An-Najah National University
Faculty of Graduate Studies

CHARACTERISTICS OF SHARP INJURIES AND FLUID SPLASH AMONG HEALTHCARE WORKER AT WEST BANK "PALESTINE"

By
Ashraf Deeb Abdalla Mahmoud

Supervisors
Dr. Basma Damiri
Dr. Souad Belkebir

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This Thesis was Defended Successfully on 09/09/2025 and approved by

Dr. Basma Damiri	Basma Damiri
Supervisor	Signature
Dr. Souad Belkebir	
Co-Supervisor	Signature
Dr. Hazem Alagha	Hazem
External Examiner	Signature
Dr. Zaher Nazzal	
Internal Examiner	Signature

Dedication

I dedicate this work to my family who have consistently believed in me.

To all the HCWs who contributed with their pure minds and honest thoughts to this study.

To every situation, and to every single person who has crossed my life and served as a source of motivation, guiding me through their actions and words and even through their shared aspiration.

Ashraf

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Initially, we attribute all honor to God, our ultimate source of strength, for enabling us to accomplish this significant mental and physical undertaking.

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Finally, we want to thank all of our colleagues, students, lecturers, and doctors at An-Najah National University for their ongoing encouragement and support.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

CHARACTERISTICS OF SHARP INJURIES AND FLUID SPLASH AMONG HEALTHCARE WORKER AT WEST BANK "PALESTINE"

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher’s own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: Ashraf Deeb Abdalla Mahmoud

Signature: Ashraf Mahmoud

Date: 09/09/2025

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Abstract

Background: Sharp injuries and fluid splash exposures (SISE) are major occupational hazards for healthcare workers (HCWs), increasing the risk of transmitting bloodborne pathogens. Despite the widespread occurrence of these incidents worldwide, data from Palestine remain limited. The study aimed to determine characterize and risk factors sharp injuries and fluid splash exposures among healthcare workers in the West Bank, Palestine.

Methods: A mixed-methods approach was employed. On the one hand, reviewed injury register records from 2019 to 2024 in five major tertiary hospitals, identifying 452 documented cases of sharp injuries and fluid splash exposures. On the other hand, a cross-sectional survey was conducted in 2024 among HCWs in the same institutions completing a structured questionnaire assessing the frequency, circumstances, and outcomes of sharp injuries and fluid splash exposures, as well as knowledge, attitudes, and preventive practices. Descriptive and analytical data analysis was performed using IBM SPSS Statistics, version 21. A level of significance of 5% was used. Ethical approval was obtained from the Institutional Review Board (IRB) at An-Najah National University.

Results: A total of 452 sharp injury and splash exposure cases were identified in the reviewed incident report. Nurses accounted for the majority of incidents (53.8%), with most events occurring during morning shifts (71.3%) and in patient rooms (74.8%). Needles were the most common cause of sharp injuries, while blood was the sole fluid in splash exposures. Among 473 surveyed HCWs, 52.9% reported at least one sharp injury, and 45.3% reported at least one fluid splash exposure during their careers. Notably, 51.4% of those with sharp injuries also experienced fluid splashes. Underreporting was prevalent: 80% of unreported cases were attributed to the perceived lack of seriousness. Hepatitis B vaccination coverage was suboptimal, and only 62.8%

adhered to recommended post-exposure protocols. Although 92% reported using personal protective equipment (PPE), gaps in training and compliance were observed. Significant associations were found between SISE occurrence and job category, department, and shift timing ($p < 0.05$).

Conclusion: Sharp injuries and fluid splash exposures are frequent among HCWs in West Bank hospitals, particularly during routine procedures such as intravenous access and blood draws. Despite widespread use of personal protective equipment, gaps in vaccination coverage and post-exposure management persist. Enhanced preventive strategies, improved reporting systems, and targeted training are urgently needed to mitigate occupational risks and protect healthcare personnel.

Keywords: Sharp injuries; Fluid splash exposure; Healthcare workers; Occupational hazards; Bloodborne infections.

Chapter One

Introduction

1.1 Introduction

The safety and well-being of healthcare workers (HCWs) are essential for delivering quality healthcare services. One of the most significant risks they face daily is exposure to deadly viruses (1). Healthcare personnel get into contact with more than 20 different bloodborne pathogens, which causes roughly 1,000 illnesses each year. According to World Health Organization (WHO) estimates, 90% of infections among healthcare worker occur in developing countries, and 3 million workers are exposed to blood-borne viruses each year (2).

The three most prevalent of these viruses are the human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) (3). One of the most significant risks to workers in the medical field is sharp injury and splash exposure (SISE) (4).

WHO estimates that illnesses related to work, including those caused on by sharp object, account for about 11% of the global disease burden. (5). According to systematic reviews, the global a year pooled prevalence of Needle stick injury (NSI) among healthcare workers is almost 44.5% (6), whereas 27% of Nigerian healthcare professionals reported experiencing at least one NSI annually (7). In Egypt, the prevalence of sharps injuries in 2019 was 64% (8).

This type of exposure includes unintentional contact with blood or other body fluids that could be tainted with HIV, HBV, or HCV (9).

The Centers for Disease Control and Prevention (CDC) states that for a susceptible person, the risk of infection from a single needle stick or cut exposure to HBV-infected blood ranges from 6% to 30%(3). In contrast, there is a 1.8% chance of having blood contaminated with HCV(10), whereas there is a 0.3% chance of HIV-contaminated blood (3). Certain diseases can be effectively disseminated by even tiny amounts of infectious fluid (11).

It's important to remember that pre-exposure vaccination is a protective measure that requires providing vaccines to those who may be exposed to particular infections (12). There are at present only HBV vaccinations available (13). HIV and hepatitis C cannot be prevented by vaccination (11). For the purpose of to reduce the danger of sharps exposure and injuries, healthcare workers must take the proper precautions, This involves appropriately disposing of sharps and contaminated objects, as well as using personal protective equipment (PPE) such goggles, masks, and gloves (14).

To prevent healthcare personnel from possibly coming into contact with blood and other bodily fluids, medical gloves are necessary for operations such as blood draws. When coming into close contact with blood, bodily fluids, or non-intact skin, WHO advises using non-sterile, disposable gloves (15,16). getting enough training in needle handling techniques and PPE use is essential.

Due to their inexperience with handling needles and their ignorance of safety procedures, less experienced medical personnel are more vulnerable to needle stick injuries (16). If a sharp injury and splash exposure (SISE) does occur, it is crucial to report it promptly and seek appropriate medical evaluation and treatment to reduce the risk of infection (12). The CDC highlights that most sharps injuries are preventable through the use of safety-engineered devices, complete training, adherence to safety guidelines, and prompt reporting and follow-up of accidents (17,18).

In Palestine, few studies have been conducted about sharp injury and needle stick injury. In 2014, the prevalence of SI was 69% and NSI was 46% among nurses in Northern West Bank hospitals (19), In Gaza, a study in 2014 at Shifa Medical Complex indicated that 54.1% of nurses experienced at least one NSI in the previous six months(20), and a 2012 study among medical students and interns shows about 40% reported at least one NSI (21), 1n Gaza strip among Nursing student 21% have experienced a needle stick injury in 2022 (22), another study among Palestinian nursing students in 2024 found that 23% reported having been exposed to NSIs at least once (23).

Studying the risk factors associated with SISE is essential. Understanding these factors helps identify what contributes to the occurrence of SISE in healthcare settings. By recognizing the risk factors, healthcare workers can implement preventive measures to reduce their exposure to bloodborne pathogens and other infectious agents. additionally, healthcare facilities can set up guidelines and practices intended to reduce the risk of SISE, protecting the health and safety of their employees in the process.

1.2 Problem statement

Healthcare professionals are vital to society because they offer critical medical services in a variety of contexts. Their safety and well-being may be affected by the occupational hazards associated with their profession, which include fluid splashes and sharp injuries. It is imperative to investigate the frequency of these instances that happen among healthcare professionals and take action to prevent them from occurring. Exposure-related care can incur high financial costs, including lost productivity, income, and time due to reporting and obtaining initial and follow-up treatment. By addressing risk factors related to fluid splash and sharp injuries, the healthcare system can ensure the safety and well-being of its healthcare workers and provide high-quality medical services to its patients.

When reviewing the epidemiological data available in Palestine, we found a lack of data related to sharp injury and fluid splashes to which healthcare workers are exposed. Although some studies have addressed this topic, these studies were not comprehensive to the West Bank governorates (with the exception of the study that included interns and medical students in 2009 (21)), and did not address other groups considered to be among the healthcare workers at risk.

When we researched Palestine studies that dealt with exposure to fluid splashes, we found a study in 2015 that involved nursing staff in hospitals in Nablus (24); however, we were unavailable to find any additional studies that involved other groups or hospitals in other cities.

The category of cleaning staff was the subject of a study paper that examined the Incident reports in the Infection Control and Control Office, which examined \ the files from 2016 to 2018 at An-Najah University Hospital(25). While there was a study in 2013 about occupational hazards among laboratory workers in Palestinian governmental hospitals in the West Bank (26), but it did not focus on this specific issue.

Frequent risk factors for SISE include improper handling and disposal of contaminated sharps, insufficient training, poor communication regarding sharp handling among healthcare workers, and a lack of use of personal protective equipment (PPE) like gloves, gowns, and masks (27). Additional problems include excessive workload and stress levels, frequent use of sharp objects, and overcrowding in hospitals (28).

The problem arises from the possible consequences of these incidents, including exposure to bloodborne infections, the spread of infectious diseases, and the psychological toll on those affected. A comprehensive understanding of the frequency, causes, and circumstances surrounding such accidents is necessary to create effective preventative measures and procedures to guarantee the safety of healthcare professionals (6).

1.3 Study hypothesis

Because the nature of this study is descriptive and observational, a hypothesis is not included. The main objective is to investigate healthcare professionals' knowledge, practice and attitudes regarding sharp injuries and splash exposures, as well as the prevalence and characteristics of these episodes. The study aims to record patterns, assess prevalence, and discover trends among the target population rather than testing a particular causal relationship or forecasting results. The exploratory aspect of the study, which aims to provide baseline information that can guide the creation of preventive interventions in healthcare settings and inform future analytical research, is consistent with the absence of a hypothesis.

1.4 Significance of the study

Epidemiologic information on splash exposures and sharp injury in Palestine is scarce. Smaller-scale research or more comprehensive regional analyses that include Palestine in the Eastern Mediterranean Region provide the majority of the data that is currently available.

The study's findings are particularly important for advancing our understanding of the frequency and contributing variables of incidents involving fluid splashes and sharp injuries among healthcare professionals in the West Bank. With this knowledge, preventative measures can be developed to lower the danger of injury and the transmission of disease. The study is expected to produce notable improvements in public health and safety, worker safety, job satisfaction, and resource allocation.

By identifying the type and frequency of these incidents, specific interventions and preventative measures can be developed to improve the safety of medical personnel. This could involve implementing specific safety measures, such as wearing personal protective equipment and utilizing safer medical equipment. Furthermore, the study can also help identify areas that contribute to these incidents, which can support the development of policies to improve occupational health and safety standards, promote a safety culture, and prioritize occupational safety in hospitals.

Epidemiologic data informs the Ministry of Health and other stakeholders about where to focus efforts and financing, especially given the challenges in the Palestinian health system, such as shortages of human resources and medical equipment, and can create focused preventative measures and training programs to limit the risk of bloodborne infections and other risks connected with sharps and splash injuries, also helping to improve infection control practices and protect healthcare workers, which is vital in a health system facing barriers like limited infrastructure and political constraints.

1.5 Objectives

This study is two parts with two different study designs

Part one

Aim: This proposed part of study aims to determine the characteristic and risk factors associated with SISE among healthcare workers in the main tertiary hospitals of the West Bank from 2019 to 2024.

Part Two

Aim: Healthcare workers were asked to complete a self-report questionnaire [Appendix C] that has five sections to:

1. Measure the prevalence and detailed characteristics of body fluid splashes and needlestick injuries among healthcare workers, examining injury types, affected professional categories (doctors, nurses, lab technicians, cleaners), specific injury events, hospital locations, and factors leading to underreporting.
2. Identify risk factors associated with sharp injuries and fluid splash among healthcare workers in the target hospitals.
3. Assess the knowledge, attitudes and practice of health workers towards sharp injury and body fluid splashes

1.6 Literature Review

1.6.1 Introduction

This chapter presents the theoretical background of the prevalence of SISE. This is in addition to several international and regional studies about the most vulnerable population, mode of injury, location of SISE, and reporting among HCWs.

1.6.2 Occurrence of SISE

Africa had the highest rate of these injuries (51%), and the World Health Organization African Region had the highest incidence among WHO regions (52%) (29).

Approximately 58.8% of healthcare professionals in the US reported having at least one sharps injury throughout their careers, according to a national study conducted in 2023(30).

In Nagoya University Hospital in Japan, the incident rate per 100 beds was 3.6. The annual rates of the incident were relatively the same during the 7 years(31). Institutional injury records in Ghana revealed that within the past 12 months of employment, 29% of the nursing staff reported and documented a sharps injury(32). In a Cameroonian referral hospital, 37% of medical staff said they had at least one exposure to blood and bodily fluid in the previous three months. (33).

In the National Center of Public Health Laboratory in Aden, 35% of participants had been exposed to needlestick injuries during their work in the laboratory(34). while, a study among nurses in Jordanian hospitals showed the prevalence of NSI within the last 3 months; 68% of the nurses reported having at least one NSI (35).

The prevalence of sharp injuries among nurses in Northern West Bank hospitals/Palestine was 67%(19). In contrast, the prevalence among interns and medical students working in nine hospitals in six governorates in the Occupied Palestinian Territory was 41% of all respondents had experienced at least one NSI(21). At Shifa medical complex wards, 54% of nurses reported at least one exposure in the last 6 months (20).

1.6.3 Health Care Workers Vulnerable to SISE

According to the EPINet Report for Needlestick and Sharp Object Injuries in 2023, the job categories of injured workers included doctors at 43% and nurses at 35%(36).

In Japan, registered nurses represented 72% of reported cases(31). In a university hospital in Palermo, Italy, the frequency of exposure to blood and body fluids was 35.3% among nurses and 31.7% among physicians(37). According to the Reporting Items for Systematic Reviews and Meta-Analyses, nurses had the highest number of NSIs, accounting for 56% of the total, followed by physicians at 20%, and operating room technicians at 1% (29).

A retrospective study conducted in India examined the records of all self-reported cases of sharp injuries and splash exposure in a tertiary hospital, revealing that 45% of the cases involved doctors(4). In Southeast Asia, the highest number of sharp injury and splash exposure (SISE) cases was reported by doctors at 44%, followed by nurses at 38%(27). A review of occupational hazards for sharps-related injuries from 2010 to 2014 in Wilson, USA found that 44.4% of injuries occurred to physicians, while 39.2% affected nurses (38).

In Buraidah Central Hospital in Saudi Arabia, nurses were involved in 66% of reported incidents, physicians in 19%, technicians in 10%, and nonclinical support staff in

5.5%(39), another study conducted from 2017 to 2020 at King Fahad Medical City (KFMC) in Riyadh, Kingdom of Saudi Arabia, revealed that nurses were the highest-risk group among healthcare workers for experiencing NSIs, at 50% (40), another study In Saudi Arabia, nurses accounted for 56% of injured workers, followed by physicians (9%) and housekeepers (8.9%)(41).

Nurses have been identified as the most vulnerable population when it comes to sharp object injuries. In hospitals in the Gaza Strip, 54% of nurses reported experiencing at least one needlestick injury (NSI), compared to 50% of doctors(42). A report covering NSIs from 2016 to 2018 at a Palestinian tertiary care teaching hospital found that nurses accounted for the highest percentage of injuries, with 51% of cases, followed by students at 23%, doctors at 12%, cleaners at 12%, and lab technicians at 2% (25).

1.6.4 Mode of injury

According to the EPINet Report, injuries from sharp objects were most frequently associated with suturing (28%), followed by injections and intramuscular/subcutaneous procedures (36).

Recapping of needles was the most frequent cause of NSIs among HCWs (30.5% of the total), followed by mental distraction (18%), Carelessness had the lowest rate (0.5%), based on a meta-regression analysis of data from 113 articles published from 2000 to 2020 (29), According to a national survey conducted in the United States in 2023, sharps injuries frequently happen during medical procedures, and the handling of instruments in the operating room makes it a high-risk setting(30).

In southern India, among tertiary care hospitals, the most common type of exposure was needling pricks (86%), followed by fluid splashes (7%) and sharp cuts (6%)(43). A retrospective review of sharps injuries from 2005 to 2014 in a tertiary hospital in Southeast Asia identified the top mechanisms of injury as intraoperative procedures (23%), drawing blood (14%), and splash exposures (14%)(27). The exposures resulted from direct patient procedures (25%), leaking or spilled specimen containers (12%), leaking or broken IV tubing, bags, or pumps (6%), and other leaking or spilled body fluid containers (6%), as noted in the EPINet Report 2023 (44).

In Jordanian hospitals, the procedure causing the most injuries among nurses was recapping needles after use (36%), followed by blood collection procedures (23%) and injection procedures (15%). Cannulation and needle disposal each accounted for 10% of all injuries, while suturing caused 5% of needlestick injuries (35). From 2017 to 2020 at King Fahad Medical City (KFMC) in Riyadh, Kingdom of Saudi Arabia, the primary cause of needlestick injuries was handling sharp objects (39%), followed by sharp object disposal (19%) among HCWs(40), The most common cause of injury (37.31%) in a cross-sectional study conducted in Yaman was recapping needles(45).

In addition to the study In Algeria, accidents that exposed staff to blood accounted for 49% of incidents, with needlestick injuries being the most common(33), In Buraidah Hospital, Saudi Arabia, most injuries occurred while recapping used needles (29%), during surgery (19%), and from collisions with sharps (14%). Disposal-related incidents accounted for 11%, while injuries from concealed sharps occurred during the handling of linens or trash containing improperly disposed needles (39).

In a Palestinian tertiary care teaching hospital from 2016 to 2018, the most common mode of injury was during blood sampling (32%). This was followed by injuries occurring at the moment of needle disposal (20%) and during cleaning or waste disposal (10%)(25). and the causes of sharp injury causes, 20% of injured participants were hurt while recapping needles, and 8% experienced injuries during suturing among nurses in Northern West Bank hospitals(19). while in Gaza Strip hospitals (40%) during drug administration, (20%) while recapping needles, (19%) during wound suturing, (15%) while cleaning, and (6%) during arterial blood gas sampling (42).

1.6.5 Location of Exposure to SISE

According to the EPINet Report 2023, most injuries occurred in the operating room/recovery (43%), patient room/ward (30%), and emergency department (8%)(36). In China, within workplaces where sharp instrument injuries occurred, general wards were the most common sites at 45%, followed by operating rooms at 22%(12). In a tertiary care hospital in southern India, the emergency department and ICU together represented the most common locations for exposure at 30.3%, followed by inpatient wards at 16% (40).

The EPINet Report 2023 indicated that exposure to blood and body fluids primarily occurred in patient rooms or wards (43%), followed by emergency departments (16%) and operating rooms/recovery (16%)(44). Accidental exposures to blood and body fluids were more frequent in the surgical department (20%) compared to other wards, including intensive care units (18%), pediatrics (16%), emergency departments (11%), and gynecology (9%) in a referral hospital in Cameroon (46).

In terms of the workplace location associated with needlestick injuries, the intensive care unit had the highest incidence of injuries at 22% Following closely was the surgical ward with a 21% incidence, and the emergency room recorded 16% among nurses in Jordanian hospitals (35). While in Abha City, Saudi Arabia, 43% of injuries among healthcare workers (HCWs) occurred in patient rooms (13), According to a Saudi Arabian survey, the majority of injuries happened in emergency rooms (19.3%), intensive care units (22.3%), and patient rooms/wards (30.2%)(41).

For interns and medical students in the Occupied Palestinian Territory, the highest incidence of NSIs was also found in the emergency room at 55.5%, followed by obstetrics at 15.0% and surgical wards at 9.6% (21).

1.6.6 Knowledge and attitude about SISE

Most nurses (93%) in Ghanaian healthcare correctly selected all of the immediate steps to perform if a sharps injury occurs (i.e., clean skin wounds with soap and water, flush mucosal surfaces with water, and note the details of the source of exposure, such as patient name, time, and location)(32). Approximately 88% of all participants among hospital healthcare workers in mainland China across different professions had attended specific training programs about sharp injury prevention (12).

The highest knowledge of hospital-acquired infection in teaching hospitals was related to hand hygiene and precautions to avoid needle stick injuries at Zabol University of Medical Sciences in Iran(11). In Ghana, knowledge of and compliance with infection prevention and control among nurses, less than one-third (28%) of the respondents reported accurately that all needles should not be recapped after injection (14).

In the government hospitals in the West Bank and Palestine, nurses were more likely to receive educational courses about compliance with infection control protocols (47% of nurses versus 25% of doctors) (47).

The evaluation of compliance with infection control protocols in the government hospitals in the West Bank/Palestine shows the absence of enough resources (55%), the absence of enough training programs (50%), the absence of clear protocols (44%), and a large number of patients (44%)(47).

1.6.7 Vaccination against HBV

Among laboratory personnel working in Aden's National Center of Public Health laboratories, only 35% received a biosafety training course, and 32% received vaccination against the hepatitis B virus (34), Less than 25% of participants in a cross-sectional research conducted in Yaman had received post-injury vaccinations or interventions(45).

In the Kurdistan Region of Iraq, among healthcare workers, 76% had been vaccinated against hepatitis B, and nearly half of them had completed the vaccination schedule. Other respondents were not vaccinated, and the reasons for non-vaccination were that they did not know their hepatitis B status or were busy and had not had time to go for vaccination (48).

In government hospitals, West Bank/Palestine nurses were more likely to have received the hepatitis B vaccination (91%) than doctors (80%)(47).

1.6.8 Wearing PPE During Injury

According to a study among healthcare workers in Rizgary Teaching Hospital, Kurdistan Region, Iraq, 78% of cases of needlestick injuries involved wearing gloves. The other cases (22%) did not wear gloves and gave reasons such as being unnecessary because the patient was not a bloodborne pathogen carrier, unable to palpate the pulse, or allergic to rubber gloves (48).

When there is a chance of coming into contact with blood or bodily fluids, it is advised to wear aprons, face shields, and other protective gear to shield the skin and mucous membranes. PPE must be incorporated into multifaceted prevention strategies because it cannot prevent all needlestick injuries on its own(49).

1.6.9 Reporting of SISE

Among Iranian nurses, 37% with needlestick injuries had officially reported their experiences. The primary reasons for not reporting needlestick injuries were dissatisfaction with follow-up investigations by officials after reporting the events (33%), and safe/low-risk considerations for source patients (29%)(50), Over 7,000 healthcare workers participated in a comprehensive survey in Gansu Province, China, which found that 32.86% of NSIs occurred, with 28.53% of these injuries going unreported(51).

Only 33% of needlestick injuries were reported to the administrator in the laboratory in Aden(34), also according to a cross-sectional research conducted in Yaman, reporting was poor (only 26%)(45).

In previous studies in Gaza Strip hospitals that included healthcare workers, 67% did not report NSI, 33% did not know how to report it, and 32% believed that reporting was useless (42). Another study among interns and medical students in the Occupied Palestinian Territory shows that almost 50% of all NSIs were not reported to occupational health departments, and 30% of them did not know to whom or to where the injuries should be reported (21). 77% of nurses exposed to injuries from sharp objects did not report these injuries in Northern West Bank hospitals in Palestine; 51% needed to learn the reporting procedure (19).

1.6.10 Training of HCWs

Training helps employees reduce sharps injuries and splash exposures by boosting their knowledge, skills, and safe behaviors associated with handling sharp instruments and minimizing exposure risks (52), also increases healthcare professionals' ability to identify unsafe conditions, respond safely, and safely handle sharp devices (53).

According to an Italian study, using safety catheter devices with passive automatic needle protection reduces the incidence of NSIs by 25 times when compared to using traditional devices. In order to decrease injuries, this study focused on integrating safety devices into clinical practice(54).

Prevention strategy meta-analysis (2002-2012) examined 17 studies and found that training alone had a 34% summary effectiveness reduction in NSIs. Even more successful were safety-engineered devices, which reduced injuries by 49%. The most impact was obtained when training and safety-engineered device were combined(55).

Training includes teaching safe work practices (e.g., avoiding recapping needles, immediate disposal of sharps), the use of safety-engineered devices, and accurate activation of safety mechanisms on sharps devices, all of which are vital to preventing injury (17).

1.6.11 Other variables

As per the EPINet report for 2023, 91% of the source patients were identifiable, and 90% of the sharp items were contaminated (36). Most NSIs (44%) occurred among Iranian nurses who worked night shifts (50). Females reported most needle stick injuries (71%), as per the Saudi Arab study (13).

According to a 2023 study that examined 233 event reports, 45.9% of NSI cases were male and 54.1% were female. While there were no significant differences in the types of devices that caused harm or the degree of the injury, there was a significant difference between the sexes in the place of injury (56).

Meta-analysis shows that the incidence of NSIs was higher in females than in male HCWs: 39% of women had NSIs compared to 27% among men (29). injuries and splash exposures among health-care workers in Kenya. The majority were females (65%) (57).

Chapter Two

Materials and Methods

2.1 Introduction

This chapter presents steps to achieve the study's objective. It covers the study design and its context, the study population and sampling strategy, the data collection tool, the pilot study, the data collection instruments, the scoring system, the data analysis, and ethical considerations.

2.2 Study design

The study was conducted in two parts, with different designs to cover sharp injuries and splash body fluid from all sides.

Part one: The study reviewed the injury registered records in the main tertiary hospitals in the West Bank (An-Najah National University Hospital, Rafidia Hospital, Palestine Medical Complex, Ahli Hospital, and Princess Alia Hospital). The study was conducted using the institutional human resources database of all self-reported and supervisor-reported fluid splash and sharps-related injuries in the target hospitals from 2019 to 2024.

Part Two: A cross-sectional study was conducted in 2024. Healthcare workers in the target hospitals were asked to complete a self-reported questionnaire to assess their knowledge and practice about sharp injuries and splash body fluids, their attitudes, and their previous exposure to such incidents.

2.3 Setting

This study was conducted at tertiary hospitals in the south, middle, and north of the West Bank of Palestine. It included governmental and private hospitals (Rafidia Hospital, Najah National University Hospital “NNUH”, Palestine Medical Complex PMC, Princess Alia Governmental Hospital, Al-Ahli Hospital), the locations of different tertiary hospitals in the West Bank's southern, middle, and northern regions to get a thorough understanding of healthcare workers. researcher attempts to address regional disparities and improve knowledge of healthcare practices throughout the West Bank by integrating these varied settings.

Tertiary hospitals provide advanced treatment options and specialized medical care, handling complex cases, surgeries, emergency care, critical care, and extensive diagnostic resources. They also serve as educational institutions, educating future medical specialists and advancing research.

2.4 Study Population

Healthcare workers (HCWs) who worked in hospitals in the West Bank, Palestine, during the study period were included in the study population. Physicians, nurses, laboratory technicians, and cleaning staff from government and private hospitals in the governorates of Nablus, Ramallah, and Hebron qualified as participants.

2.5 Inclusion criteria

1. For part one of the study, all reports for healthcare workers employed at the target hospitals were included in the study's population.
2. Part two of the study included physicians and surgeons, nurses, laboratory technicians, and cleaners.

2.6 Exclusion criteria

1. The study sample will exclude all uncompleted reports.
2. Participants who participated in the pilot study.

2.7 Sample and Sampling Method

Part one: The study includes all available incident reports documented in the infection control department of the target hospital over the last six years (2019-2024). The number of incident reports were as follows: Rafidia Hospital, NNUH, Palestine Medical Complex, Ahli Hospital, and Princess Alia Hospital

Part Two: To include a representative sample, all the target health cleaners in the target hospitals were invited to participate in the study. To calculate the sample size for part two, assuming an unknown population size, a proportion be 50%, and the margin of error is 5%, using the following formula:

$$n = (Z^2 * p * (1 - p)) / E^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where:

n = sample size
Z = Z-score corresponding to the desired confidence level (e.g., 1.96 for a 95% confidence level)
p = proportion (assumed to be 0.5 or 50% in this case)
E = margin of error (0.05)

The minimum required sample size to meet the study's objectives was 384 participants. After considering various potential confounding factors, such as the location of the hospital department, the type of healthcare worker, gender, and years of experience, an additional 10% was added to the sample size, resulting in a final total of 422 participants. To ensure a representative sample, a stratified sampling technique was employed, taking into account the hospital's location, gender (with 50% male and 50% female representation), and department. The required sample sizes from each hospital were as follows: Rafidia Hospital: 88 participants, NNUH: 110 participants, Palestine Medical Complex: 108 participants, and Al-Ahli Hospital: 88 participants.

Participants were asked to fill out a paper questionnaire in each department of the hospitals that were the subject of the study, using a stratified sample technique to cover all targeted staff groups in the healthcare industry.

2.8 Data Collection

2.8.1 Tool and operational definition

Part One: “Incident Report Part” The incident report injury register compiles data from the main tertiary hospitals in the West Bank from 2019 to 2024. The SISE [Appendix B] report includes crucial clinical and demographic details such as age, gender, department, years of experience, staff position, test follow-up, mechanism of injury, circumstances leading to the injury, source status (HBsAg, HIV, and HCV antibody status), and whether post-exposure prophylaxis was administered.

Part Two: "Questionnaire part" Healthcare workers were invited to complete a self-report questionnaire in Arabic [Appendix C].

The questionnaire was developed from the literature review (4,19,43,58–60) and consists of five sections as follows:

Section one: Socio-demographic data: This part included questions about age, gender (male; female), place of work (Nablus; Ramallah; Hebron), hospital categories (governmental; private), job (Doctor, Nurse, Laboratory Technician, cleaner), department of the hospital (emergency room, intensive care unit, operation room, laboratory, other), and years of experience (1-5 years; 6-10 years; more than 10 years). Job position: The specific role of the healthcare worker (e.g., doctor, nurse, technician) can affect their exposure risk to injuries and fluids, as different positions have varying levels of contact with patients and medical procedures.

Section Two: It is related to the occurrence of needlestick or sharp instrument injuries during your work in the health field. A sharps injury is when a healthcare worker is accidentally stabbed by a sharp instrument (such as a needle, blade, or suture needle) that may have had contact with blood or other body fluids from a patient. Incident of sharp injuries: This refers to the frequency and circumstances under which healthcare workers experience needlestick or sharp instrument injuries during the target period.

This section consists of 15 items divided into 3 parts related to whether the participant has experienced such injuries, the number of times they occurred, and the actions taken afterward serve to measure this variable. The items were as follows: occurrence of injury (if exposed to sharp injury and frequency), before occurrence of injury (wearing PPE, injury occurring during which procedure, source, place), after occurrence of injury (direct action, reporting or not with cause if underreporting, vaccination requirement).

Section Three: Data related to exposure to body fluids, a splash injury, from patients during their work in the health field. A splash injury occurs when body fluids from a patient splash into an open cut, wound, or membrane, such as the eye, of a healthcare worker.

Incident of Fluid Exposure: Similar to sharp injuries, these variables capture how often healthcare workers are exposed to patient body fluids. This section consists of 13 items divided into 3 parts related to the frequency of exposure and specific circumstances surrounding these incidents. The items were as follows: occurrence of exposure to patient body fluid (frequency and type of fluid), before occurrence of exposure (wearing Personal protective equipment, splash occurring during which procedure, source, place), after occurrence of exposure (direct action, reporting or not with cause if underreporting).

Section Four: This section focuses on the medical staff's knowledge and Practice of needle stick exposure and patient bodily fluids. There are eight questions, and responses are categorized as "yes," "no," or "sometimes." The questions cover topics such as prior training, wearing protective gear, knowledge of sharp injuries, bodily fluid spills, and regulations related to sharps injury and safer exposure (SISE).

Knowledge and Practice: This section covers the participants' comprehension of safety protocols, daily practice, reporting requirements, and safeguards against fluid exposure and sharp injury.

The practice items were as follows: “I wear medical gloves when drawing blood, I do not recap the needle after use, I Throw used needles or sharps into sharps disposal bins immediately, in case of acute injury, wash the site with running water, using appropriate protective equipment (such as gloves and goggles) when dealing with patients whose body fluids you may be exposed to.

Scoring System: Participants' knowledge and practice of SISE was assessed using thirteen statements, each of which had three possible responses: "yes," "no," and "sometimes." Accurate responses received one point, while unclear or incorrect responses received zero. The total score ranged from 0 to 13. Those who answered at least 80% of the questions correctly (a score of 10) were considered to have a high level of knowledge and correct practice (19).

Section Five: Attitude and Behavioral Responses: This section contains 5 items with responses categorized as always: every day, frequently: several times, sometimes: occasionally, rarely: activity infrequently, and never. It addresses questions about attitudes and behaviors related to needlestick injuries, exposure to body fluids, and sharp objects. The attitude items, special precautions to reduce the risk of needle sticks and exposure to body fluids while doing your job, is necessary to write a report of an acupuncture injury". The behavior items were as follows: "Exposure to patient body fluids is the result of poor skill and lack of training among medical staff, Personal protective equipment plays an important role in avoiding needle stick injuries and exposure to the patient's body fluids, less experienced medical staff are more susceptible to needle stick injuries and exposure to patient body fluids".

Scoring System: In order to assess attitudes as well as behavioral and practice compliance with SISE, ten statements were used, each with five possible responses: always, often, sometimes, seldom, and never. The response that was consistently considered correct received one point, while all other responses received zero points. The overall score was between 0 and 5. If a participant received a score of ≥80%, or 4 or higher, they were classified as having a high level of attitude and compliance(19).

2.8.2 Validity and Reliability Test

The questionnaire's validity was examined in the following ways:

- To accomplish the study's goals, the researcher created the questionnaire based on a review of relevant literature.
- Two academic experts with prior experience creating and distributing questionnaires evaluated the survey. (Appendix A)
- A pre-test was administered to a group of HCWs as part of a pilot study, and the questionnaire was adjusted following that procedure.

To determine the reliability of the questionnaire, the researcher used Cronbach Alpha for reliability. The reliability coefficient for Knowledge and Practice questionnaire was 0.62, and Attitude and behavioral was 0.71, which indicated that the questionnaire was reliable, and this reliability coefficients value is suitable for research purposes.

2.8.3 Pilot Study

A pilot study was conducted as part of a survey to evaluate the effectiveness and clarity of the research instruments utilized. This preliminary phase involved a sample of fourteen healthcare professionals in Al-Watni hospital, including nurses, doctors, technicians, and cleaners. Participants were given the opportunity to complete the questionnaire, and their feedback was instrumental in identifying areas for improvement. The pilot study aimed to assess the appropriateness of the response rate, review data collection methods, and estimate the required time and resources for the main study. Based on the pilot study results, some questions were revised to enhance clarity and relevance, ensuring that the final survey would yield valid and reliable data.

2.9 Ethics approval and consent to participate

The Ethics Committee of the Institutional Review Board (IRB) at An-Najah National University (ANNU) was obtained to confirm that the study matches the ethical research protocols. Informed consent was obtained from each participant prior to participation. Anonymous questionnaires were used. Participants were informed that they could assent to or dissent from participation. Participants were assured that all the data collected would be kept confidential and only accessible to the investigators.

Approval was also obtained from the education in health and scientific research unit in the Ministry of Health after submission of the required information and approval from Najah National Hospital after recording on their scientific electronic site. Approval was obtained for both parts of the study, but Ahli Hospital, after connecting with a quality officer, approved only the questionnaire part of the study.

2.10 Statistical Analysis Methods

Statistical analysis was performed using IBM SPSS Statistics, version 21. Descriptive statistics were used to summarize the demographic and occupational characteristics of healthcare workers and to determine the prevalence of sharp injuries and fluid splash exposures. To assess relationships between categorical variables such as gender, job title, department, activity type, and exposure status, the Pearson Chi-Square test was primarily used. Fisher’s Exact Test was applied when expected frequencies in contingency tables were too small for the Chi-Square test to be valid. 95% confidence intervals (CIs) reported to quantify associations. A p-value less than 0.05 was considered statistically significant in all analyses.

Chapter Three

Results

3.1 Introduction

A cross-sectional study was conducted in 2024, where healthcare workers at selected hospitals completed a questionnaire to assess their knowledge of sharp injuries and splashes of body fluids, alongside their attitudes and previous exposures. Additionally, a retrospective cohort study reviewed injury records from leading tertiary hospitals in the West Bank—an-Najah National University Hospital, Rafidia Hospital, Palestine Medical Complex, Ahli Hospital, and Princess Alia Hospital—focusing on self-reported or supervisor-reported fluid splashes and sharps-related injuries from 2019 to 2024.

3.2 Socio-demographic Data For incident report and questionnaire

Five hundred health workers were recruited, 473 responded, and 27 refused. The final participants were 473, with 52.4% being male and most 43.5% from Nablus. Nurses were the largest group, with 58.6% working in governmental hospitals, experience levels varied, with 46.3% having 1-5% experience. For the incident report, five hospitals were invited and one hospital refused. The incident report involved 452 participants, with 54.6% males, 67.5% residing in Nablus, 46.5% in governmental hospitals, and 53.8% nurses, with 28.2% in general wards and 18.2% in the OR (see Table 1).

Table 1

Socio-demographic data for the incident report part and the questionnaire part

		Incident report	Questionnaire
		N (%)	N (%)
Gender	Male	247(54.6)	248(52.4)
	Female	205(45.4)	225(47.6)
Governorate	Nablus	305(67.5)	205(43.3)
	Ramallah	130(28.8)	110(23.3)
	Hebron	17(3.8)	158(33.4)
Hospital	Governmental	210(46.5)	268(56.7)
	Non-Governmental	242(53.5)	205(43.3)
Job title	Doctor	112(24.8)	75(15.9)
	Nurse	243(53.8)	277(58.6)
	Laboratory Technician	18(4)	53(11.2)
	Cleaner	79(17.5)	68(14.4)
Department	Emergency room	51(11.3)	62(13.1)
	Intensive care unit	72(27.3)	110(23.3)
	Operation room	82(18.2)	84(17.8)
	Laboratory	20(4.4)	53(11.2)
	Clinic	48(10.6)	14(3)
	Kidney unit	22(4.9)	24(5.1)
	Cardiac surgery unit	25(5.5)	11(2.3)
	Inpatient wards	127(28.2)	114(24.1)
	central sterilization service department	3(0.8)	1(0.2)
	Laundry	1(0.2)	0
Experience (years)	1-5 y	-	219(46.3)
	6-10 y	-	114(24.1)
	More than 10 y	-	140(29.6)

3.3 Incident report: Sharp injury and splash patient fluid exposure details

Over the six-year period from 2019 to 2024, 452 incidents were analyzed, with 2023 having the highest reported at 21.5%. Most incidents occurred during the morning shift (71.3%), with 74.8% occurring in patient rooms. Sharp injury sources were known in 77.6% of cases, and blood was identified as a fluid in 100% of splash exposure incidents. Moreover, 90.2% of injured employees reported wearing PPE, and 28.8% reported drawing blood as the most frequent injury (see Table 2).

Figure 1

Incident of sharp injury and splash exposure according to years

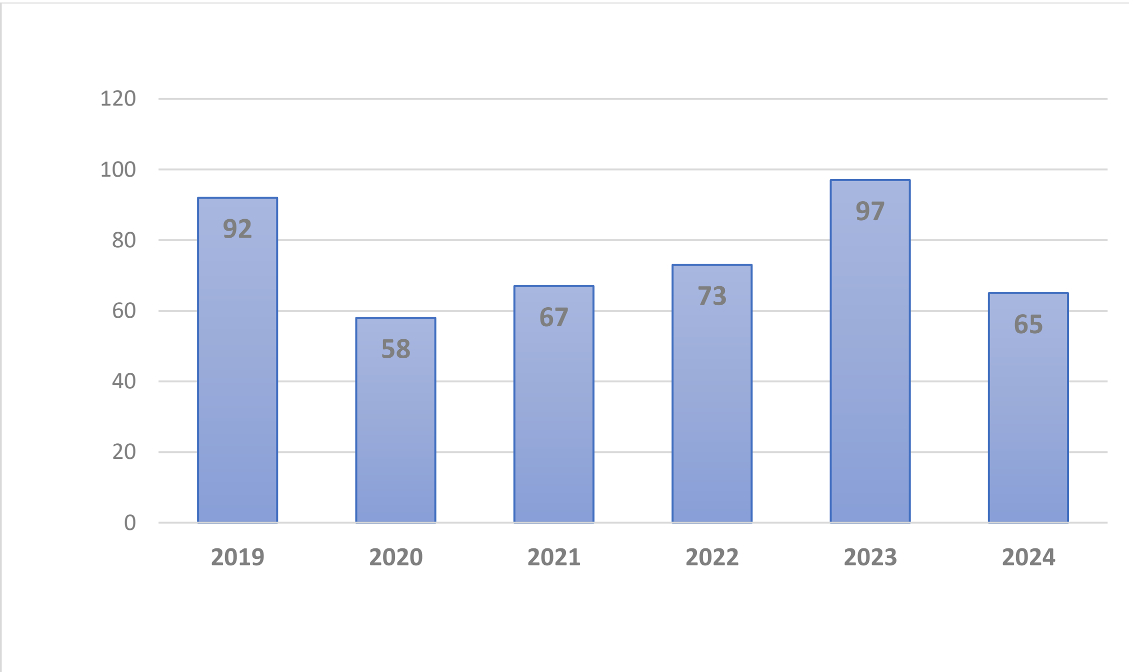

Table 2

Incident report about sharp injury and splash patient fluid exposure details

		n (%)
Type of incident	Fluid	14(3.1)
	Sharp injury	438(96.9)
Shift in which injury occurred	Morning	281(71.3)
	Evening	67(17)
	Night	46(11.7)
Place of exposure	Inpatient room	335(74.8)
	outpatient room	113(25.2)
Known source of sharp injury	Yes	336(77.6)
	No	97(22.4)
Type of instrument lead to sharp injury	Needle	421(96.1)
	Blade	12(2.7)
	Other	5(1.1)
Type of fluid cause splash exposure	Blood	14 (100)
Wearing personal protective equipment injured	Yes	313(90.2)
	No	34(9.8)
the injury occurred during	Drawing blood	128(28.8)
	Insert IV	73(16.4)
	Recapping	23(5.2)
	Cleaning instruments	16(3.6)
	Discarded needle	55(12.4)
	Waste collecting	73(16.4)
	Suturing	35(7.9)
	During operation	37(8.3)
	Other	5(1.1)
If check the source of SISE	Yes	321(76.4)
	No	99(23.6)
Cause of not checking the source	unknown	95(100)
examination employee	yes	447(99.8)
	No	1(0.2)
Needed for vaccinated against hepatitis B	Yes	130(29)
	No	318(71)
Doses of vaccine have been taken	Once	101(74.8)
	Twice	7(5.2)
	3 doses	20(14.8)
	Vaccine and immunoglobulin	7(5.2)
Cause of not vaccinated	Not needed	312(69.5)
	Personal neglect	2(0.4)

3.4 Sharp injury and splash exposure according to Survey results

Table 3 illustrates the experiences of 473 healthcare workers (HCWs) with sharp injuries and body fluid splashes. Among HCWs who experienced sharp injuries, 51.4% also reported fluid splashes, while 48.6% did not. Conversely, among those without sharp injuries, 38.6% encountered fluid splashes, and 61.4% did not.

Table 3

HCWs who have sharp injury and splash body fluid as a questionnaire

n (%)	
Sharp injury and fluid splash	128(27)
Only sharp injury	121(26)
Only fluid splash	86(18)
No sharp injury or splash fluid	137(29)

3.5 Survey results on exposure to sharp injuries by gender

A survey of 473 healthcare workers showed that 52.9% had experienced a sharp injury, most of which happened in patient rooms. Blood drawing was the main cause, with most incidents occurring during morning shifts. Most employees wore personal protective equipment, and 43% cleaned the injury site. Hepatitis B vaccination was required for 47.5% of employees, with most needing only one dose (see Table 4).

Table 4

Gender- based differences of previous exposure to sharp injury while working in the healthcare field

	.	Males n (%)	Females n (%)	Total n (%)	P-value
Previous exposed to sharp injury	Yes	137(55.2)	113(50.2)	250(52.9)	0.275
	No	111(44.8)	112(49.8)	223(47.1)	
Frequency exposed to sharp injury:	Once	59(43.1)	46(40.7)	105(42)	0.637
	Twice	34(24.8)	25(22.1)	59(23.6)	
	3-5 times	17(12.4)	22(19.5)	39(15.6)	
	More than 5 times	11(8)	7(6.2)	18(7.2)	
	Don’t remember	16(11.7)	13(11.5)	29(11.6)	
Place of exposure	Inpatient room	101(73.7)	74(66.7)	175(70.6)	0.225
	Outpatient room	36(26.3)	37(33.3)	73(29.4)	
Can determine the source of sharp injury	Yes	118(86.1)	91(81.3)	209(83.9)	0.297
	No	19(13.9)	21(18.8)	40(16.1)	
The injury occurred during:	Drawing blood	27(19.7)	43(38.1)	70(28)	0.001
	Insert intravenous	26(19)	23(24)	49(19.6)	
	Recapping	24(17.5)	22(19.5)	46(18.4)	
	Cleaning instrument	10(7.3)	7(6.2)	17(6.8)	
	Discarded needle	7(5.1)	8(7.1)	15(6)	
	Waste collecting	21(15.3)	5(4.4)	26(10.4)	
	Suturing	4(2.9)	2(1.8)	6(2.4)	
	During operation	11(8)	-	11(4.4)	
	Other	7(5.1)	3(2.7)	10(4)	
Shift occurred injury:	Morning	88(64.2)	68(60.2)	156(62.4)	0.720
	Evening	35(25.5)	35(31)	70(28)	
	Night	8(5.8)	7(6.2)	15(6)	
	More than one shift	6(4.4)	3(2.7)	9(3.6)	
If wearing personal protective equipment when injury	Yes	121(89.6)	89(80.2)	210(85.4)	0.037
	No	14(10.4)	22(19.8)	36(14.6)	

Chi-Square Test of Independenc.

Table 5

Gender-based differences previous to sharp injury for actions taken after exposure

		Males n (%)	Females n (%)	Total n (%)	P-value
Action taken after injury	Wash with water and soap	65(47.8)	42(37.2)	107(43)	0.574
	Used an antiseptic solution	15(11)	12(10.6)	27(10.8)	
	Blood test and writing report	5(3.7)	4(3.5)	9(3.6)	
	Nothing	1(0.7)	1(0.9)	2(0.8)	
	Wash with water and soap + Used an antiseptic solution	7(5.1)	10(8.8)	17(6.8)	
	Wash with water and soap + Reporting and lab test done	20(14.7)	25(22.1)	45(18.1)	
	Wash with water and soap + Used an antiseptic solution + Reporting and lab test done	23(16.9)	19(16.8)	42(16.9)	
Reporting event	Yes	99(72.3)	78(69)	177(70.8)	0.575
	No	38(27.7)	35(31)	73(29.2)	
Check source:	Yes	85(85.9)	68(87.2)	153(86.4)	0.799
	No	14(14.1)	10(12.8)	24(13.6)	
Reason for not checking the source	Unknown	9(100)	7(100)	16(100)	
If employee was checked	Yes	99(100)	78(100)	177(100)	
If employee need for vaccine for Hep B	Yes	45(45.5)	39(50)	84(47.5)	0.548
	No	54(54.5)	39(50)	93(52.5)	
How many doses taken	One	20(47.6)	18(50)	38(48.7)	0.800
	Twice	10(23.8)	10(27.8)	20(25.6)	
	3 doses	12(28.6)	8(22.2)	20(25.6)	
the cause if not vaccinated	Not needed	50(92.6)	38(97.4)	88(94.6)	0.307
	Personal neglected	4(7.4)	1(2.6)	5(5.4)	
Causes underreporting	Unaware that they need to report	7(18.4)	2(5.9)	9(12.5)	0.191
	Uncertain of whom to report	2(5.3)	0	2(2.8)	
	No benefit in reporting	5(13.2)	5(14.7)	10(13.9)	
	It was not serious to be reported.	24(63.2)	27(79.4)	51(70.8)	

Chi-Square Test of Independence

3.6 Exposure to body fluids by gender survey results

Table 6 shows that 45.3% of surveyed healthcare workers were exposed to patient body fluids, mostly in patient rooms. Blood was the most common fluid, and exposures happened most often during morning shifts. 86.8% used PPE when exposed, and 44.4% washed the area afterward. Only 32.7% reported incidents, with 80.9% feeling they were not serious enough.

Table 6

Gender-based differences of exposure to body fluids from patients while working in the healthcare field

		Males	Females	N (%)	P-value
Previous exposed to SE	Yes	118(47.8)	96(42.7)	214(45.3)	0.266
	No	129(52.2)	129(57.3)	258(54.7)	
Frequency of exposed to SE	Once	28(23.7)	21(21.9)	49(22.9)	0.491
	Twice	26(22)	23(24)	49(22.9)	
	3-5 times	20(16.9)	23(24)	43(20.1)	
	More than5 times	27(22.9)	14(14.6)	41(19.2)	
	Not remember	17(14.4)	15(15.6)	32(15)	
Place of exposure fluid	Inpatient room	103(88)	81(84.4)	184(86.4)	0.438
	Outpatient room	14(12)	15(15.6)	29(13.6)	
The source of is known	Yes	94(80.3)	74(77.1)	168(78.9)	0.562
	No	23(19.7)	22(22.9)	45(21.1)	
Shift	Morning	68(58.1)	76(79.2)	144(67.6)	0.004*
	Evening	37(31.6)	13(13.5)	50(23.5)	
	Night	9(7.7)	7(7.3)	16(7.5)	
Type of body fluid	Blood	60(50.8)	59(61.5)	119(55.6)	0.276
	Urine	23(19.5)	19(19.8)	42(19.6)	
	Sputum	8(6.8)	3(3.1)	11(5.1)	
	More than one type of patient body fluid	27(22.9)	15(15.6)	42(19.6)	
Occurred during:	Drawing blood or insert IV	39(33.1)	52(54.2)	91(42.5)	<0.001*
	Dealing with urinary catheters	39(33.1)	25(26)	64(29.9)	
	In operation Room	26(22)	4(4.2)	30(14)	
	Other	14(11.9)	15(15.6)	29(13.6)	
wearing PPE	Yes	106(91.4)	78(81.3)	184(86.8)	0.030*
	No	10(8.6)	18(18.7)	28(13.2)	
Reporting Event	Yes	43(36.4)	27(28.1)	70(32.7)	0.197
	No	75(63.6)	69(71.9)	144(67.3)	
Causes underreporting	Unaware that they need to report	6(8.1)	7(10.4)	13(9.2)	0.142
	Uncertain of whom to report	1(1.4)	1(1.5)	2(1.4)	
	No benefit in reporting	10(13.5)	1(1.5)	11(7.8)	
	It was not serious to be reported	57(77)	57(85.1)	114(80.9)	
	Chi-Square Test of Independence				

3.7 Knowledge and Practice of healthcare workers about sharp injury and splash exposure

The study shows that 97.7% of respondents are aware of needle stick and patient body fluid exposure risks, with 57.6% reporting regular training. In addition, 86.7% use protective equipment, and 90.3% follow specific procedures. Moreover, 84.3% conduct risk assessments before tasks involving exposure, and 85.6% acknowledge clear workplace policies. 78.4% believe improvements are necessary, healthcare workers consistently wear gloves 91%, recap needles 73%, dispose of sharp items 96%, wash injury sites under running water 92%, use PPE 89%, **(**see Table 7).

Table 7

The knowledge and practice of healthcare workers about sharp injury and splash exposure

	Yes	No	Not sure
	n (%)	n (%)	n (%)
Do you know the risk of contracting blood-borne diseases through needle sticks?	461(97.7)	10(2.1)	1(0.2)
Do you receive regular training on safety and prevention of needlestick injuries and exposure to body fluids?	272(57.6)	129(27.3)	71(15)
Do you regularly use protective equipment (such as gloves, masks, goggles) while working?	409(86.7)	15(3.2)	48(10.2)
Do you follow specific procedures when exposed to needles or body fluids?	426(90.3)	19(4)	27(5.7)
Have you practiced using and storing sharp instruments (such as surgical strips, scissors) in a safe manner?	385(81.6)	67(14.2)	20(4.2)
Do you assess potential risks before performing tasks that may expose you to SISE?	398(84.3)	25(5.3)	49(10.4)
Do you have clear policies in your workplace regarding reporting and documenting SI?	404(85.6)	37(7.8)	31(6.6)
Do you think there is a need to improve procedures or provide PPE to reduce the risk of SISE?	370(78.4)	54(11.4)	48(10.2)
I wear medical gloves when drawing blood.	433(91.8)	7(1.4)	32(6.8)
I do not recap the needle after use	345(73.1)	73(15.5)	54(11.4)
I Throw used needles or sharps into sharps disposal bins immediately.	454(96.2)	5(1)	13(2.8)
In cae of SI, wash the site with running water.	437(92.5)	9(2.5)	23(4.5)
using appropriate PPE when dealing with patients whose SE you may be exposed to	422(89.5)	11(2.4)	38(8.1)

3.8 Attitude and behavioral responses about sharp injury and splash exposure

Table 8 shows that report sharp injuries 74%. Lower experience levels are associated with increased perception of SISE risk 34%, while 50.2% acknowledge that low expertise leads to higher risk (See Table 7).

Table 8

Attitude and behavioral responses for sharp injury and splash exposure

	Always	Mostly	Sometimes	Rarely	Never
	n (%)	n (%)	n (%)	n(%)	n (%)
special precautions to reduce the risk of SISE while doing your job	305(64.6)	114(24.2)	37(7.8)	11(2.3)	5(1.1)
is necessary to write a report of an acupuncture injury	350(74.2)	75(15.9)	39(8.3)	4(0.8)	4(0.8)
Exposure to SISE is the result of poor skill and lack of training among medical staff.	161(34.1)	94(19.9)	112(23.7)	59(12.5)	46(9.7)
PPE plays an important role in avoiding SISE	360(76.3)	80(16.9)	23(4.9)	4(0.8)	5(1.1)
Less experienced medical staff are more susceptible to SISE	237(50.2)	130(27.5)	77(16.3)	13(2.8)	15(3.2)

3.9 The occurrence of sharp injuries and splash exposures (SISE) according to job categories

Table 9 presents the occurrence of sharp injuries and splash exposures according to job categories, based on data from incident reports and questionnaires. Key findings show that nurses reported the highest number of exposures, especially during procedures like blood drawing and inserting IV lines, which were predominantly performed in patient rooms. For nurses, 61.8% of exposures occurred in patient rooms according to incident reports, and 66.9% according to the questionnaire. In contrast, cleaners experienced most exposures during waste collection, with 60.2% reported outside patient rooms in incident reports. Doctors primarily encountered injuries during operations and suturing, while laboratory technicians faced exposures largely from handling needles during blood drawing.

Figure 2

Occurrence of SISE according to job category in department according to incident report

	Doctors I	Nurses I	Lab T I	Cleaner I
CSSD	0	3	0	0
InPt wards	24	84	1	18
CSU	2	18	1	4
KU	2	15	0	5
Clinic	8	26	0	14
Lab	0	1	13	6
OR	51	19	3	9
ICU	10	48	0	14
ER	15	29	0	7

Table 9

Occurrence of SISE according to job category in incident report and questionnaire

		Doctors		Nurses		Laboratory Technician		cleaner	
		Incident report	Questionnaire	Incident report	Questionnaire	Incident report	Questionnaire	Incident report	Questionnaire
Place of exposure	Inpatient room	107 (31.9)	34 (19.4)	207 (61.8)	117 (66.9)	11 (3.3)	12 (6.9)	10 (3)	12 (6.9)
	Outpatient room	5 (4.4)	3 (4.1)	33 (29.2)	38 (52.1)	7 (6.2)	18 (24.7)	68 (60.2)	14 (19.2)
Activities during the injury	Drawing blood	19 (14.8)	4 (10.8)	99 (77.3)	50 (32.1)	10 (7.8)	16 (51.6)	0	0
	Insert IV	25 (34.2)	6 (16.2)	47 (64.4)	41 (26.3)	1 (1.4)	2 (6.5)	0	0
	Recapping	6 (26.1)	8 (21.6)	16 (69.9)	29 (18.6)	1 (4.3)	9 (29)	0	0
	Cleaning instrument	1 (6.3)	1 (2.7)	12 (75)	13 (8.3)	0	1 (3.2)	3 (18.8)	2 (7.7)
	Discarded needle	2 (3.6)	1 (2.7)	47 (85.5)	14 (9)	5 (9.1)	0	1 (1.8)	0
	Waste collecting	1 (1.4)	0	0	2 (1.3)	1 (1.4)	0	71 (97.3)	24 (92.3)
	Suturing	32 (91.4)	6 (16.2)	3 (8.6)	0	0	0	0	0
	During op	22 (59.5)	10 (27)	15 (40.5)	1 (0.6)	0	0	0	0
	other	3 (60)	1 (2.7)	1 (20)	6 (3.8)	0	3 (9.7)	1 (20)	0
Department	ER	15 (29.4)	23 (37.1)	29 (56.9)	33 (53.2)	0	0	7 (13.7)	6 (9.7)
	ICU	10 (13.9)	9 (8.2)	48 (66.7)	88 (80)	0	0	14 (19.4)	13 (11.8)
	OR	51 (62.2)	23 (27.4)	19 (23.2)	44 (52.4)	3 (3.7)	6 (7.1)	9 (11)	11 (13.1)
	Lab	0	0	1 (5)	0	13 (65)	47 (88.7)	6 (30)	6 (11.3)
	Clinic	8 (16.7)	0	26 (54.2)	12 (85.7)	0	0	14 (29.2)	2 (14.3)
	KU	2 (9.1)	0	15 (68.2)	22 (91.7)	0	0	5 (22.7)	2 (8.3)
	Laundry	0	0	0	0	0	0	1 (100)	0
	CSW	2 (8)	2 (18.2)	18 (72)	6 (54.5)	1 (4)	0	4 (16)	3 (27.3)
	Inpatient wards	24 (18.9)	18 (15.8)	84 (66.1)	71 (62.3)	1 (0.8)	0	18 (14.2)	25 (21.9)
	CSSD	0	0	3 (100)	1 (100)	0	0	0	0

Chapter Four

Discussion

The incidence of sharps injuries and fluid splash exposures in Palestine is not well documented in the literature. In 2024, a comprehensive cross-sectional study was conducted to evaluate healthcare workers' awareness and attitudes regarding sharp injuries and body fluid splashes in selected hospitals. Participants completed a detailed questionnaire designed to assess their knowledge of potential risks and experiences related to these hazardous incidents. Additionally, a retrospective cohort study was undertaken to analyze injury records from prominent tertiary hospitals in the West Bank. This investigation focused on both self-reported and supervisor-reported cases of fluid splashes and sharps-related injuries between 2019 and 2024.

About 97% of all report during the study period involved injuries from sharp objects. The findings of study showed that injuries from sharp objects occur much more frequently among healthcare professionals than fluid spills. Several study carried out in nations like China, Ethiopia, India, and Tunisia support this conclusion (12,43,61,62).

The study's findings highlight attention to number of important workplace safety concerns. The findings point to a significant gender gap in experience with sharps injuries, especially needle stick injuries, and health care workers. Female healthcare professionals are more likely to be associated with situation where exposure to such injuries occurs, as evidenced by the higher percentage of female participants (54.6%) compared to male participant. The data also highlight fact that more than half of the NSIs that were reported involved women, which is similar to research’s from other settings, including Tanzania and Iran, showing that women frequently report higher rates of occupational exposures (58,63). This pattern may be explained by fact that women make up a significant portion of the nursing workforce, which increased the possibility that they will come across circumstances involving NSIs and skin exposures (58,63). Because female healthcare worker is more susceptible to these injuries, the study emphasizes the need for protective measures and specific intervention. Better training, easier access to the safety equipment, and improved procedures to reduce risks in clinical settings are a few examples of this.

According to the finding, nurses are more likely than other medical professionals to be suffer an injury. The data showed that nurses had highest rates in both the survey responses (53.8%) and the incident report (58.6%). This aligns with previous research (56,64). A study conducted in Saudi Arabia identified nurses and doctors as the most affected groups when it comes to workplace injuries (65). The significant proportion of injuries among nurses can be attributed to their vital role in the hospital setting. Handling needle, drawing blood, and giving direct patient care is just some of the tasks that nurses commonly perform that have a higher risk of injures. Since they make up of important percentage of the healthcare workers, they are more likely to report injuries due to their increased exposure to potentially dangerous situations. Given the finding that nurses are most vulnerable to injuries from sharp objects, it is recommended that nursing staff received more training on safety procedures, that stronger guidelines for handling needles and sharp objects be put in place, that access to safety-engineered devices be expanded, and that continuous monitoring and support systems be put in place to efficiently monitor and handle incidents. additionally, reducing risk will be required to developing a culture of safety in healthcare facilities that promotes open communication and reporting of injuries caused by sharp objects.

Additionally, the findings show that risk level for sharp injuries is specifically distributed among various departments in medical facility. Given that it performs many invasive procedures and provides direct patient care, the inpatient department may need special attention along with improved safety protocol, as evidenced by its highest occurrence rate of 28.2%. The critical nature of patient care in intensive care unit, where immediate actions may be required, is the reason for the ICU's rate of 27.3%, which further increases exposure to the sharp objects. Despite being lower at 18.2%, the operating room remains a serious risk, which emphasizes the necessity for surgical teams to continue being careful when putting safety precautions in place. These results support the contention that departments with high rate of invasive actions is linked to higher risks and are consistent with previous research, including that from the

University of Minnesota. (66). All things considered, the findings highlight the need for specific to each department risk management plan, stressing the value of ergonomic equipment's, training, and regulations designed to the handle the specific challenges present in every setting in order to be successfully reduce the risk of sharp injuries.

The findings of the research draw attention to pressing issues surrounding healthcare workers' experiences and workplace safety. The challenges of ensuring safe workplace can be made worse by understaffing, which can cause burnout and lower job satisfaction among healthcare professional. The findings are consistent with related research from places like Saudi Arabia (30), India (4), and Southeast Asia (16), which show that fight for safety in medical environments is a global problem rather than one that limited to specific areas. The fact that 46.3% of participants had little professionals' knowledge, defined as having worked in their positions for one to five years, is an important finding. This result is consistent with similar research from other area, such as a teaching hospital for tertiary care in Palestine and studies carried out in Northwestern and Iran (25,58,63). Concerns concerning lack of understanding regarding infection prevention and control protocol are raised by the association between less experienced staff and a higher frequency of serious safety incidents. Untrained medical personnel may find it difficult to identify risk and may not have the skills to properly manage them, which emphasizes the necessity of focused educational programs to aid in their growths. The concerning finding that more than 52.9% of the healthcare professional surveyed said they had suffered at least one serious injury while working highlights serious safety concerns that are common in the healthcare setting. The fact that 70.6% of these injuries happened in inpatient settings which present particular safety challenges particularly concerning. Additionally, an important number of injuries (62.4%) occurred during morning shift, according to the data. Several variables, such as increased patient activity, variation in reporting practices, and fatigue impairing decision-making, could be responsible for this trend. (48), and how healthcare worker perceptions of risk change during their shifts. Higher patient to staff ratios is typically found in inpatient care setting, which increases the risk of accident, especially at peak times when patient turnover is high. The need to provided care quickly may cause people to forget established safety procedure, which raises the possibility of harm (4).

High rate of occupancy, excessive workloads, and staffing shortages is frequently cited reasons for incidents; these factor all contribute to a challenging workplace environment that may have a negative impact on standard of patient care. These difficulties get worse by the growing demand on healthcare systems around the world, especially in the wake of events like the COVID-19 pandemic. Given the prevalence of injuries during morning shift, additional study into the underlying causes of this incident is necessary. It is important to create plans to reduce risk, especially when activity is at its highest level. To improve working conditions for health care workers, this involve reassessing the management of healthcare facilities. Healthcare organizations should put in place comprehensive training program that focus on infection prevention and control policies and safety procedures for both new and seasoned employees in light of these findings. Safety procedures can be enhanced and confidence can be fostered through ongoing education and simulation-based training.

Administrators in the medical field should also give top of priority to staffing strategy, which may include raising employee numbers or enhancing supporting networks for current employees. Reducing injures rates and maintaining high-quality patient care require developing an atmosphere that prioritizes safety and support for medical staff. In the end, protecting healthcare worker' health is both moral requirement and essential to the long-term sustainability and efficiency of healthcare systems around the world.

The finding draw focus to the inherent risks of using needles and other sharp object during common medical procedures like blood collection and IV-line insertion.

The frequency of "the injury occurred while drawing blood" are statistically significant higher in females than in male, with a p value of 0.001. This show an incidental risk that is gender-related, with women being more exposed during blood collection procedures.

Healthcare personnel who handle these objects are at particularly high risk of inadvertent cuts or punctures that could expose them to infections or other problems. The mention of specific situations, such as Shanghai worker (67) and Saudi Arabia (65), highlights the fact that this problem is not specific and that it affect healthcare workers worldwide in a variety of contexts. The studies discussed point to the need for more targeted investigation into the types and prevalence of these injuries in various cultural and medical contexts. In order to reduce these risk and protect healthcare personnel from harm caused on by coming into contact with contaminated sharps, improving training and strict adherence to safety procedures are essential (68).

The study also assessed the practice and knowledge of healthcare workers with regard to fluid spills and sharp injuries. Even though the majority of healthcare workers shows that they understand post-exposure protocols, different reactions after accidents indicate varying degrees of adherence to established safety measures. Additionally, even though 47.5% of healthcare workers acknowledged value of hepatitis B vaccination, a significant proportion (71%) said they did not think it was required. This suggests that employees have basic understanding, which is necessary to set in place suitable safety measures. These results are corroborated by research conducted in other areas. For instance, according to a study by Alzahrani et al. (2020), 60% of Saudi Arabian healthcare worker knew that hepatitis B vaccination was necessary. However, only 30% were vaccinated, indicating similar differences between healthcare workers' perceptions of need for vaccinations and their actual vaccination uptake (69). Healthcare professional need to be aware of ways that infections spread and how to avoid contracting them (24). According to a systematic review by Chen et al. (2018), appropriate training significantly raises awareness of and adherence to safety procedures (70). Furthermore, survey carried out in Bahrain found that almost all healthcare professionals received PPE training, and that taking part in this training had a major impact on compliance score(71). This supports the Centers for Disease Control and Prevention's findings that regular safety education and training lead to a significant drop in occupational infections. (72).

In addition, 15.5% of healthcare workers reported recapping needles, a practice that extremely dangerous and highlights the necessity of stricter compliance with needle safety laws. Despite being aware of the potential hazards, almost two-thirds of healthcare worker occasionally recap needles, according to a previous study(73). According to a survey done in the US, about 30% of medical professional were routinely recapping needles, frequently pointing to time constraints as contributing factor(30). However, only 10% of healthcare workers in Australia reported recapping needle, according to study that attributes this lower incidence to increased safety protocol enforcement and training(74). Additionally, data from Turkey's Infection Control Committee show that recapping needles is responsible for one-third of needlestick injuries, which suggests a serious problem that need to dealt with right away in order to prevent injuries in medical facilities (75).

PPE is a crucial last line of protection against possible hazard, but it not always sufficient to avoids sharp injuries. A previous finding revealed that 89.5% of individuals with injuries reported using personal protective equipment (49). The variable "If wearing personal protective equipment when injury" obtained significant with a p value of 0.037, indicating that females wore PPE at the time of injury at a lower rate than males. This reveals a potential gap in PPE adherence, requiring targeted educational interventions and monitoring.

This may be attributed to various factors, including inconsistent or incorrect use of the equipment, reliance on substandard or inadequate gear, or overconfidence in PPE as the sole protective measure without implementing additional safety protocols. PPE also helps healthcare professionals assess the risk of infection and determine if further precautions or treatments, such as post-exposure prophylaxis, are necessary (50). Studies highlight the varying effectiveness of different types of PPE (gloves, gowns, face shields) and may detail the specific contexts in which they are most and least effective(76,77). These findings underscore the importance of optimal PPE usage tailored to specific situations. Most respondents (90%) reported wearing PPE at work every day. However, prior research highlights a persistent knowledge and practice gap regarding the inconsistent use of PPE among healthcare workers (78,79). Despite this, the commitment to wearing personal protective equipment shows proactive approach to personal safety, which is essential for reducing exposure to bloodborne pathogen.

Furthermore, significant number of medical personnel stated that they wore medical gloves when taking blood, highlighting their compliance with fundamental safety procedures. Medical staff member are protected from sharps objects and contaminated surfaces by these gloves, which act as important physical barrier (80). This barrier significantly reduce the possibility of harm and needlestick injuries from instruments like scalpels and needles. (24). Additionally, research indicate that double gloves offer better protection against injuries than single gloves by greatly lowering the likelihood of gloves perforation(81). Healthcare professional must adhere to exact donning and doffing procedures in order to be as effective as possible. Therefore, it is advised that they washed their hands right away after removing off their gloves in order to avoiding contamination(1,82). It's interesting to noted that 43% of medical professionals showed a solid understanding of how to treat post-exposure symptoms by quickly washing an exposed area with soap and water. A very tiny portion (0.8%) did nothing at all, highlight the need for better rapid response strategies. Effective training programs dramatically increase PPE compliance rates and lower the frequency of injuries among healthcare workers, according to research. (83). According to the study's finding, healthcare professionals need to better trained on exposure incidents and appropriate response techniques. It is imperative to highlight how important it to act right away, such as by washing the exposed area with soap and water. The fact that some did not act, even though some of them show sufficient knowledge, emphasizes the need for regular training, prompt reminders, and clear post-exposure protocol to guarantee prompt and efficient reactions in any circumstance.

Further understanding of the barriers to the efficient use of PPE can also be gained by investigating the social and psychological elements that affect compliance. Prior research focused on how environmental factors, workload, and stress affect PPE adherence(84). A culture of safety that emphasizes prompt action after exposures maybe promoted by understanding of these human factors. Additionally, using interdisciplinary approach to healthcare worker safety, which incorporate feedback from engineers, psychologists, and occupational health specialists can improve overall protection to prevent injuries caused by sharp objects. Previous studies have presented effective strategies for monitoring and reporting incident, thereby enhancing protocols and training measures (85). Creating robust surveillance systems can track needlestick injuries and refine responses based on real-world data, ultimately leading to improved safety practices in healthcare settings.

Among healthcare professionals whom a sharp object had not harmed, 38.6% reported exposure to bodily fluids, including blood, urine, and sputum. Notably, 51.4% of those who experienced a sharp injury also reported fluid splashes, highlighting the range of risks that healthcare workers encounter in hospital settings. Previous research conducted in Ghana indicated that blood was the most commonly involved fluid in recorded splash incidents, emphasizing the heightened risk of bloodborne infection(86). A comprehensive assessment revealed that exposure to sharp objects and splashes poses a significant occupational hazard, particularly in Arab countries (62). Daily occurrences of blood and other fluid splashes were reported among midwives in Addis Ababa (61), which is consistent with findings from a 2023 study conducted in China (87). Similarly, in southern Ethiopia, about one-third of healthcare workers reported experiencing at least one splash exposure (64). Another study identified that the incidence of sharp injuries is influenced by factors such as job category, seniority, and training (88).

Fluid spills were also reported to occur daily during morning shifts and in inpatient settings, similar to sharp injuries. Remarkably, the shift in which bodily fluid exposure occurred differed considerably between genders ($p = 0.004$). Females showed a higher incident report of exposure during the morning shift, but males had more occurrences in the evening.

Splashes occurred even when 90.2% of healthcare workers were wearing personal protective equipment during the incidents, suggesting potential issues with the effectiveness or proper use of PPE. Males were more likely than females to wear PPE, and most participants exposed to fluids did use personal protection. An Indian study suggests that female healthcare workers frequently feel uncomfortable using standard-sized equipment, which may result in lower usage rates compared to their male counterparts (78). Research also highlights that two of the leading causes of these workplace hazards are inadequate training and limited access to PPE (2). These results enhance questions about whether all employe received enough training and resources to ensure their safety, as well as the efficacy and compliance of PPE across gender. All staff must have access to appropriate safety gear, received focused training on safe fluid handling and PPE use, and have regular PPE effectiveness evaluations in order to reduce the risk of exposure to bodily fluids. Implementing procedural control for high-risk tasks, expanding access to personal protective equipment, and creating a strong safety culture with well-defined reporting protocols are further ways to reduce exposure. Continued observation and partnership with infection control expert are also necessary for maintain proper protections.

Needlestick incidents and others sharp injuries are more frequent, but they are frequently not reported. Many employe thinks these injuries are too small to bring up. This pervasive pattern indicate that sharp injury happen more than fluid exposures. (12,43,61,62). Perceptions that some injuries are not severe enough to reported it, anxiety of stigma, or ignorance of the risks involved are the main causes of the underreporting of these incidents, which is serious issue. The World Health Organization estimates that contaminated sharps cause percutaneous injuries to over 2 million healthcare worker annually, with 25–90% of these injuries going unreported. (89). Many medical professionals regardless the gender, frequently reduce the significance of reporting such cases, according to surveys done in the UK, China, Yemen, Chicago, and Denmark. (59,60,88,90,91). This conduct exposes concerning weakness in the safety culture of the workplace, affecting efficacy of safety protocols and leading to wrong occupational exposure data. In order to be improved reporting and safety protocol for healthcare personnel, it is imperative that these attitudes be changed.

4.1 Strengths of the Study

The study succeeds in a number of important areas. Firstly, its thorough data collection process makes possible to thoroughly analyze medical staff's exposures to fluid splashed and injuries from sharp object, which increases the validity of the results. focusing on important issues, especially the high rate of injuries and the gender difference that impact female healthcare workers, tackles issues that are frequently overlooked in the industry. Furthermore, the study offers precise, doable suggestions that are suited to the unique requirement of healthcare professionals and can be successfully converted into safety precautions. the study identifies essential factors for the effective execution of safety procedure by stressing the value of developing a supportive culture and improving compliance monitoring.

Furthermore, identifying high-risk areas, especially those involving invasive procedures, enables targeted interventions to maximize impact. By recognizing the vital role of frontline workers, particularly nurses, the study advocates for equipping them with the knowledge and resources necessary for their safety. Collectively, these strengths contribute to the study's potential to inform healthcare policies and drive meaningful changes in safety practices, ultimately creating a safer work environment for healthcare professionals.

4.2 Limitations of the study

1. They are missing data in the reports that documented
2. The number of incident reports is significantly different between different hospitals.
3. Different forms of incident reports contain different data.
4. Reject our request to review the incident report at Ahli Hospital.
5. Princess Alia Governmental Hospital has lost the incident report among 3 years (2019-2021)
6. Potential reporting bias is associated with a self-administered questionnaire.
7. Due to the heavy workload in government hospitals, the response rate varied, and participant categories differed from duo to duo, with varying numbers for each category in a healthcare setting.

4.3 Recommendation

1. Provide better training to healthcare workers, especially nursing staff, on safety procedures to reduce sharp injuries and fluid splash exposures.
2. Improve access to safety equipment, including safety-engineered devices and personal protective equipment, tailored to specific departments and job roles.
3. Establish comprehensive and ongoing education programs focused on infection prevention and control (IPC), post-exposure protocols, and appropriate PPE usage for both new and experienced staff.
4. Address workforce issues by optimizing staffing levels to reduce burnout and enhance adherence to safety measures during high-risk shifts.

5. Implement robust surveillance and interdisciplinary approaches combining engineering, psychology, and occupational health to innovate and maintain healthcare worker safety.

4.4 Conclusion

This study identifies key areas that need focused interventions to enhance the attitude and knowledge of healthcare workers about fluid splash exposures and sharp injuries.

To increase understanding of the mechanisms by which bloodborne diseases spread, how to wear personal protective equipment, and how to avoid exposure following an incident, regular, mandated training sessions are essential. Despite the widespread reports of PPE use by healthcare professionals, prior research on uneven practices necessitates better compliance monitoring. PPE must always be accessible, comprehensive instructions on how to put on and take off safety gear must be provided, and frequent audits must be conducted in order to close these gaps. Furthermore, healthcare facilities must have a supportive, non-punitive culture in order to promote the proper and timely reporting of splash exposure and injuries brought on by sharp objects. Transparency and ongoing safety practice improvement can be further supported by streamlining the report process and providing regular feedback on incidents that are reported.

The findings emphasize how urgent it is to address the severe issue of SISE, particularly among Palestinian healthcare professionals. Sharp object injuries are more frequent than fluid leaks, therefore it's important to recognize the vital role that healthcare professionals—especially nurses and female professionals—play in maintaining workplace safety. Nonetheless, statistics indicate a gender disparity, which means that female healthcare workers are disproportionately harmed by needlestick injuries and other incidents involving sharp instruments. This calls for targeted interventions that prioritize their safety, like enhanced sharps management protocols, specific training programs, and simpler access to safety-engineered equipment. Additionally, the high number of injuries among nursing staff highlights the urgency of putting in place comprehensive safety measures.

As the primary caregiver with important responsibilities, nurses need to be supplied with the expertise and resources needed to minimize their exposure to risks. Stronger protocols, a culture of safety, and the implementation of continuing education initiatives are necessary to lower the occurrence of sharps injuries in healthcare settings. Furthermore, analyzing the risk distribution across several departments—particularly the intensive care unit and inpatient unit—identifies critical regions for specific safety actions. Additional study and the development of specialized risk management plans should focus on departments with high rates of invasive surgeries in order to successfully lower this risk.

In the end, addressing the problems brought about by fluid exposures and injuries from sharp objects is crucial for protecting the health and safety of medical staff and goes beyond simple compliance. If health care providers prioritize these concerns with focal interventions and promote a safety culture, they can significantly lower the number of preventable injuries. In finality, this was making the workplace safer and healthier for all healthcare workers.

List of Abbreviations

Abbreviation	Meaning
CDC	Centers for Disease Control and Prevention
SISE	Sharp Injuries and Splash Exposures
WHO	World Health Organization
PPE	Personal Protective Equipment
HIV	Human Immunodeficiency Virus
HCV	Hepatitis C Virus
HBV	Hepatitis B Virus
ICU	Intensive Care Unit
ER	Emergency Room
OR	Operation Room
IPC	infection prevention and control
NSI	Needle Stick Injury

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Appendices

Appendix A

Nama of academic Scholer with experience in developing and administering questionnaires

Name	Specify
Dr. Basma Damiri	
Dr. Souad Belkebir	

Appendix B

Acupuncture, Blood and Body Fluid Splash Exposure Model

نموذج التعرض للوخز بالابر وتراشق الدم وسوائل الجسم

إسم الموظف: .... الرقم الوظيفي: .... مكان العمل: ....

مكان حدوث الاصابة: .... تاريخ الاصابة: ....../...../......

ساعة حدوث الاصابة .... ص/ م

تاريخ التبليغ عن الاصابة: ..../......./.......

ساعة التبليغ عن الاصابة ....

الوظيفة: O طبيب O اختصاصي O مقيم O امتياز O طالب

- ممرض: O قانوني O مشارك O طالب
- فني: O مختبر O تخدير O أسنان O غير ذلك حدد (   )
- الخدمات: O عامل نظافة O مصبغة O غير ذلك حدد (   )

مكان التعرض للإصابة: O داخل غرفة المريض O خارج غرفة المريض

O موضع الاصابة (   )

كيفية حدوث الاصابة:

هل يمكن تحديد مصدر الاصابة؟ O نعم O لا O غير معروف O لا ينطبق

نوع الأداة التي أدت إلى الاصابة: O إبرة O شفرة O زجاج O غير ذلك

نوع سوائل جسم المريض: O دم ومشتقاته O قيء O لعاب O بلغم O سائل بريتوني O بول Oغير ذلك

هل كنت ترتدي الألبسة الوقائية الشخصية أثناءالاصابة: O نعم O لا

حدثت الاصابة أثناء: O سحب الدم O تركيب الابرة الوريدية O إعادة الغطاء O غسيل الأدوات

O إبرة مهملة O جمع القمامة Oغير ذلك (   )

إسم المريض:

فحص المريض (مصدر الاصابة): HBsAg (   ) HIV (   ) HCV (   )

رفض الفحص (   ) غير معروف (   )

فحص الموظف (المتعرض للإصابة): إجراءات بعد الاصابة:

التأكد من اخذ مطعوم الكبد البائي (B): O نعم O لا عدد الجرعات (   )

HBsAgtiter (   ) HBsAg (   ) HCV (   ) HIV (   ) PPD test (   )

1. إجراءات بعد الشهر الأول:
2. إجراءات بعد الشهر الثاني:
3. اجراءات بعد السادس:

Appendix C

Questionnaire

أنا الطالب أشرف محمود من كلية الدراسات العليا في جامعة النجاح الوطنية – نابلس، أقوم بعمل بحث علمي يستهدف العاملين في مجال الرعاية الصحية في المستشفيات الرئيسية في الضفة الغربية في فلسطين. بإشراف الدكتورة بسمة ضميري والدكتورة سعاد بلكبير.

يهدف البحث إلى دراسة تعرّض العاملين في مجال الرعاية الصحية في المستشفيات لحوادث التعرض للإصابات الحادة والتعرض للرذاذ وقياس مدى المعرفة والسلوك اتجاه الإصابات الحادة والتعرض للرذاذ، والمعلومات ومدى الوعي في مكان العمل، وأسباب التعرض والوقاية منها، والمخاوف من حدوثها. حيث أنه تم اختيارك للمشاركة في هذا البحث عشوائيا، وأنّ إجابتك عن هذا الاستبيان ستبقى سرية تماما وجميع مسار التجربة سوف يتم بخصوصية تامة وسيتم استخدام البيانات فقط لأغراض علمية وبحثية وسوف يطلع عليه الباحثون فقط. مشاركتك في هذه التجربة طوعية واختيارية. لا يجب أن تكون في هذا البحث إذا كنت لا ترغب في ذلك، فلديك الحق في تغيير رأيك والانسحاب من الدراسة في أي وقت دون إبداء أي سبب وفي أي وقت. إجابتك على الأسئلة يعني موافقتك على المشاركة في البحث طوعا.

(يتكون الاستبيان من 6 صفحات-5 اقسام).

القسم الأول: معلومات عامة عن المشارك

الرجاء وضع علامة (x) في المكان الذي يمثل وضعك

العمر.________:

الجنس: ☐ ذكر ☐ أنثى

المحافظة التي تعمل بها: ☐ نابلس ☐ رام الله ☐ الخليل

المشفى الذي تعمل به: ☐ حكومي ☐ خاص

الوظيفة:

☐ طبيب (☐ أخصائي ☐ مقيم ☐ امتياز ☐ طالب)

☐ ممرض (☐ قانوني ☐ مشارك ☐ امتياز ☐ طالب)

☐ فني (☐ مختبر ☐ تخدير ☐ غير ذلك_______)

☐ خدمات (☐ عامل ☐ نظافة ☐ غير ذلك _______)

القسم:

☐ طوارئ ☐ عناية مكثفة ☐ عمليات ☐ المختبر ☐ غير ذلك ___________.

سنوات الخبرة:

☐ 1–5 سنوات ☐ 6–10 سنوات ☐ اكثر من 10 سنوات

القسم الثاني: هذا القسم متعلق بحدوث الإصابة بالوخز بالإبر او الأدوات الحادة أثناء عملك في المجال الصحي

هل سبق لك أن تعرضت لوخز بالإبر أو أداة حادة أثناء العمل؟ ☐ نعم ☐ لا

*ملاحظة: إذا كانت إجابتك لا، انتقل الى القسم الثالث

كم مرة تعرضت للإصابة بوخز الإبر أو الأدوات الحادة خلال عملك في المجال الصحي؟

☐ مرة واحدة ☐ مرتين ☐3 –5 مرات ☐ أكثر من 5 مرات ☐ لا أذكر

مكان التعرض للإصابة: ☐ داخل غرفة المريض ☐ خارج غرفة المريض

موضع الإصابة:___________.

هل يمكن تحديد مصدر الإصابة: ☐ نعم ☐ لا

حدثت الإصابة أثناء:

☐ سحب دم ☐ تركيب الإبرة الوريدية ☐ إعادة غطاء الابرة.

☐ غسيل الأدوات. ☐ إبرة مهملة ☐جمع القمامة ☐غير ذلك ___________.

المناوبة التي حدثت بها الإصابة: ☐ صباحية ☐ مسائية ☐ ليلة

هل كنت ترتدي الألبسة الوقائية الشخصية أثناء الإصابة ؟ ☐ نعم ☐ لا

ما الإجراء الذي اتخذته بعد تعرضك لوخز الإبر؟

☐غسلت المنطقة المعرضة بالماء والصابون على الفور. ☐ استخدمت محلول مطهر على المنطقة المعرضة. ☐أجريت فحصًا لفيروس الإيدز أو الإجراءات الوقائية الأخرى. ☐ لم افعل شيء

☐غير ذلك _____________.

هل تم الإبلاغ عن الإصابة بالوخز بالإبر أو الأداة الحادة؟ ☐ نعم ☐ لا

***إذا كانت إجابتك (نعم)**

تم الإبلاغ إلى: ☐ مسؤولي المباشر ☐ وحدة الجودة ☐ وحدة ضبط ومكافحة العدوى

☐ غير ذلك___________.

هل فحص مصدر الإصابة: ☐ نعم ☐ لا (☐ غير معروف ☐ رفض ذلك)

هل فحص الموظف المتعرض للإصابة: ☐ نعم ☐ لا

هل حصلت على تطعيم ضد التهاب الكبد الوبائيB:

☐ نعم (☐ جرعة ☐ جرعتين ☐ ثلاث جرعات)

☐ لا (☐ ليس بحاجة ☐ اهمال شخصي ☐ غير ذلك________)

إذا لم تقم بالابلاغ عن تعرضك للإصابة بالوخز بالإبر والأدوات الحادة نرجو تحديد السبب لذلك:

☐ لا أعلم أنه يجب الإبلاغ ☐ لا أعلم لمن يجب الإبلاغ

☐ أعلم أنه لا فائدة من الإبلاغ ☐ لم تكن الإصابة كبيرة وبحاجة إلى إبلاغ

☐غير ذلك ________________.

القسم الثالث: هذا القسم متعلق بالتعرض لسوائل الجسم من مرضى أثناء عملك في المجال الصحي

هل سبق لك أن تعرضت لسوائل الجسم من مرضى أثناء العمل؟ ☐ نعم ☐ لا

*ملاحظة:اذا كانت إجابتك لا، انتقل الى القسم الرابع

كم مرة تعرضت لسوائل الجسم من مرضى خلال عملك في المجال الصحي؟

☐ مرة واحدة ☐ مرتين ☐ 3-5 مرات ☐ أكثر من 5 مرات ☐ لا أذكر

مكان التعرض للإصابة: ☐ داخل غرفة المريض ☐ خارج غرفة المريض

موضع الإصابة:__________.

هل يمكن تحديد مصدر الإصابة: ☐ نعم ☐ لا

المناوبة التي حدثت بها الإصابة: ☐ صباحية ☐ مسائية ☐ ليلة

نوع السائل الذي أدى إلى الإصابة: ☐ دم ☐ بول ☐ بلغم ☐ غير ذلك

حدثت الإصابة أثناء:

☐ سحب الدم أو تركيب أو سحب إبرة وريدية ☐ التعامل مع المريض وأدواته مثل قسطرة بولية

☐داخل غرفة العمليات ☐ غير ذلك____________________.

هل كنت ترتدي الألبسة الوقائية الشخصية أثناء الإصابة ؟ ☐ نعم ☐ لا

ما الإجراء الذي اتخذته بعد تعرضك لسوائل جسم المريض؟

☐ غسلت المنطقة المعرضة بالماء والصابون على الفور ☐ استخدمت محلول مطهر على المنطقة المعرضة

☐ تبدل الملابس التي تعرضت للرشق بالسوائل ☐غير ذلك ______________________.

هل تم الإبلاغ عن تعرضك للرشق بسوائل جسم المريض ؟ ☐ نعم ☐ لا

***إذا كانت إجابتك (نعم)**

تم الإبلاغ إلى:

☐ مسؤولي المباشر ☐ وحدة الجودة ☐ وحدة ضبط ومكافحة العدوى ☐غير ذلك___________.

إذا لم تقم بالإبلاغ عن تعرضك للرشق بسوائل جسم المريض نرجى تحدد السبب لذلك:

☐ لا أعلم أنه يجب الإبلاغ ☐ لا أعلم لمن يجب الإبلاغ ☐ أعلم أنه لا فائدة من الإبلاغ

☐ لم تكن الإصابة كبيرة بحاجة إلى إبلاغ ☐غير ذلك ___________________.

القسم الرابع: هذا القسم متعلق بمدى المعرفة للعاملين بالمجال الصحي حول التعرض للإصابة بوخز الإبر ولسوائل جسم المريض

		نعم	لا	أحيانا
.1	هل تعرف عن خطر الإصابة بالأمراض المنقولة بالدم عبر وخز الإبر؟			
.2	هل تتلقى تدريبًا منتظمًا حول السلامة والوقاية من الإصابات بالوخز بالإبر والتعرض لسوائل الجسم؟			
.3	هل تستخدم الوسائل الوقائية (مثل القفازات، الكمامات، النظارات الواقية) بانتظام أثناء العمل؟			
.4	هل تتبع إجراءات معينة عند التعرض للوخز بالإبر أو التعرض لسوائل الجسم؟			
.5	هل تمرنت على استخدام وتخزين الأدوات الحادة (مثل الشرائح الجراحية، المقصات) بطريقة آمنة؟			

6. هل تقوم بتقييم المخاطر المحتملة قبل أداء المهام التي قد تتعرض فيها للوخز بالإبر أو لسوائل الجسم؟

7. هل توجد سياسات واضحة في مكان عملك بخصوص التبليغ والتوثيق عند حدوث وخز الإبر؟

8. هل تعتقد أن هناك احتياجًا لتحسين الإجراءات أو توفير المعدات الوقائية لتقليل مخاطر الوخز بالإبر والتعرض لسوائل الجسم؟

القسم الخامس: يتناول هذا القسم أسئلة حول موقفك والسلوك اتجاه الإصابة بالوخز بالإبر والتعرض لسوائل الجسم والأدوات الحادة

		دائما	غالبا	أحيانا	نادرا	أبدا
1	أقوم بارتداء القفازات الطبية عند عملية سحب الدم					
2	لا أقوم بإعادة تغطية الإبرة بعد الاستعمال					
3	أقوم برمي الإبر المستخدمة أو الأدوات الحادة في صناديق التخلص من الأدوات الحادة على الفور					
4	عند حدوث الإصابة الحادة أغسل الموقع بالمياه الجارية					
5	هل تستخدم الأدوات الوقائية المناسبة (مثل القفازات والنظارات الوقائية) عند التعامل مع مرضى يحتمل تعرضك لسوائل جسمهم؟					
6	هل توجد لديك محاذير خاصة للتقليل من خطر الاصابة بوخز الإبر والتعرض لسوائل الجسم أثناء قيامك بعملك؟					
7	هل تعتقد أن هنالك ضرورة لكتابة تقرير بالإصابة بالوخز بالإبر؟					
8	التعرض لسوائل جسم المريض يكون نتيجة ضعف المهارة ونقص التدريب لدى الطواقم الطبي					
9	للملابس الوقائية دور مهم في تفادي الاصابة بالوخز بالابر والتعرض لسوائل جسم المريض					
10	الطواقم الطبية الاقل خبرة أكثر تعرض للإصابة بالوخز بالابر والتعرض لسوائل جسم المريض					

شكرا لحسن تعاونكم

Appendix D

Study approval 1

State of Palestine
Ministry of Health
Education in Health and Scientific Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

Ref.: ………………
Date:………………

الرقـــم: ٢٠٢٤/١٧٨٢/٢٢٢
التـــاريخ: ٢٠٢٤/٨/١١

الأخ مدير عام الادارة العامة للمستشفيات المحترم،،،

عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،

الآخت ق. أ. مدير عام الادارة العامة لتكنولوجيا المعلومات المحترمة،،،

تحية واحترام،،،

<u>الموضــوع: تسهيل مهمة بحث</u>

يرجى تسهيل مهمة الطالب: **أشرف ذيب عبد الله محمود- ماجستير مكافحة العدوى- جامعة النجاح**، لعمل بحث الماجستير بعنوان:

"سمة الاصابات الحادة ورذاذ السوائل لدى العاملين في مجال الرعاية الصحية في الضفة الغربية"

حيث سيقوم الطالب بجمع معلومات عن طريق الاطلاع على تقارير وتوزيع استبانة على الكوادر الصحية،

وذلك في:

- **مستشفى رفيديا – مستشفى عاليه**
- **مجمع فلسطين الطبي**

على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات، وعدم التعرض للمعلومات الشخصية.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

نسخة: نائب الرئيس للشؤون الاكاديمية المحترم / جامعة النجاح

Telfax.:09-2333901 scientificresearch.dep@gmail.com تلفاكس: 09-2333901

Appendix E

Study approval 2

State of Palestine
Ministry of Health
Education in Health and Scientific Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

Ref.: ....
Date:..................

الرقم: ٢٠٢٤/١٧٨٢/١٦٢
التاريخ: ٢٠٢٤/٨/١١

الأخ مدير عام الادارة العامة للمستشفيات المحترم،،،

عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،

الآخت ق. أ. مدير عام الادارة العامة لتكنولوجيا المعلومات المحترمة،،،

تحية واحترام،،،

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالب: **أشرف ذيب عبد الله محمود- ماجستير مكافحة العدوى- جامعة النجاح**، لعمل بحث الماجستير بعنوان:

"سمة الاصابات الحادة ورذاذ السوائل لدى العاملين في مجال الرعاية الصحية في الضفة الغربية"

حيث سيقوم الطالب بجمع معلومات عن طريق الاطلاع على تقارير وتوزيع استبانة على الكوادر الصحية،

وذلك في:

- **مستشفى رفيديا** – **مستشفى عاليه**
- **مجمع فلسطين الطبي**

على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات، وعدم التعرض للمعلومات الشخصية.

على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

وحدة التعليم الصحي والبحث العلمي

نسخة: نائب الرئيس للشؤون الاكاديمية المحترم / جامعة النجاح

Telfax.:09-2333901 scientificresearch.dep@gmail.com تلفاكس: 09-2333901

جامعة النَّجاح الوطنيَّة
كليَّة الدّراسات العليا

سمة الإصابات الحادة ورذاذ السوائل لدى العاملين في مجال الرعاية الصحية في الضفة الغربية "فلسطين"

إِعداد
أشرف ذيب عبد الله محمود

إشراف
د. بسمة ضميدي
د. سعاد بلكبير

قدمت هذه الرسالة استكمالا لمتطلبات الحصول على درجة الماجستير في مكافحة وضبط العدوى، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس – فلسطين.

2025

سمة الإصابات الحادة ورذاذ السوائل لدى العاملين في مجال الرعاية الصحية في الضفة الغربية "فلسطين"

إعداد

أشرف ذيب عبد الله محمود

إشراف

د. بسمة ضميدي

د. سعاد بلكبير

الملخص

خلفية الدراسة: تُعدّ الإصابات الحادة والتعرض لرذاذ السوائل من المخاطر المهنية الرئيسية للعاملين في مجال الرعاية الصحية، مما يزيد من خطر انتقال مسببات الأمراض المنقولة بالدم. وعلى الرغم من انتشار هذه الحوادث على نطاق واسع في جميع أنحاء العالم، إلا أن البيانات الواردة من فلسطين لا تزال محدودة. هدفت الدراسة إلى تحديد معدل الإصابة وتوصيف الإصابات الحادة والتعرض لرذاذ السوائل بين العاملين في مجال الرعاية الصحية في الضفة الغربية، فلسطين.

منهجية الدراسة: تم استخدام نهج متعدد الأساليب في دراسة إصابات العاملين في الرعاية الصحية. شملت الدراسة تحليل 452 حالة إصابة حادة وتعريض للسوائل بين عامي 2019 و2024 في خمسة مستشفيات، بالإضافة إلى إجراء مسح مقطعي في 2024 شمل 473 عاملاً. استُخدم استبيان منظم لتقييم الإصابات والمعرفة والممارسات الوقائية. تمت معالجة البيانات باستخدام برنامج الحزمة الإحصائية، وحصلت الدراسة على موافقات أخلاقية ومستنيرة من المشاركين.

نتائج الدراسة: تم تحديد 452 حالة إصابات حادة ورذاذ سوائل في مراجعة بأثر رجعي، حيث شكل الممرضون الأغلبية (53.8%)، مع وقوع معظم الحوادث خلال نوبات العمل الصباحية (71.3%) وداخل غرف المرضى (74.8%). كانت الإبر السبب الرئيسي للإصابات الحادة، بينما كان الدم هو السائل الوحيد في التعرض للرذاذ. أفاد 52.9% من العاملين بإصابة حادة واحدة على الأقل، و45.3% بتعرضهم لرذاذ واحد على الأقل خلال حياتهم المهنية، كما أن 51.4% من المصابين بإصابات حادة تعرضوا لرذاذ. كان نقص الإبلاغ ملازمًا، حيث

عُزيت 80% من الحالات غير المبلغ عنها لعدم جدية الحالة. كانت تغطية لقاح التهاب الكبد الوبائي "ب" منخفضة حيث استوفى 62.8% فقط بروتوكولات ما بعد التعرض. رغم أن 92% استخدموا معدات الوقاية الشخصية، لوحظت فجوات في التدريب والامتثال. وُجدت ارتباطات بين الإصابات وفئة الوظيفة والقسم وتوقيت المناوبة (قيمة الاحتمال < 0.05).

إستنتاجات الدراسة: تتكرر الإصابات الحادة والتعرض لرذاذ السوائل بين العاملين في الرعاية الصحية في مستشفيات الضفة الغربية، خاصة أثناء الإجراءات الروتينية. ورغم استخدام معدات الوقاية الشخصية، توجد فجوات في التطعيم وإدارة ما بعد التعرض، مما يستدعي تحسين استراتيجيات الوقاية، أنظمة الإبلاغ، وتدريب العاملين لتقليل المخاطر المهنية وحمايتهم.

الكلمات المفتاحية: إصابات الأدوات الحادة؛ انسكاب السوائل؛ العاملين في مجال الرعاية الصحية؛ أخطار مهنية؛ العدوى المنقولة عن طريق الدم.