

# Preventive Measures after Needle-Stick Injuries and Association with Health Locus of Control Beliefs in Medical Students

M. Karbakhsh, M. Shamseddini Motlagh, M. Khansari

**Abstract**—The purpose of this research was to demonstrate prevalence of post-exposure preventive measures (PEP) after needle-stick injuries and its relationship with locus of control beliefs in a sample of medical students. In this cross-sectional study, 300 medical students with history of having experienced needle stick injuries (NSI) for at least once filled in a questionnaire to determine if they perceived themselves to be responsible and effective in preventing blood born infections after NSI. About 38% of students did not seek any professional consult or PEP after NSI due to lack of enough time or access, anxiety about tests results, belief in uselessness of follow-up and not being able to change destiny. These 114 students were not different from others regarding their scores on NSI specific scale of locus of health control. Thus, the potentiality of NSI locus of control beliefs in predicting PEP was not seen in this study.

**Keywords**—health care workers, locus of health control, needle stick injuries, post-exposure prevention.

## I. INTRODUCTION

THIS It is estimated that each year, more than three million health care workers (HCWs) experience a percutaneous injury with a contaminated sharp object throughout the world [1]. Similar to other health personnel, medical students may sustain needle stick injuries (NSI) during their years of training and practice in medical wards [2-5].

One of the highest reported prevalences pertains to a study from Shiraz, Iran where more that 70 percent of surveyed clinical students (medical, nursing, midwifery and dental) had experienced NSIs for at least once [6].

Although the probability of being infected by a blood-borne pathogen may be low after a single exposure, the scale of consequences for the student who becomes infected is huge regarding his/her future career perspective and health [7].

Every HCW who sustains a NSI should have access to post-exposure prophylaxis (PEP) as appropriate, along with counseling, confidential testing, and follow-up [8]. Nevertheless, many reports have shown inadequate post exposure practices among medical students [6]-[9]. This might be a greater issue especially in developing countries, where the rate of NSI reporting is generally low [10].

Different reasons are listed for lack of PEP and reporting such as low perceived risk of post-exposure infections, lack of knowledge on importance and efficacy of PEP, not having access to PEP, or belief that it cannot influence the outcome [6],[8],[11]. This latter explanation was the most common reason for not reporting, in a study among French medical students (40%)[12].

M. Karbakhsh is with department of Community and Preventive Medicine at Tehran University of Medical Sciences, Tehran, Iran (phone: +9821 64053367; fax: +9821 88962357; e-mail: mkarbakh@tums.ac.ir).

M. Shamseddini Motlagh and M. Khansari were in Tehran University of Medical Sciences in their general medical practice.

These students are considered as “internal” according to Rotter’s social learning theory. In locus-of-control terminology, “internals” are persons who believe their health is largely determined by their own behaviors. On the other hand, “externals” are those that believe their health is determined by chance, fate, or other people or events that are beyond their control [13].

Some researchers have examined the association between health locus of control and preventive health behaviors [14],[15]. It seems logical that when individuals assume responsibility for their own health, they behave in a health-enhancing manner, thus maximizing the chance of maintaining a satisfactory level of well-being and helping to avoid illness or accidents [16]. The needle stick specific locus of control has not been studied previously. The purpose of this research was to demonstrate post-exposure preventive measures after needle-stick injuries and the relationship with locus of control beliefs in a sample of medical students from Tehran, Iran.

## II. METHODS

In this cross-sectional study, our sampling frame included medical students in clinical training (years 5-7 of their major) in Tehran University of Medical Sciences, Tehran, Iran. The inclusion criteria were defined as having the history of NSIs for at least once during their training and willingness to participate in the study. Then, we developed a questionnaire in which the students were asked to remember the most important NSI that they had experienced (if any) and whether they have followed standard PEP and the reasons for not following PEP, if so. Before the main phase of the study, 59 medical students were reached as a pilot study, of whom 18 had experience NSI for at least once (30.5%). Furthermore, 11 of 18 needle-sticked students said they had not done any PEP or follow up (61.1%). According to the results of this small scale study, the sample size was determined as 300 needle-sticked medical students. It was estimated that about 984 students had to be reached ( $300 \times 100/30.3$ ) to have 300 students with at least one previous history of NSI. Then, a questionnaire was developed to determine if the students felt themselves responsible and effective in preventing blood born infections (BBI) after needle stick injuries. The first health-related locus of control measure which was developed by Wallston et al, consisted of 11 items with a 6-point Likert response format [17]. In our study, we developed a 11-item questionnaire with 5-point Likert scale to examine health related locus of control regarding NSIs. The minimum attainable score for this scale was 11 which meant that the student does not feel to be effective in preventing BBI after NSIs and chance or fate are more powerful determinants of getting a BBI after a NSI(i.e. having external locus of control

regarding prevention of NSI). On the other end of the scale, a student who scored 55 believed that she/he is responsible in this regard and can actively influence the outcome after a NSI. This questionnaire was also piloted in our small scale study and some minor modifications were made (Chronbach  $\alpha=0.7$ ). Data analysis was performed using SPSS statistical software version 13.

### III. RESULTS

In order to have 300 needle-sticked students, we provided our questionnaire to 1156 students. In other words, the prevalence of NSI was 25.9 percent in our study population. These 300 subjects were our denominator for the rest of analysis regarding PEP and health locus of control. The mean age of these cases was  $25.86 \pm 1.37$  (median: 26) and about 68.3 percent were female. About 38% of students did not seek any professional consult or PEP after NSI (n=114). They listed the reasons showed in table 1 for not having received follow up care (some cases mentioned more than one reason). Other reasons which were added by students to our suggested barrier were lack of access to PEP, low(perceived) risk of transmission, previous HBS vaccination/HBS Ab titre measurement, discharge of the patient before having the chance of testing him/her regarding virus markers and opinion of the student's spouse for not seeking follow-up .

TABLE I  
 REASONS FOR NOT SEEKING POST EXPOSURE PROPHYLAXIS AFTER A  
 NEEDLE STICK INJURY IN STUDY SUBJECTS

Reason	N	Percent
Lack of enough time	75	25
Anxiety about the results of tests	35	11.7
Belief in uselessness of these actions	26	8.6
Not being able to change destiny and fate	14	4.7

Regarding the responses to locus of control questionnaire, the answers to each question is shown in table 2. The mean score for this scale in our study was  $43.24 \pm 5.2$  (median: 43). Mean score of this questionnaire was lower in students who had not done PEP in comparison to others; but, the difference was not statistically significant (P=0.8).

TABLE II  
 RESPONSES TO QUESTIONS OF NEEDLE- STICK SPECIFIC LOCUS OF CONTROL  
 SCALE

Question	agree or Strongly agree(%)	No ideas(%)	Disagree or Strongly disagree (%)
1. Post exposure follow-up only induces anxiety and worry.	12.4	12.7	75
2. PEP# does not influence the probability of acquiring hepatitis or HIV.	15	11.3	73.6
3. If I'm going to get hepatitis or HIV after NSI*, I'll have it even in case of PEP#.	13	9.3	77.6
4. Getting hepatitis or HIV after NSI* mainly depends on fate and destiny.	17.3	15	67.7
5. In future, if I have a NSI*, I'll immediately check my HBS	85.7	6.3	8

Antibody titer			
6. In future, if I have a NSI* with secretions of a HR ⚠ patient, I'll immediately ask to let us check his/her blood borne virus profile.	84.3	10.3	5.4
7. In future, if I have a NSI* with secretions of an HIV+ patient, I'll take anti-retrovirus medications, if medically indicated.	82	10.7	7.3
8. According to my bad chance and luck, It's probable that I get blood borne infections if I have a NSI*.	13	30	77
9. The number of health personnel that acquire blood borne infections after NSI* are very limited.	32	38	30
10. If someone gets hepatitis or HIV following NSI*, it has been really his/her fate.	9.7	21.3	69
11. I use protective devices during medical procedures as these are effective in preventing from getting blood borne infections.	91.7	4.7	3.7

# PEP: Post exposure prophylaxis  
 \*NSI: needle stick injuries  
 ⚠ HR: high risk

### IV. DISCUSSION

The main objective of this study was to assess if needle-sticked subjects who do not follow PEP, consider themselves as being unable to influence the outcome and overcome chance or fate. Some studies have previously shown that those who consider themselves capable to change health outcomes (i.e. have internal locus of control) are more likely to show behaviors that lead to better physical well-being [18]. Nevertheless, other studies have failed to show the associations between health locus of control and engaging in risky behaviors such as smoking, alcohol consumption[19] or involvement in screening behaviors[20] Thus, as Shamseddeen implies[21] these studies were generally performed in developed nations and the results have been mixed. People in developing countries and especially in the Middle East seem to have some differences regarding their attitudes and dependence on fate [21],[22]. Knecht et al, have suggested that locus of control belief are behavior specific [23]. They showed that only dental (and not diabetes) locus of control beliefs could predict oral health behavior. We also developed a situation-specific locus of control scale for predicting PEP behaviors after NSIs; nevertheless, no significant associations were found. The median score obtained by our sample was relatively high. This can be due to knowledge base of our sample who were students of medicine and thus, were potentially aware of the preventability of BBI. In other words, it can be said that belief in chance or fate had not been the main obstacle for seeking PEP after NSI in our setting. This is while perceived inability to change the outcome was reported as the main reason for to seeking PEP among French students [12].

On the other hand, about 38 percent of students had done nothing more than worrying or asking from non-professionals on what to do and had not reported the incidence and thus failed to follow up. According to two surveys from Toronto and Virginia, US more than 50 percent of students surveyed

continued working and failed to seek medical advice after NSI[9], [4]. The overall prevalence of NSI was 25.9 percent which is similar to prevalences reported by Rosenthal et al.[12] and Shen[4].

Barriers for reporting were generally similar to the ones reported by others[6],[8],[11]. In addition, an issue such as lack of agreement of the spouse for PEP was mentioned by two female married students. This needs further verification; but, can be interpreted according to the some cultural norms or preponderance of female participants in our study. It needs to be emphasized that now in Iran, more than half of medical students are female[24] and thus, our gender distribution is not different from the overall gender pattern of medical students in Iran.

*Some limitations might be considered when interpreting our results:*

1) Asking HCWs on their experience of NSI and what they did afterwards is prone to recall. In our research, we tried to minimize this potential bias by limiting our research to students who were in the clinical practice for about two or four years (in contrast to surveying nurses or attending physicians who might have been in clinical practice for more than five years). In addition, they were asked to mention their follow-up behaviors for "their most significant and remarkable NSI", if they had experienced it more than once.

2) Our developed questionnaire needs to be tested in other similar research to show if it is a valid and reproducible scale in demonstrating NSI-specific locus of health control. It is also necessary that its association with general health locus of control be demonstrated.

To encourage and ensure compliance with PEP among students of medicine, it is important that barriers are recognized and disseminated especially obstacles that might be culture or situation specific. Our research showed that about 38 percent of medical students did not seek PEP after NSIs. The potentiality of locus of control beliefs in domain of NSI in predicting PEP was not seen in this study.

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#### REFERENCES

- [1] Prüss-Ustün A, Rapiti E, Hutin Y. Estimation of the global burden of disease attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med.* 2005 Dec;48(6):482-90
- [2] Sharma GK, Gilson MM, Nathan H, Makary MA. Needlestick injuries(NSI) among medical students: incidence and implications. *Acad Med.* 2009 Dec;84(12):1815-21.
- [3] Norsayani MY, Noor Hassim I. Study on incidence of needle stick injury and factors associated with this problem among medical students. *J Occup Health.* 2003 May;45(3):172-8.
- [4] Shen C, Jagger J, Pearson RD. Risk of needle stick and sharp object injuries among medical students. *Am J Infect Control.* 1999 Oct;27(5):435-7.
- [5] Hadadi, A, Afhami S, Karbakhsh M, Esmailpour N. Occupational exposure to body fluids among healthcare workers: A report from Iran. *Singapore Medicine Journal,* 2008. 49(6): p.492.
- [6] Askarian M, Malekmakan L. The prevalence of needle stick injuries in medical, dental, nursing and midwifery students at the university

- teaching hospitals of Shiraz, Iran. *Indian J Med Sci.* 2006 Jun;60(6):227-32.
- [7] Tereskerz PM, Pearson RD, Jagger J. Occupational exposure to blood among medical students. *Engl J Med.* 1996 Oct 10;335(15):1150-3.
- [8] Wilburn SQ, Eijkemans G. Preventing needlestick injuries among healthcare workers: a WHO-ICN collaboration. *Int J Occup Environ Health.* 2004 Oct-Dec;10(4):451-6.
- [9] Cervini P, Bell C. brief Report: needlestick Injury and Inadequate Post-Exposure Practice in Medical Students. *J Gen Intern Med.* 2005 May; 20(5): 419-421
- [10] Sagoe CM, Pearson JD, Perry J, Jagger J. Risks to health care workers in developing countries. *N Engl J Med.* 2001;345:538-9.
- [11] Kennedy R, Kelly S, Gonsalves S, Mc Cann PA. Barriers to the reporting and management of needlestick injuries among surgeons. *Ir J Med Sci.* 2009 Sep;178(3):297-9. Epub 2009 Jun 4.
- [12] Rosenthal E, Pradier C, Keita-Perse O, Altare J, Dellamonica P, Cassuto JP. Needlestick injuries among French medical students. *JAMA.* 1999 May 5;281(17):1660
- [13] Rotter JB. Generalized expectancies for internal versus external control of reinforcement. *Psychol Monogr.* 1966;80(1):1-28
- [14] Gale CR, Batty GD, Deary IJ. Locus of control at age 10 years and health outcomes and behaviors at age 30 years: the 1970 British Cohort Study. *Psychosom Med.* 2008 May;70(4):397-403.
- [15] McCusker J, Morrow G. The relationship of health locus of control to preventive health behaviors and health beliefs. *Patient Counselling and Health Education* 1979;1(4):146-150
- [16] Wallston KA, Wallston BS. Who is responsible for your health: The construct of health locus of control. In G. Sanders & J Suls (Eds.) *Social Psychology of Health and Illness.* Hillsdale, N.J.: Lawrence Erlbaum & Associates, 1982: 65-95.
- [17] Wallston BS, Wallston KA, Kaplan GD, Maides SA. The development and validation of the health related locus of control (HLC) scale. *Journal of Consulting and Clinical Psychology* 1976, 44, 580-585
- [18] Wallston, B. S. & Wallston, K. A. Locus of control and health: A Review of the literature. *Health Education Monographs* 1978, 6, 107-117
- [19] Peltzer, K. Tobacco use among black South African university students: attitudes, risk awareness and health locus of control. *Curationis,* 200124, 4-8.
- [20] Holm, C.J., Frank, D.I. and Curtin, J. Health beliefs, health locus of control, and women's mammography behavior. *Cancer Nursing* 1999, 22, 149-156.
- [21] Shamseddeen W, Mahmoud H, Otrock Z, Soweid RAA. Health Locus of Control among Medical Students in a Developing Country. *International Journal Of Health Promotion and Education* 2006, 44(4): 145-151
- [22] M Grivna, H Al-Shamsi, A Al-Hammadi, M Al-Obthani, M Al-Ali, A Al-Senani, M El-Sadig, R Bernsen, P Barss. Child restraints a cross-sectional study on knowledge, attitude and practice of traffic police in United Arab Emirates. *Inj Prev* 2010;16:A241 doi:10.1136/ip.2010.029215.859
- [23] Knecht MC, Syrjälä AM, Knuutila ML. Locus of control beliefs predicting oral and diabetes health behavior and health status. *Acta Odontol Scand.* 1999 Jun;57(3):127-31.
- [24] Malekzadeh R, Mokri A, Azarmina . Medical science and research in Iran. *Arch Irn Med* 2001; 4(1): 27-39