevalence of SIs, but a low reporting rate. This suggests the reporting system requires simplification and also should include a quick response management component. Promoting positive attitudes to SI prevention, and improving the reporting system would reduce SIs.

Keywords: Sharps injuries; Needlestick injury; Nurses; Prevalence; Prevention and control; Reporting rate

Introduction

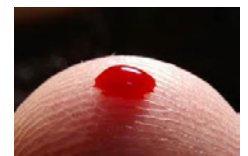
Health care workers (HCWs) such as medical doctors, nurses and laboratory staff are frequently exposed to infectious diseases.¹ Some infectious diseases have no available vaccination or

complete treatment, so blood-borne infections are a major cause of anxiety for HCWs. Globally, about 35 million HCWs face the risk of sharps injuries (SIs) from contaminated sharp objects every year.² However, previous research has indicated that SIs may be under-reported by 39.4%

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TAKE-HOME MESSAGE

- Health care workers are frequently exposed to infectious diseases.
- Sharps injuries are one of the most serious occupational accidents among nurses due to the possible severe consequences, such as the transmission of infectious diseases.
- Nurses were most likely to have needle stick injuries among health care workers.
- Reporting sharps injuries is important as it leads to sharing of the causes of the injuries and subsequent prevention of those accidents.
- Proper work environment might decrease the number of sharps injuries.
- Safe disposal boxes should be provided in all patient rooms and clinical settings.
- Advanced hospitals have tried to improve their hospital safety climates by providing nurses and head nurses with continuous education, focusing on improving individual nursing skills, managing reporting systems for sharps injuries, applying CDC and Universal Precautions guidelines, and setting adequate workloads for nurses.
- Nurse attitudes towards sharps injuries prevention and occurrence of sharps injuries is important.

to 75%.^{3,4} Some HCWs are not seriously concerned about infection by SIs and forget to report accidents. Yet SIs constitute a significant risk of transfer of blood-borne pathogens, and proper prevention and treatment is, therefore, important for HCWs.⁵

A Thai HCWs study conducted between 1998 and 2003, reported 820 episodes with occupational blood or body fluid exposures. The highest rate (27%) was found among nurses.⁶ Other research has also shown that nurses face a particularly high risk of SIs compared to other HCWs.⁷ In particular, nurses were most likely to have needle stick injuries (NSIs) among HCWs.⁸ Nursing staff face with the risk of SIs in a wide range of situations, but continuous education and adequate training for nurses may lead to reduction of potential hazards in their routine work.

In 2009, a research project was conducted in Delhi to assess the knowledge and practices of staff nurses regarding NSIs and to evaluate the effectiveness of guidelines developed for the prevention and management of NSIs in a selected Delhi government hospital. The study showed that 70% of nurses had experienced NSIs. Of these, the majority (71%) did not report the incident. There was lack of awareness among staff nurses regarding preventive behavior, especially the importance of reporting NSIs. Reporting NSIs is important as it leads to sharing of the causes of the injuries and subsequent prevention of those accidents.⁹

SIs often have severe consequences both physically and mentally. Physically, occupational infection with human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) may have serious consequences. The risk of infection with HBV, HCV and HIV from SIs has been estimated to vary from 6% to 30%, from 3% to 10%, and about 0.4%, respectively.¹⁰ For some HCWs with SIs, the emotional impacts of SIs were deeply severe for a long time, even though they were not infected by a serious pathogen.^{11,12} It has been suggested that a proper work environment might decrease the number of SIs.¹³ For example, safe disposal boxes should be provided in all pa-

tient rooms and clinical settings.¹⁴ Some advanced hospitals, therefore, have tried to improve their hospital safety climates by such strategies as providing nurses and head nurses with continuous education, focusing on good team work, managing reporting systems for SIs, and setting adequate workloads for nurses.¹⁵ SIs may be considered a manifestation of human error requiring not only individual effort for prevention, but also a proper workplace environment designed to reduce SIs.

Nowadays, hospitals in many countries are tackling the SI problems by improving individual nursing skills and applying Center for Disease Control and Prevention (CDC) and Universal Precautions (UPs) guidelines.¹⁶ However, SIs still occur frequently to HCWs everywhere and are often under-reported. This study was therefore conducted to determine the prevalence of SIs among nurses in a Thai regional hospital, and to examine factors (knowledge, attitudes, practices and preventive management) associated with SIs.

Materials and Methods

This study was a cross-sectional study, conducted among nurses working at a regional hospital in Thailand. Formal approval to collect data was obtained from ethics committees at Mahidol University and the regional hospital. The total number of the nurse staff was 789 in 2009. The sample size was estimated using a confidence interval of 95%, an acceptance error of 2%, and a proportion of having SIs in 2009 of 0.0347.¹⁷ Thus, the required sample size was at least 250. Stratified random sampling was used to select the participants, with wards as the strata and the number of nurses selected proportional to the size of the ward nurse population. Two-hundred and sixty-one self-administered questionnaires were distributed to nurses who used needles, syringes or oth-

er sharp medical equipment in their work. Anonymous data collection was conducted in January 2011.

The questionnaire was divided into six parts: socio-demographic factors comprised six questions dealing with age, gender, marital status, working duration, working department and working positions. The section about information regarding SIs comprised eight questions which focused on the nurses SI experiences during the 12 months prior to this study, and throughout their careers. Information was also elicited from the nurses about the severity of their SIs, the equipment being used, the circumstances of the SIs and the reporting of SIs.

The knowledge section comprised information about nurse knowledge about HIV, HBV and HCV transmission, and preventing SIs using UPs. The number of statements was 12. In each statement, respondents were given one point for the correct answer and no point for an incorrect answer. Scores ranged from 0 to 12. The total score of the knowledge part was classified into three categories: "poor" if the score was <60% of the total score; "fair" if from 60% to 80%; and "good" if >80%.

The attitude section addressed nurse feelings and thoughts about preventing SIs, including use of UPs. The attitude section had seven statements. Scoring for each statement was 5, 4, 3, 2, and 1 corresponding to "strongly agree," "agree," "neutral," "disagree" and "strongly disagree." The score was reversed for negative statements. Scores ranged from 7 to 35. The total score was categorized into two groups: "positive attitude" (equal to or more than the median) or "negative attitude" (less than the median). A "negative attitude" indicated the nurse thinks that preventing SIs is not very important.

The safe work practices section considered three stages with nine statements: preparation (asking about enough space

Table 1: Distribution of respondents by socio-demographic factors

Socio-demographic factors	n	%
Age group (yrs)	246	
21–30	126	51.2
31–40	77	31.3
41–50	34	13.8
51–60	9	3.7
Median = 30, QD*=6.5, Min=22, Max=57		
Gender	250	
Female	233	93.2
Male	17	6.8
Marital status	250	
Single	144	57.6
Married	95	38.0
Divorced	9	3.6
Widowed	2	0.8
Work duration (years)	248	
1–10	144	58.1
11–20	68	27.4
21–30	30	12.1
31–40	6	2.4
Median=9, QD=6.5, Min=1, Max=36		
Work position	248	
Full-time nurse	236	95.2
Part-time nurse	4	1.6
Head nurse	6	2.4
Others	2	0.8
Work department	250	
ICU and CCU	49	19.6
Critical Units	105	42.0
Semi-critical Care Units	45	18.0
Special Care Units	51	20.4

*QD=quartile deviation

and light to work), procedure (asking about using appropriate equipment and applying UPs), and after using sharp medical equipment (asking about recapping). Five levels of answers were put in this part; 5 points: “always;” 4: “quite often;” 3: “sometimes;” 2: “rarely;” and 1: “very

rarely.” The score was reversed for negative statements. Score for safe work practices ranged from 9 to 45. The total score was classified into two categories; a total score which was equal to or more than the median was considered “good,” and less than the median was considered “poor.”

The data concerning preventive management of SIs were obtained from nurse perceptions regarding five aspects: staff skills management, interpersonal management, information management, workload and workplace environment and leadership management.

With regard to validity and reliability, the questionnaire was revised according to the comments and the suggestions given by three experts. After the pre-test, some questions in the knowledge section were revised, deleted, added and amended. In the final score, the Kuder-Richardson (KR20) test for the knowledge section was 0.476. Cronbach's α for attitude, practice and perception were 0.609, 0.600 and 0.699, respectively.

Univariate analysis was used to describe the mean, standard deviation, median, quartile deviation, minimum, maximum, number and percentage. χ^2 tests were used to determine a possible association between each qualitative independent variable and SIs among nurses during the 12 months prior to interview. Correlation between quantitative variables was examined. Finally, multiple logistic regression analysis was used to determine the association between independent variables and SIs.

Results

Of 261 questionnaires distributed, 250 were completed and returned by nurses, translating into a response rate of 95.8%. Just over half (51.2%) of the respondents were aged between 21 and 30 years, with a median age of 30 years. Almost all were

female (93.2%), and 57.6% were single. Nearly 60% had been working as nurses from one to ten years; their median work duration was nine years; 42.0% were working in critical care units (Table 1).

Table 2 shows that about 67% had fair knowledge about transmission of infectious diseases and prevention of SIs. About half (50.4%) had a positive attitude towards prevention of SIs. More than half had good practices, and had positive perceptions regarding preventive management in workplaces. Moreover, nearly 70% had already been fully vaccinated against HBV. Of those, about 53% had checked their anti-HBs (hepatitis B surface antibody) level after vaccination. When exploring correlation, only a significant correlation between practice and attitude was found ($r=0.544$, $p<0.001$). However, correlation between practice and knowledge ($r=0.094$) and also between attitude and knowledge ($r=0.115$) was not significant.

Table 3 shows the prevalence (55.5%) of SIs for the one year prior to this study; of all SIs, 91.1% were with exposure to blood among nurses. Approximately, half of the last SIs occurred during the preparation stage and only 20% happened during using of the device. SIs happened most commonly with needles (52.8%), followed by ampoules (26.2%). Only 24% reported their last SIs to the hospital. The main reason for not reporting to the hospital was that SIs were considered not serious (72%).

SIs had a significant association with each of marital status, work duration, work department, attitude, and preventive management (only workload and workplace environment) as shown in Table 4. On the other hand, age group, gender, work position, knowledge, practice, and preventive management (management of staff skills, interpersonal relations, information, and leadership) were not associated with SIs. Multiple logistic regression

Table 2: Distribution of respondents by knowledge, attitude, safe work practice and perception level

Perception Level	n	%
Knowledge	250	
Poor	31	12.4
Fair	168	67.2
Good	51	20.4
Median=9, QD*=2, Min=5, Max=12		
Attitude	250	
Negative	124	49.6
Positive	126	50.4
Median=28, QD=2.5, Min=17, Max=35		
Safe work practice	241	
Poor practice	111	46.1
Good practice	130	53.9
Median=35, QD=3.0, Min=24, Max=45		
Perception of workplace management	241	
Negative	104	43.2
Positive	137	56.8
Median=36, QD=3.0, Min=23, Max=45		

*QD=quartile deviation

indicated that nurses who had negative attitudes towards prevention of SIs were nearly two times more likely to have SIs than those with positive attitude, when adjusting for other factors (Table 5).

Discussion

With regard to the prevalence of SIs during the 12 months prior to this study, 55.5% of the nurses had experiences of at least one episode of SIs, higher than the rate reported in previous studies. In a study from Malaysia in 2008, the prevalence of SIs was 27.9%,¹⁸ and in an African study in 2004 it was 53.2%.⁹ In this study, it is considered that the high prevalence was due to heavy workloads and short duration

Table 3: Prevalence of SIs of respondents in the 12 months prior to interview and stages of procedures when injuries occurred.

Prevalence of SIs of nurses	n	%
SIs of nurses	220	
Yes	122	55.5
No	98	44.5
Could not recall	25	
SIs with blood	112	
Yes	102	91.1
No	10	8.9
When injuries occurred	210	
During preparation	110	52.4
During using of the device	42	20.0
After using of the device	37	17.6
While disposing of the device	10	4.8
Others*	11	5.2

*"Others" include during washing equipment and during carrying them to other places.

of work. The rate of occupied beds was 110.95% in 2010 (the official number of beds was 867 and additional beds were set up during this study) and the number of patients coming to the hospital averaged 3305 per day.¹⁹ However, the prevalence of SIs found in this study was lower than findings in a study conducted at a university hospital which showed that 68.4% of nurses had received SIs in the previous year. The study also concluded that long working hours and heavy workloads increased the risk of SIs.²⁰ Findings from the present study showed that 60.4% of the nurses constantly felt tired after work. This is consistent with a study in which nurses with emotional exhaustion were about two times more likely to have SIs.²¹

A significant association between SIs and working duration ($p=0.031$) was de-

tected in this study. The nurses who had been working from 1 to 20 years were about two times more likely to have SIs than those working from 21 to 40 years. Less experienced nurses were more likely to have SIs compared to more experienced nurses. This was consistent with findings in a study from Africa which showed that less experienced nurses were 1.67 times more likely to have SIs than those having more experience.²²

In this study, 24% reported their last SIs to the hospital. Other studies have found higher rates of reporting: 57% in the Philippines and 42.9% in Malaysia.^{23,24} They also mentioned the reasons for not reporting to be that "the event was not serious at the time," "too busy to report and no systematic reporting system,"²³ and that "the source was thought not to be infectious."²⁴ These reasons were similar to those given in this study which were that "the SIs were not serious at the time" and that "devices were unused." However, the hospital needs to improve the reporting system because reporting can lead to sharing of experiences about the causes of SIs among nurses and may reduce their frequency effectively.

This study found that the relationship between nurse attitudes towards SI prevention and occurrence of SIs was statistically significant. A Kathmandu study found that HCWs had negative attitudes towards reporting SIs;²⁵ another study from Nigeria showed that poor attitudes regarding use of UPs caused high prevalence of NSIs.¹³ Hospitals can reduce the number of SIs by improving attitudes of nurses as attitude is strongly correlated to behavior.²⁶

This study was conducted in a Thai regional hospital which has an official standard post-exposure policy and procedures to assist nurses in receiving appropriate care (at no cost) when they have SIs. The hospital encourages and supports the staff

Table 4: Association between SIs and each independent variable

Variables	n	SIs in the previous 12 months			p value
		Yes %	No %	Crude OR (95% CI)	
Marital status	220				
Single	134	66.4	33.6	3.18 (1.81–5.58)	<0.001
Married	86	38.4	61.6	1	
Work Duration (yrs)	218				
1–20	186	58.1	41.9	2.31 (1.01–5.00)	0.031
21–40	32	37.5	62.5	1	
Work department	220				
ICU and CCU	46	65.2	34.8	2.47 (1.05–5.78)	0.038
Critical Care Unit	92	57.6	42.4	1.79 (0.87–3.70)	0.117
Semi-Critical Care Unit	38	52.6	47.4	1.46 (0.61–3.50)	0.394
Special Unit	44	43.2	56.8	1	
Attitude	220				
Negative	107	64.5	35.5	2.06 (1.2–3.53)	0.009
Positive	113	46.9	53.1	1	
Preventive management (workload and work- place environment)	218				
Negative	81	64.2	35.8	1.82 (1.04–3.2)	0.037
Positive	137	49.6	50.4	1	

to be fully vaccinated against HBV. However, only 70% of nurses in this study revealed that they had already been fully vaccinated against HBV.

This study had some limitations. This study was confined to a single (albeit large) hospital in Thailand. For this reason, it is inappropriate to generalize the findings to the whole of Thailand. The research design of this study was cross-sectional and relied on recall of SIs during the previous 12 months. Thus, the study is subject to the recall bias in respondents' memories. Self-selection bias may also have occurred, as the respondents were nurses who chose

to participate in the study. Due to ethical issues, the nurses also had the right not to participate. Further studies are recommended, to include more regional hospitals and assess SIs during only the three months prior to the interview. To avoid recall bias, a prospective study should be conducted to identify the incidence of SIs and related factors.

In conclusion, the study reveals a high prevalence of SIs among nurses, but a low reporting rate. Improving the reporting system should be a priority. This may increase awareness of the need to report SIs to the hospital. The reporting system

Table 5: Multiple logistic regression analysis for predictors of SIs in the nursing staff.

Variables	Adj OR (95% CI)	p value
Work duration (yrs)		
21–40	1	
1–20	2.18 (0.95–4.99)	0.065
Attitude regarding SIs prevention		
Positive	1	
Negative	1.86 (1.03–3.38)	0.040
Safe work practice		
Good	1	
Poor	1.10 (0.6–2.02)	0.748
Preventive management (workload and workplace environment)		
Positive	1	
Negative	1.82 (1.01–3.30)	0.047

should be simpler and should also include a quick response management component. Nurses' attitude towards prevention of SIs was found to be the strongest predictor when adjusted for other factors. Nurses who had a negative attitude towards prevention of SIs were nearly two times more likely to have SIs than those with a positive attitude. Therefore, nurses, especially young staff, need continuing education and training about prevention of SIs as this contributes to improved attitudes and would decrease SIs. The hospital needs to evaluate a training program regularly to avoid inadequate training in the prevention of SIs.

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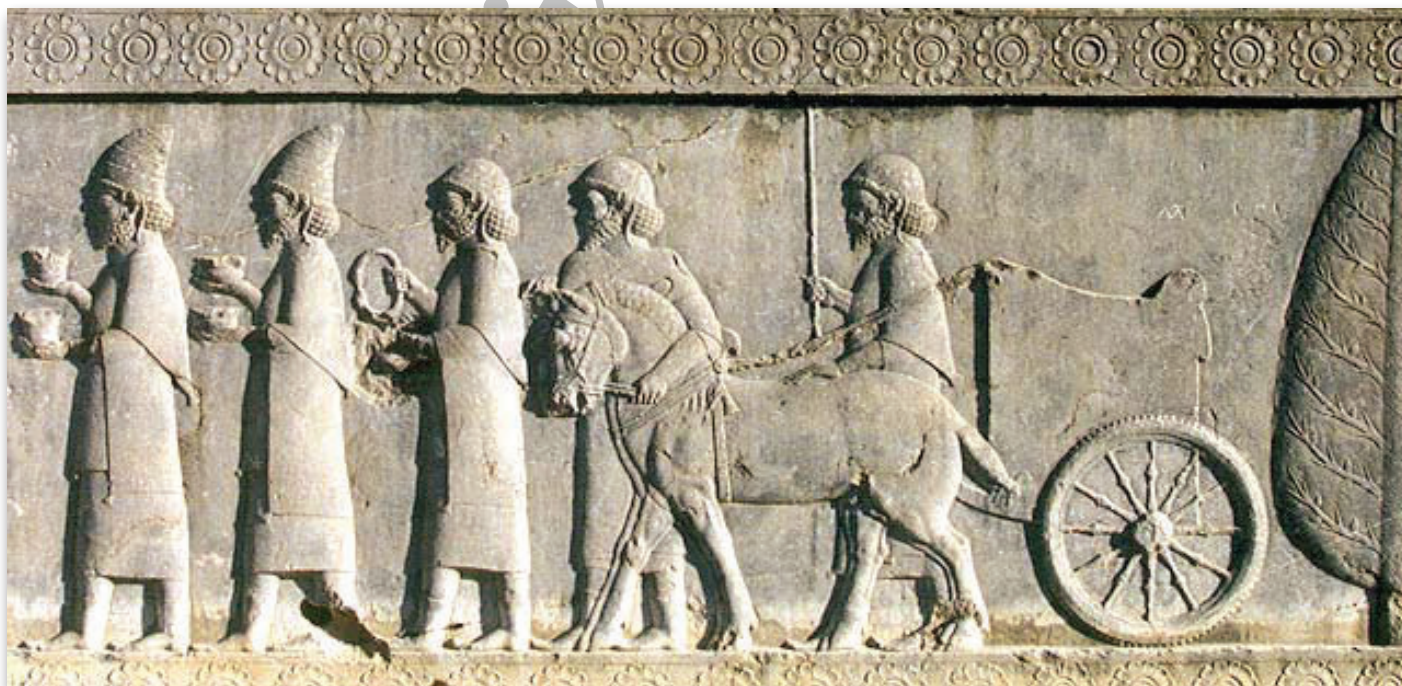
Conflicts of Interest: None declared.

References

- Leliopoulou C, Waterman H, Chakrabarty S. Nurses failure to appreciate the risks of infection due to needle stick accidents: a hospital based survey. *J Hosp Infect* 1999;**42**:53-9.
- World Health Organization. *The World Health Report: quantifying selected major risks to health*. Geneva: WHO, 2002.
- Ghofranipour F, Asadpour M, Ardebili HE, et al. Needle sticks/sharps injuries and determinants in nursing care workers. *Eur J Soc Sci* 2009;**11**:191-7.
- Wicker S, Ludwig A, Gottschalk R, Rabenau H. Needlestick injuries among health care workers: occupational hazard or avoidable hazard? *Wien Klin Wochenschr* 2008;**120**:486-92.
- Bandolier E. Needlestick injuries. 2008, Available from www.medicine.ox.ac.uk (Accessed December 30, 2010).
- Kiertiburanakul S, Wannaying B, Tonsuttakul S, et al. Use of HIV postexposure prophylaxis in healthcare workers after occupational exposure: a Thai university hospital setting. *J Med Assoc Thai* 2006;**89**:974-8.
- Lachowicz R, Mathews P. The pattern of sharps injury to health care workers at Witbank Hospital. *S Afr Fam Pract* 2009;**51**:148-51.
- Muralidhar S, Singh PK, Jain RK, et al. Needle stick injuries among health care workers in a tertiary care hospital of India. *Indian J Med Res* 2010;**131**:405-10.
- Simon LP. Prevention and management of needle-stick injury in Delhi. *Br J Nurs* 2009;**18**:252-6.
- Department of Health. Procedure for management of needlestick injury or mucosal contact with blood or body fluids. 1995, Available from www.info.gov.hk/aids/pdf/g38.pdf (Accessed November 20, 2010).
- Lee JM, Botteman MF, Xanthos N, Nicklasson L. Needle stick injuries in the United States. *AAOHN Journal* 2005;**53**:117-33.
- Efetié ER, Salami HA. Prevalence of, and attitude towards, needle-stick injuries by Nigerian gynaecological surgeons. *Niger J Clin Pract* 2009;**12**:34-6.
- Clarke SP, Rockett JL, Sloane DM, Aiken LH. Organizational climate, staffing and safety equipment as predictors of needlestick injuries and near-misses in hospital nurses. *Am J Infect Control* 2002;**30**:207-16.

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14. Askarian M, Shaghaghian S, McLaws M.L. Needlestick injuries among nurses of Fars province, Iran. *Ann Epidemiol* 2007;**17**:988-92.
15. Kudo Y, Kido S, Shahzad MT, *et al*. Safety climate and motivation toward patient safety among Japanese nurses in hospitals of fewer than 250 beds. *Ind Health* 2009;**47**:70-9.
16. Centers for Disease Control and Prevention. Exposure to blood: what healthcare personnel need to know. 2003, Available from www.cdc.gov/ncidod/dhqp/pdf/bbp/exp_to_blood.pdf. (Accessed August 15, 2011)
17. Khon Kaen Hospital. *Report on sharp injuries at work in 2009*. Khon Kaen: Infectious Prevention and Control Section of Khon Kaen Hospital; **2009**.
18. Rampal L, Zakaria R, Sook LW, Zain AM. Needle stick and sharps injuries and factors associated among health care workers in a Malaysian hospital. *Eur J Soc Sci* 2010;**13**:354-62.
19. Khon Kaen Hospital. *Statistics report of outpatients service 2007-2010*. Khon Kaen: ICT Center, **2010**.
20. Ilhan MN, Durukan E, Aras E, *et al*. Long working hours increase the risk of sharp and needlestick injury in nurses: the need for new policy implication. *J Adv Nurs* 2006;**56**:563-8.
21. Clarke SP, Sloane DM, Aiken LH. Needlestick injuries to nurses. 2002, Available from www.upenn.edu/ldi/issuebrief8_1.pdf (Accessed December 25, 2010).
22. Nsubuga FM, Jaakkola MS. Needle stick injuries among nurses in sub-Saharan Africa. *Trop Med Int Health* 2005;**10**:773-81.
23. Castro ABd, Cabrera SL, Gee GC, *et al*. Occupational health and safety issues among nurses in the Philippines. *AAOHN Journal* 2009;**57**:149-57.
24. Lee L, Hassim IN. Implication of the prevalence of needlestick injuries in a general hospital in Malaysia and its risk in clinical practice. *Environ Health Prev Med* 2005;**10**:33-41.
25. Gurung B, Gurung U. Attitude of junior doctors towards needle-stick injuries. *J Inst Med* 2009;**31**:28-31.
26. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 1991;**50**:179-211.



One of the Persepolis carvings (near Shiraz, Iran).