



The Prevalence of Needlestick Injuries and Exposure to Blood and Body Fluids Among Iranian Healthcare Workers: A Systematic Review

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Abstract

Introduction: This study aimed to systematically review previous studies conducted in Iran on the prevalence of injuries caused by needlestick, sharp, and cutting instruments and exposure to blood and body fluids.

Methods: In this systematic review, all published full-text articles authored by Iranian researchers in Farsi or English in the field of needlestick injuries among healthcare workers during the period 2001-2016 were examined. Searches were performed on Iranian databases such as Scientific Information Database (SID), Iran Magazine Information Bank (Mag Iran), Iranian Journals of Nursing (N Index), and Directory of Medical Sciences Articles (Iran Medex) as well as international databases including Google Scholar, ISI Web of Knowledge, Scopus, PubMed, Science Direct, and CINAHL.

Results: The prevalence of injuries caused by needles ranged from 10.0% to 84.29% in different studies. The prevalence of exposure to blood and body fluids ranged from 13.46% to 79%.

Conclusions: The results indicated that almost half of Iranian healthcare workers during their daily work are at the risk of needlestick injury and exposure to blood and body fluids. Hence, research and needlestick injury reduction strategies should be emphasized, and modifications should be made to organizational factors such as the development of educational programs, prevention along with performance monitoring, engineering factors such as redesigning tools to promote safety, and behavioral factors such as behavior modification of capping needles.

Keywords: Needlestick Injury, Body Fluids, Health Personnel, Iran

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Introduction

Injuries caused by needles and sharp and cutting objects include wounds, cuts, or abrasions caused by medical devices that may have already been contaminated with blood or other body fluids.¹ In most studies on injuries caused by needles and sharp objects, the injuries are introduced as an important occupational hazard for healthcare workers.^{2,3} There are about thirty-five million healthcare workers in the world who make up 12% of the world labor force.⁴ The Center for Disease Control and Prevention estimates that 385 000 healthcare workers in America annually experience injuries caused by needles and sharp objects.⁵ In some countries, including Iran, despite safety precautions, injuries caused by needles and sharp objects still occur, inflicting significant economic

and human costs.⁶ More than 90% of infections caused by sharp tools among healthcare workers occur in low-income countries where these injuries are preventable.^{7,8} Given the necessity for a coherent review study regarding injuries caused by needles, sharp objects, blood and body fluids, the current study aimed to make an analytical review of previous research conducted in this regard to determine the prevalence of the phenomenon among Iranian healthcare workers.

Methods

This study was a systematic review of the research conducted in the field of injuries caused by needlestick, sharp objects, and exposure to blood and body fluids among Iranian healthcare workers.

Search Strategy and Eligibility Criteria

In this study, a literature search strategy, selection of published studies, data extraction, and the reporting of the results of reviewed studies based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 1) were employed. In the search, the following keywords were used: Needlestick injury AND Iran (Needlestick OR Needle-stick OR Sharp Injury). Inclusion criteria were as follows: study conducted in Iran, availability of full-text article, published in Farsi or English. Selection criterion was the relevance of the study subject.

Data Collection

Articles were collected from Iranian databases such as Scientific Information Database (SID), Iran Magazine Information Bank (Mag Iran), Iranian Journals of Nursing (N Index), and Directory of Medical Sciences Articles (Iran Medex) as well as international databases including Google Scholar, ISI Web of Knowledge, Scopus, PubMed, Science Direct, and CINAHL. In searching for a comprehensive strategy, all published full-text articles authored by Iranian researchers in Farsi or English in the field of needlestick injuries among healthcare workers during the period 2001-2016 were examined. The findings were then tabulated, and the necessary information was extracted.

Study Design

All studies with all designs that investigated and reported the prevalence of needlestick and sharp injuries among Iranian healthcare workers were included.

Data Extraction

After the screening and selection of eligible studies, the following data was extracted: name of first author, year of publication, study design, sample size, concerned healthcare workers, and prevalence of injury.

Results

In a preliminary search based on selected keywords, 4012

articles were found. After evaluation for duplication, relevancy, accordance with research question, and abstract screening, 60 papers were checked for eligibility. Ultimately, 49 articles with relevant research topics were selected (Figure 1). As shown in Table 1, 36 articles in Farsi published in Iranian journals (73.5%)^{2,3,9-12,13-42} and 13 articles in English published in Iranian and non-Iranian English language journals (26.5%)^{11,54,65} were included in the study. The prevalence of injuries caused by needles ranged from 10.0% to 84.29% in different studies^{13,14} and a total of 52 data in 49 studies showed that on average, damage caused by needles to healthcare workers is 47.9%.^{2,3,9-55} The prevalence of exposure to blood and body fluids ranged from 13.46% to 79%,^{25,55} and a combination of 7 studies showed that the mean prevalence of exposure to blood and body fluids is 46.47%.^{15,25,30,37,38,54,55}

Discussion

Injuries caused by needlestick and exposure to blood and body fluids are considered to be highly significant occupational hazards requiring special attention due to the risk of transmission of infection. This systematic review focused on the incidence of injuries caused by needlestick and exposure to blood and body fluids among healthcare workers in Iran. The results of several studies reviewed in this research showed that the prevalence of injuries caused by needles ranged from 10.0% to 84.29% and that on average, damage caused by needles among healthcare workers is 47.9%. As the results indicate, the prevalence of needlestick injuries among healthcare workers in Iran is significant; almost half of all healthcare workers are affected. Given that the majority of studies conducted around the world have indicated that many health professionals do not report injuries from needlestick,^{57,56} the actual rate of injury caused by needlestick is probably higher than reported. The incidence of injury caused by needlestick and exposure to blood and body fluids is not expressed the same in all regions. This variability depends on economic prosperity and the health budgets of each country, the number of health staff in different therapeutic areas, different cultural and business environments, available

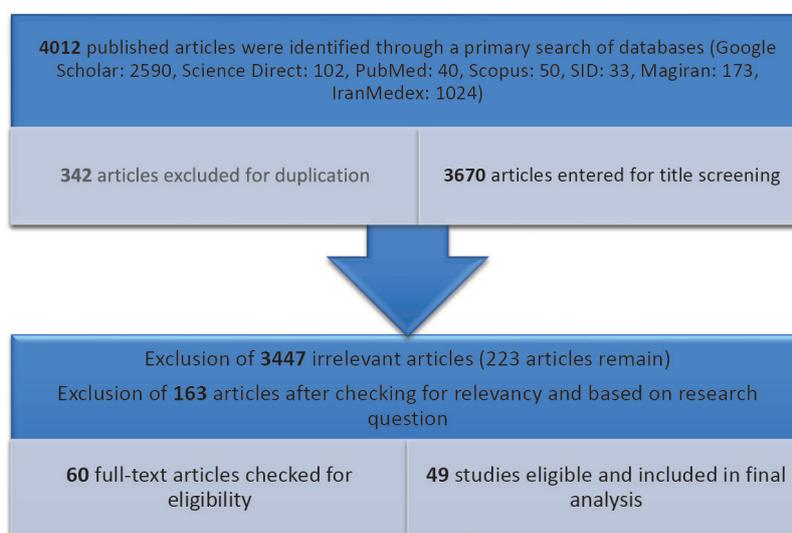


Figure 1. Flow Chart of the Study.

Table 1. Specifications of Studies on Needlestick in Iranian Healthcare Workers

First Author	Publication Year	Study Design	Sample Size	Concerned Personnel	Injury Prevalence	Ref.
Balouch, A.	2015	Cross-sectional	200	Nurses	64%	43
Jahangiri, M.	2015	Cross-sectional	168	Nurses	76%	44
Adib-Hajbagheri, M.	2013	Cross-sectional	298	Nurses, midwives, laboratory technicians, nursing assistants	38.3%	45
Mahmoudi, N.	2015	Cross-sectional	100	Nurses	41%	46
Mohammadnejad, E.	2014	Cross-sectional	135	Doctors, nurses, laboratory staff	64.4%	47
Gholami, A.	2013	Cross-sectional	384	Doctors, nurses, midwives, technicians, nursing assistants, workers	32.3%	48
Farsi, D.	2012	Cross-sectional	200	Physicians, residents, interns, nurses, laboratory technicians, service workers, others	57.5%	49
Kazemi, M. H.	2010	Cross-sectional	158	Nurses	56.96%	50
Haj-Abdulbaghi, M.	2014	Cross-sectional	358	Nurses	23.46%	9
Hosseini, S. M.	2013	Cross-sectional	214	Nursing students	56.3%	10
Nezhad Ghaderi, SM.	2012	Descriptive-analytical	186	Nurses, auxiliary nurses, technicians of operating room, anesthesia, and laboratory	54.1%	11
Shoghli, A.	2012	Cross-sectional	593	Nurses, auxiliary nurses, operating room personnel, midwives, anesthesia personnel, laboratory personnel	53.6%	12
ParsaPili, J.	2013	Cross-sectional	515	Nurses	18.8%	51
Taghavi, R.	2014	Cross-sectional	191	Doctors, nurses, midwives, personnel of operating room, anesthesia, laboratory technicians, radiology technicians, nursing assistants, technical personnel, accounting, services	84.29%	13
Zeighami, R.	2013	Historical cohort	310	Nurses	10%	14
Mirzaei, M.	2011	Cross-sectional	120	Nurses	71.7% needle 39.4% blood	15
Rezaei, S. H.	2014	Cross-sectional	514	Nurses, nursing assistants, anesthetists, and operating room technicians.	26.07%	52
Rezaei, S. H.	2012	Cross-sectional	991	Doctors, nurses, medical students and nurses, auxiliary nurses	16.85%	16
Rahnavard, F.	2011	Cross-sectional	500	Nurses, paramedics	77.2%	17
Hashemi, S. H.	2011	Cross-sectional	700	Physicians, physician assistants, interns, nurses, midwives, nursing and midwifery students, lab and radiology staff, nursing assistants, servants	24.1%	18
Ehsani, S. R.	2013	Cross-sectional	328	Nurses	45.12%	53
Baghcheghi, N.	2010	Cross-sectional	227	Nursing students	70%	19
Heidari, M.	2010	Cross-sectional	77	Operating room staff (surgeons, anesthetists, nurses, operating room technicians, anesthesia technicians, workers, service personnel)	74.03%	20
Nouhi, E.	2010	Cross-sectional	190	Nursing and midwifery trainees and interns	42.3%	21
Abbasi, A.	2010	Cross-sectional	200	Nursing and midwifery students after training principles and techniques	26%	22
Mohammad Nezhad, E.	2010	Cross-sectional	218	Nurses and paramedics of emergency departments	43.11%	23
Mohammad Nezhad, E.	2009	Cross-sectional	68	Nurses	47.03%	24
Kouhestani, H. R.	2010	Cross-sectional	52	Medical emergencies students	32.7% needle 13.46% blood	25
Ghasemi, A.	2009	Cross-sectional	568	Nurses and service personnel	55%	26
Khalouee, A.	2009	Cross-sectional	388	Nurses, nursing assistants	33%	27
Seraji, A.	2009	Cross-sectional	275	Nursing and midwifery students	43%	29
Bahreini, M.	2009	Clinical Trial	120	Nurses, paramedics	37%	30
Mohammadi, N.	2011	Descriptive-analytical	138	Nurses	52.9% needle 65.4% blood	54
Gholami, A.	2010	Cross-sectional	400	Nurses, other health workers, service personnel	26.8%	31
Abdi, M. H.	2008	Cross-sectional	298	Surgeons, physicians, nurses, paramedics, midwives, technicians of laboratory, surgery and anesthesia	47.3%	32
Rakhshani, F.	2007	Cross-sectional	231	Nurses, midwives, technicians of laboratory, operating room, and anesthesia, nursing assistants	64.9%	3
Askarian, M.	2005	Cross-sectional	1555	Junior nurses, nurses, midwives, nursing assistants	50% needle 79% blood	55

Table 1. Continued

First Author	Publication Year	Study Design	Sample Size	Concerned Personnel	Injury Prevalence	Ref.
Moradi, A.	2010	Cross-sectional	182	Doctors, dentists, nurses, paramedics, midwives, laboratory technicians, health workers, other health workers	57.7%	33
Joneydi Jafari, N.	2009	Cross-sectional	613	Nurses	32.78%	34
Bizhani, B.	2010	Cross-sectional	172	Nurses	32%	35
Lotfi, R.	2006	Cross-sectional	90	Doctors, dentists, midwives, nurses, laboratory technicians, anesthesia personnel and operating room staff, paramedics	80%	36
Nazmiyeh, H.	2005	Cross-sectional	1020	Doctors, nurses, nursing assistants, midwives, paramedics, medical students, nurses, midwifery and paramedical, coaches, teachers, workers, secretaries	57.25%	2
Vahedi, M. S.	2004	Descriptive-Analytical	847	Nurses, paramedics, midwives, laboratory technicians	64.9% needle 57.5% blood	37
Agha Doust, D.	2005	Cross-sectional	678	Specialist physicians, general practitioners, nurses, technicians and nurses of operating room, laboratory technicians, medical interns, nursing interns, anesthesia technicians	74.3% needle 63.7% blood	38
Nasiri, E.	2004	Cross-sectional	352	Nurses, operating room technicians, anesthesia technicians, surgeons, anesthetists, paramedics	76%	39
Askarian, M.	2005	Descriptive-Analytical	137	All clinical dental students	73.7%	40
Mirzaei, T.	2003	Cross-sectional	231	Nurses, midwives, laboratory technicians, nursing aides	46.3%	41
Afrasiyabi far, A.	2001	Retrospective	159	Nurses, operating room technicians, anesthesia technicians, midwives, paramedics, laboratory workers	39.3%	42

facilities, as well as the awareness and importance of the issue for policymakers. The lowest incidence of injuries resulting from needlestick in Iran was 10.0% reported by Zeighami et al in training hospitals in Qazvin in a historical cohort study was done on nursing staff who were responsible for direct patient care. The nurses in the case group were selected from the emergency department, and the control group consisted of nurses from other wards. Zeighami et al mentioned that the risk of needlestick injuries among nurses in emergency wards is dramatically higher than in other wards.¹⁴ The lowest prevalence in Iran was approximate to the annual mean value reported for 100 beds in Japan (5.7-6.7) and healthcare workers in Switzerland (9.7%).⁵⁹⁻⁵⁸ The highest prevalence of injuries caused by needlestick, cutting, and sharp objects (84.29%) was reported by Taghavi et al in Sina hospital in Mashhad. In this study, healthcare workers from the emergency ward, inpatient wards, operating room, radiology, labor and laboratory were examined. The researcher named possible causes such as heavy workload of healthcare workers and non-compliance of the standard number of personnel in hospital with the number of beds.¹³ The highest prevalence was approximate to Ilhan's reported value in Turkey (79.9%) of staff experiencing needlestick during the course of their work.⁶⁰ The wide range of the prevalence of injury among healthcare workers (10.0% -84.2%) can be attributed to differences in the samples of each study (for example, in one study, only nurses were evaluated, and in another, nurses, doctors, and other healthcare providers were evaluated), types of hospital (private vs. public), ward types (emergency department vs. other departments), and study methods.

The mean prevalence of injury caused by needlestick and sharp objects for healthcare workers was 47.9%. The

frequencies of injuries caused by needlestick and sharp objects for healthcare workers were 9.7% and 30.8% annually in Switzerland and Ethiopia, respectively, 65% in 5 years in Portugal, 57% among healthcare staff in England, and 38% during the work period last year.^{59,61-63} The prevalence of exposure to blood and body fluids in different studies ranged from 79% to 13.46%, and the mean prevalence of exposure to blood and body fluids was 47.46%.^{15,25,30,37,38,54,55} As the results showed, exposure to blood and body fluids also affects almost half of the healthcare workers in Iran. This result was consistent with the result of a study conducted in a hospital in India, which reported the rate of exposure to blood and body fluids to be 47.14%.⁶⁴

Conclusions

Important factors affecting the reduction of the incidence rate of injury include the following: emphasis on efficient research and strategies based on evidence of reduced risk of injuries caused by sharp object penetration, the provision of continuing education on the risk of diseases transmitted through blood, emphasis on observing the principles of comprehensive precautions and standards, use of newly developed technologies in the manufacture of safe medical equipment, use of the systems and experiences of other countries in the field of reporting and methods of reducing risk, observation of standards and compliance of the ratio of number of beds and patients to personnel, immunization of the environment and observation of safety principles at work, understanding and evaluation of patients during interventions, performing invasive interventions based solely on basic needs while complying with standard principles, and maintenance of mental calmness during work. One possible

limitation of this systematic study was the possibility of the occurrence of errors while searching based on the research strategies.

Authors' Contributions

ZF was involved in the database search, extracting data, and the early drafting of the manuscript; MNK contributed to the conception and design of the study and aided in writing and revising the manuscript; NJ was involved in the conception and design of the study and the search for articles; MKM aided in the database search, extracting data, and revision of the manuscript; AD acted as advisor in all stages of the research.

Conflict of Interest Disclosures

The authors declare no conflicts of interest.

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