

The National Ribat University

Faculty of Graduate Studies & Scientific Research



**Assessment of Knowledge and Practice of Injection Safety
among health care workers at National Ribat University
Hospital in Khartoum State, Sudan**

A Thesis Submitted in the Fulfillment of the Requirement of M.Sc Degree in Health
Management by Research

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Dedication

I dedicate this research to my family who supported me and helped me to accomplish it

Thank you

Acknowledgment

I would like to express my master to Allah for providing me the blessing to complete this master and ask him that this research would be another tool to help the hospital for enhance the level of knowledge and practice of injection safety

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Abbreviations

Abbreviation	Items
CDC	Center For Disease Control
WHO	World Health Organization
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human Immune Deficiency Virus
NSI	Needle Stick Injury
PEP	Post Exposure Prophylaxis
SPSS	Statistic Package For Social Science
HCWs	Health Care Workers
RUP syringes	Reuse Prevention Syringe
SIP syringes	Syringes With Sharp Injury Protection
ISO	International Standardization For Organization
LMICs	Low And Middle Income Countries
SIPC	Safe Injection Practice Coalition
NIOSH	National Institute Of Occupational Safety And Health
NRUH	National Ribat University Hospital

Abstract

Safety of injection is an important health issue affecting million of individual worldwide. And our study aimed to assess health care workers knowledge and practice towards the injections safety in National Ribat University Hospital.

- It was cross-sectional descriptive community based study conducted between December 2016 to February 2017. Through this study we founded that 75.60% of HCWs did not received any training courses about the injections safety.

And It was reflected in 44.4% and 22.2% from the HCWs who does not tack appropriate action toward the prick site after exposure to hazards of needle stick injuries.97.2% They were not reporting to the hospital about their prick injury 53.8% of HCWs complain from the lack of supply of safety boxes permanently in their departments. 74.1% of health care providers they have no any idea about the injection safety polices in the hospital.

- 90% of them had good knowledge about the diseases transmitted through unsafe injection .while 25.3% of the participants did not receive full doses of vaccination against HBV.

This recommended to bullish the policies of injection safety to all hospital departments and trained the HCWs about it. And continues following for all health care workers to complete their full doses of HBV vaccine.

ملخص البحث

الحقن الامن من اهم القضايا الصحية التي تؤثر على ملايين الاشخاص في مختلف انحاء العالم وقد اجريت هذه الدراسة في مستشفى الرباط الجامعي بهدف تقييم معرفة وممارسه الكادر الطبي للحقن الامن في المستشفى

تم تنفيذ هذه الدراسة بطريقة الدراسة الوصفية في الفتره مابين ديسمبر 2016الى فبراير 2017 .

-ومن خلال هذه الدراسة تبين ان 75.6% من الكادر الصحي لم يتلقى التدريب الكافي عن الحقن الامن .وقد انعكس ذلك في الممارسة الخاطئه للكادر الصحي تجاه منطقة الوخز الابري بنسبة 44.4% والبعض الاخر بنسبة 22.2% . كما ان نسبة 97.2% منهم لا يقومون بتبليغ ادارة المستشفى عند تعرضهم للوخز الابري. ونسبة 53.8% من الكادر الصحي يعانون من عدم توفر صناديق الحقن الامن بالاقسام التي يعملون بيها بصوره دائمه وليس لديهم ادنى معلومه عن سياسات الحقن الامن التي يجب اتباعها . نسبه 90% من الكادر الطبي لديهم معرفه جيده عن ان الحقن غير الامن يؤدي الى انتشار الايدز والكبد الوبائي . 25.3% فقط من الكادر الطبي اكملو جرعات تطعيم الكبد الوبائي.

ولذلك اوصي بتعميم سياسات الحقن الامن على جميع الاقسام وتدريب الكادر الطبي على سياسات الحقن الامن في مستشفى الرباط الجامعي ومتابعة الكادر الطبي والتأكد من تلقيهم جرعات تطعيم الكبد الوبائي كامله.

Chapter One

-Introduction

-Problem statement

-Justification

-Objectives

1. Introduction:

Mathematical modeling of available epidemiological data suggests that each year unsafe injection practices are responsible for 8 to 16 million people contracting hepatitis B virus (HBV), 2.3 to 4.7 million people contracting hepatitis C virus (HCV), and 80 000 to 160 000 people contracting human immunodeficiency virus (HIV) worldwide. In most cases, the transmission of these agents goes unrecognized because the infection is initially subclinical (1). Globally, it has been estimated that unsafe injections cause about 1.3 million deaths annually (2). In most developing countries, unsafe injections occur routinely, posing a significant potential threat for the transmission of blood borne pathogens such as Hepatitis B, C and HIV (2,3). In 2000, the World Health Organization (WHO) estimated that contaminated injections might have caused 250 000 HIV infections among injection recipients and 1000 among injection providers (4). In developing countries it is estimated that 20%–50% of all injections administered are unsafe or done with re-used syringes (2). In addition, in some countries of the WHO Eastern Mediterranean Region like Egypt and Pakistan, unsafe injections have been a significant mode of transmission responsible for the introduction of HCV (5,7). Unsafe injection practices not only harm the patient but also carry risks to the health care workers (HCWs). Needle stick injury (NSI) is commonly encountered by the provider. About thirty different infectious diseases can be transmitted by NSI(8) among which the chances of acquiring hepatitis B infection is much higher than other infections. Unfortunately, in developing countries, less number of HCWs are vaccinated against Hepatitis B(9) and they work in adverse conditions

where occupational hazards are very high compared to western countries⁽¹⁰⁾.

A safe injection is one that, "does not harm the recipient (patient), does not expose the provider (HCWs) to any avoidable risk and does not result in waste that is dangerous for the community^(11, 12). Hence, safe injection practice involves administration of rational injection by a qualified and well trained person using a sterile device (syringe, needle etc), adopting sterile technique, and discarding the used devices in a puncture-proof specially designed container for appropriate disposal. Any breach in the process makes the injections extremely unsafe and hazardous to HCWs (provider) as well⁽¹²⁾. In order to achieve safe injection practice, Government of Nepal has been trying to deliver health care services by mobilizing qualified health personnel, ensuring availability of sufficient quantity of sterile devices including auto-disable syringe for immunization and safety boxes (puncture-proof specially designed container for appropriate disposal of syringes) . Auto-disable syringe are manufactured in such a way that they cannot be reused. They include a mechanism to immobilize the plunger or block the needle or cause the syringe to leak when a second injection is attempted. The needle is also fixed permanently in the syringe to prevent the reuse of the needle as well⁽¹³⁾. Mission hospitals play an integral role in healthcare provisions for the people. In such settings, the HCWs are exposed to a lot of sharps as they are primarily responsible for the administration of parenteral medications including some intravenous drugs as well as minor surgical procedures like wound suturing and episiotomies. No evidence-based guidelines are available to guide injection providers through the steps they should follow

to prevent injection-associated infections. Thus, WHO asked a development group and a steering group to develop best practices for use of safe injections using WHO –re commended process to formulate evidence –based guidelines.(7,8)

in order to reduce or eliminate the hazard of occupational exposure to blood borne pathogens , an employer must implement an exposure control plan for the worksite with details on employee protection measure . the plan must also describe how an employer will use engineering and work practice control, personal protective equipment and clothing, employee training, hepatitis vaccination(6,5) Hence it becomes all the more pertinent to reinforce safe injection practices amongst the medical personnel. Medical interns who begin their clinical career after completing their graduation are exposed to blood and blood products in various settings like immunization sessions, drawing blood samples, assistance during surgery, conducting deliveries, and so forth. It is important that they are fully aware of safe injection practices and related biomedical waste management. Even before starting their internship, medical students face similar type of exposures during their clinical postings in the departments of obstetrics and gynecology, medicine, surgery, accident and emergency, orthopedics, pediatrics, and so forth, thus making them vulnerable to deadly infections. Thus, safe injection practice is critically important and its lack poses a major occupational health hazard for health care professional Knowledge and practice(9).

1.1 problem statement:

- More than 50 outbreak of viral and bacterial infections occurred in the united states during 1998-2014 because of these unsafe injection practices and knowledge .these outbreak resulted in the transmission of hepatitis B virus ,HCV, and bacterial pathogens to more than 700 patient.(12)
- While in developing countries like Sudan it is estimated that 20%–50% of all injections administered are unsafe or done with re-used syringes with poor knowledge and practices(12) . with insufficient researches about the safe injection in Sudan.

1.2 justification

Unsafe injections practices and poor knowledge toward injection safety (especially needle and syringe reused are common place in developing country health setting) in hospitals of Sudan most of health care workers they are not following polices and proper practices related to safety injection which can lead to needle stick injury and introducing high risk of blood borne pathogens.

1.3 objectives

1.3.1 General:

To assess the knowledge and practice of health care workers towards injection safety in 8 departments at National Ribat University hospital.

1.3.2 Specific

1.3.2.1 To determine the knowledge of health care workers about:

-The injection safety polices in the hospital.

-The reporting to the hospital administration after the needle stick injury.

-The diseases transmitted through the needle stick injury.

1.3.2.2 To identify the practice of health care workers regarding the following procedures related to safety injection:

- Proper hand hygiene.

-Cleaning the skin of the patient with an antiseptic solution.

-Recap the used needles and syringes.

-The action of HCWs toward the prick site post injury.

- If the injections are prepared using aseptic technique in clean area.

- Did the HCWs immediately disposed needles in appropriate sharp containers.

-If Sharp containers are replaced when the fill line reached.

1.3.2.3 To determine the vaccination status of HCWs.

1.3.2.4 To identify the availability of safety boxes permanently in their departments.

Chapter Two

- Literature review
- Pervious studies

2. Literature Review

1. Introduction

Unsafe injection practices are an international issue. With an estimated 16 thousand million injections administered annually in developing and transitional countries alone, the importance of promoting safe injection practices is unprecedented. Over the past few decades' failures to follow safe injection practices have burdened many developing as well as developed countries with outbreaks of infectious diseases. Although the exact global burden of disease resulting from unsafe injections is difficult to measure, 40% of all injections are believed to be unsafe while in some countries the proportion is as high as 70%. Globally, approximately 3-4 injections per person per year are administered. As such, the danger of contaminated needles and syringes put thousands of millions of people at risk of contracting blood borne pathogens including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). The WHO strategy for the safe and appropriate use of injections worldwide has four objectives: (1) formulating national policies and plans for the safe and appropriate use of injections, (2) ensuring quality and safety of injection equipment, (3) facilitating equitable access to injection equipment and (4) achieving appropriate, rational and cost effective use of injections. This strategy is an integral part of the strategies of the Department of Health Policy, Development and services. We can identify four main problems which make injections potentially dangerous for the patient, the health care worker and the community at large, (when sharps waste is not safely collected and disposed. (21,22)

-injection is regarded as a powerful tool to heal disease, especially in developing countries. Patients are pleased and may feel that they have obtained the best care when they are administered injections. Health workers get financial and status rewards by using injections. Hence a mutually reinforcing cycle exists between the patient and the injection provider which is responsible for frequent use of injections.(20,21)

-In developing countries, injections are provided by various sectors which are divided as follows:

1. Formal sector consisting of doctors, nurses and other health care workers (HCWs) who are trained for providing injections and have legal right to provide the same. This sector can easily be influenced by regulatory bodies and it is easy to implement state policies. Most of the useful injections are provided by this sector but they might also sometime be involved in administering unnecessary injections.(20)
2. Informal sector which includes traditional healers, doctors, medical shop keepers etc. They are not well trained to administer injections and have no legal rights to inject the same. They often live close to the community (clients), are easily approachable by the people and provide service round the clock. Their direct charges for the service are usually low and are generally paid after the result of the treatment is known. This sector is recognized by the state through associations. Except a few, most of the injections provided by them are unnecessary and/or unsafe.(20)
3. Illegal (Quacks) sector comprises of individuals who provide injections for financial benefit. They have no sanction and training for injections and are not identified by the state. They are mostly self-taught or learn the procedure

working under another person. The state finds it difficult to identify and control them. The injections provided by them are unnecessary and unsafe.⁽²⁰⁾

4. Domestic sector: The injections are administered by relatives or neighbors and generally payment is not involved. They are also difficult to identify and be influenced by the state.⁽²⁰⁾

2. Unsafe practices include, but are not limited to, the following prevalent and high –risk practices:

1. Re-use of injection equipment:

To administer injections to more than one patient, including reintroduction of injection equipment into multi-dose vials, re-use of syringe barrels or of the whole syringe, informal cleaning with re-use and other practices. These practices are often ingrained and believed to be safe, but in reality they lead to the transmission of blood borne viruses such as HIV, HBV, and HCV, as well as bacterial infections and abscesses at the injection site. In 2000, at the start of the WHO Injection Safety Program and of the Safe Injection Global Network (SIGN), WHO estimated that 40% of the 16 billion injections were given with re-used injection equipment, leading to 21 million new HBV cases (32% of all new cases), 2 million new HCV cases (40% of all new cases) and around 260 000 HIV cases (5% of all new HIV cases). Other diseases can also be transmitted through the re-use of injection equipment e.g. viral hemorrhagic fevers, such as Ebola and Marburg.⁽²¹⁾

2. Accidental needle-stick injuries (NSIs).

in health care workers (HCWs) which occur while giving an injection or after the injection, including handling infected sharps before and after disposal. Certain practices considered high risk for HCWs, such as recapping contaminated needles, are associated with NSIs and have frequently been observed during surveys on injection practices using WHO's Injection Safety Assessment Tool .in 2003, who published the burden of diseases from NSIs in HCWs which showed that there were 3 million accidental needle-stick injuries leading to 37% of all new HBV cases in HCWs, 39% of new HCV cases and around 5.5% of new HIV cases.(21)

3. Over-use of injections.

for health conditions where oral formulations are available and recommended as the first line treatment. demand for and prescriptions of inject able medicines that are inappropriate include overuse of antibiotics, use of unnecessary inject-table products such as certain vitamins, moving directly to second-line inject-table treatments and others. Some of these issues are addressed through other WHO interventions to promote a rational and responsible use of medicines, and specific initiatives to combat overuse of antibiotics. Such initiatives use information and communication campaigns to target both HCWs and communities to decrease inappropriate demands for medicines, including inject-table medicines. Similarly, and in support of the guidance in this document, WHO will embark on an injection safety global campaign targeting both HCWs and communities as a means of decreasing demand for and over-prescription. (21)

4. Unsafe sharp waste management:

Putting HCWs, waste management workers and the community at large at risk of needle-stick injuries and subsequent blood borne infections. Unsafe management of sharps waste includes incomplete incineration, disposal in open pits or dumping sites, leaving used injection equipment in hospital laundry and other practices that fail to secure infected sharps waste. In some cases, used injection equipment is removed from open waste pits by people who scavenge through waste and then wash, repackage and resell the equipment as new. These issues will be covered by the recommendations made in this document to procure sufficient safety boxes for the containment of all safety-engineered devices, as well as through the global injection safety campaign to implement and adapt the recommendations to each country context. RUP and SIP syringes, especially in curative services, are the focus of the recommendations contained in this document, along with the provision of sharps waste management equipment. As above, reducing inappropriate demand will be addressed separately through other WHO initiatives.⁽²¹⁾

As part of a comprehensive package of interventions to ensure safe and rational use of injections – including communication and behavior change strategies, supportive policies and provision of sufficient quantities of the appropriate injection equipment – WHO has analyzed the potential contribution of safety-engineered syringes in reducing the problem of re-use and preventing needle-stick injuries. Safety syringes are well established and available in global markets. Official performance requirements and definitions have been added and developed over time, beginning with AD syringes for immunization in 1990 and progressing to models with re-use prevention in 2006 and sharps injury protection features in 2012. The International Organization for Standardization (ISO)

has well defined requirements for producers of these products related to performance and fitness for purpose of safety syringes. This document references safety syringes according to their ISO definition to provide an exact definition of the safety mechanism of each type of syringe and allow a common understanding between all guideline readers. The ISO definitions also provide guidance for procurers in determining the specifications and minimum standards for performance of safety-engineered devices for the selection of appropriate devices (21).

A new study published in 2013 by Pepin et attempted to document the impact of all these global efforts by measuring the variation between 2000 and 2010 of the two key injection safety indicators, which are the number of injections per person per year and the re-use rate of injection equipment. The key findings of this study show that from 2000 to 2010, in LMICs, the average number of injections per person per year has decreased by 15% from 3.4 to 2.9 but two WHO sub-regions saw an increase (Americas Region B and Western Pacific Region B). The proportion of re-use of injection equipment decreased by 86% from 39.6% to 5.5%. This decrease was seen in all but two sub-regions (Americas Region B and European Region B). Such progress in injection practice is due to global multifaceted interventions developed and implemented worldwide, including the policy which supports the introduction of auto-disable syringes for immunization injections and the introduction of injection safety into therapeutic programs in PEPFAR-funded countries. Safety-engineered syringes with different mechanisms, including those which prevent re-use and/or needle-stick injuries, have been available on the international market since 1990 for AD syringes and 2004 for RUP and SIP models. Some models are similar in cost to standard single-use

syringes, while others, depending on the technical complexity of the safety mechanism, are up to five times more expensive, which can be prohibitive for some LMICs. The definitions of safety features established by the ISO are important in understanding the various types of syringes available for different injection procedures. While research and development may yield additional product definitions in the future, it is important that syringes procured and distributed are certified against ISO standards or other internationally recognized standards to ensure their performance and quality. AD syringes (auto disposable syringes) for immunization sterile hypodermic syringes for single use. RUP syringes (re use prevention feature) for therapeutic injection. SIP (syringes with sharp injury protection feature) recommended as opposed to devices without a sharp injury protection feature by HCWS delivering intramuscular, subcutaneous, or intra-dermal inject-table medication to the patient.⁽²²⁾

- Adoption of safety-engineered syringes is absolutely critical to protecting people worldwide from becoming infected with HIV, hepatitis and other diseases. This should be an urgent priority for all countries,” says Dr Gottfried Herschel, Director of the WHO HIV/AIDS Department. The new “smart” syringes WHO recommends for injections into the muscle or skin have features that prevent re-use. Some models include a weak spot in the plunger that causes it to break if the user attempts to pull back on the plunger after the injection. Others have a metal clip that blocks the plunger so it cannot be moved back, while in others the needle retracts into the syringe barrel at the end of the injection⁽²²⁾.

3. Blood borne diseases through unsafe injection:

Blood borne pathogens are infectious microorganisms in human blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV). Needle sticks and other sharps-related injuries may expose workers to blood borne pathogens. Workers in many occupations, including first responders, housekeeping personnel in some industries, nurses and other healthcare personnel, all may be at risk for exposure to blood borne pathogens. In order to reduce or eliminate the hazards of occupational exposure to blood borne pathogens, an employer must implement an exposure control plan for the worksite with details on employee protection measures. The plan must also describe how an employer will use engineering and work practice controls, personal protective clothing and equipment, employee training, medical surveillance, hepatitis B vaccinations, and other provisions as required by OSHA's Blood borne Pathogens Standard. Engineering controls are the primary means of eliminating or minimizing employee exposure and include the use of safer medical devices, such as needleless devices, shielded needle devices, and plastic capillary tubes.⁽²³⁾

A. Hepatitis B virus:

Hepatitis B is a potentially life-threatening liver infection caused by the hepatitis B virus. It is a major global health problem. It can cause chronic infection and puts people at high risk of death from cirrhosis and liver cancer. Hepatitis B prevalence is highest in sub-Saharan Africa and East Asia, where between 5–10% of the adult population is chronically infected. High rates of chronic infections are also found in the Amazon and the southern parts of eastern and central Europe. In the Middle East and the Indian subcontinent, an estimated 2–5% of the general population is chronically infected. Less than 1% of the population of Western Europe and North America is chronically infected⁽²³⁾

-Post exposure Prophylaxis to Prevent Hepatitis B Virus Infection

- HBsAg-Positive Exposure Source:

- Persons who have written documentation of a complete hepatitis B vaccine series and who did not receive post vaccination testing should receive a single vaccine booster dose.
- Persons who are in the process of being vaccinated but who have not completed the vaccine series should receive the appropriate dose of hepatitis B immune globulin (HBIG) and should complete the vaccine series.
- Unvaccinated persons should receive both HBIG and hepatitis B vaccine as soon as possible after exposure (preferably within 24 hours). Hepatitis B vaccine may be administered simultaneously with HBIG in a separate injection site. The hepatitis B vaccine series should be completed in accordance with the age-appropriate vaccine dose and schedule. ⁽²³⁾

Exposure Source with Unknown HBsAg Status:

- Persons with written documentation of a complete hepatitis B vaccine series require no further treatment.
- Persons who are not fully vaccinated should complete the vaccine series.
- Unvaccinated persons should receive the hepatitis B vaccine series with the first dose administered as soon as possible after exposure, preferably within 24 hours. The vaccine series should be completed in accordance with the age-appropriate dose and schedule⁽²³⁾.

- Recommended PEP for exposure to HBV.

	Treatment of Exposed Workers*		
Vaccination and Antibody Response Status of Exposed Workers*	Source HBsAg Positive	Source HBsAg Negative	Source Unknown or Not Available for Testing
Unvaccinated	HBIG [†] × 1 and initiate hepatitis B vaccine series	Initiate hepatitis B vaccine series	Initiate hepatitis B vaccine series
Previously vaccinated Known responder [‡]	No treatment	No treatment	No treatment
Known no responder [§]	HBIG × 1 and initiate revaccination or HBIG × 2[¶]	No treatment	If known high-risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs [¶] 1. If adequate, [‡] no treatment is necessary 2. If inadequate, [§] administer HBIG × 1 and initiate 2nd vaccine series	No treatment	Test exposed person for anti-HBs 1. If adequate, no treatment is necessary 2. If inadequate, administer 2nd vaccine series.

B. HIV POST EXPOSURE PROPHYLAXIS:

Post-exposure prophylaxis, or PEP, is another name for emergency HIV treatment. PEP is not a cure for HIV, it is a form of HIV prevention. It is a short course of antiretroviral drugs that stops exposure to HIV from becoming a life-long infection.⁽²⁴⁾

- PEP can cause side effects such as nausea and fatigue. **DO NOT** stop taking PEP - talk to your healthcare professional.
- PEP must be taken as soon as possible to be effective and no later than 72 hours after exposure to HIV.
- PEP must be taken at the same time every day for 4 weeks.

Usually you should only take PEP if...

- It has **not** been longer than 72 hours since exposure to HIV
- you are not already living with HIV
- A mucous membrane (including: eyes, mouth, vagina, rectum) has had direct contact with someone's bodily fluid that might be infectious
- An open wound has had direct contact with someone's bodily fluid that might be infectious
- The source of exposure is infected with HIV or their HIV status is unknown.

It's normal to feel anxious about being infected with HIV. Don't let being worried stop you from getting an HIV test.

- If you took PEP - get tested 3 and 6 months after potential exposure.
- If you didn't take PEP - get tested 3 months after potential exposure.

- Post-exposure prophylaxis, or PEP, is another name for emergency HIV treatment. PEP is not a cure for HIV, it is a form of HIV prevention. It is a short course of antiretroviral drugs that stops exposure to HIV from becoming a life-long infection(24).

- Recommended HIV PEP for mucous membrane exposures and non intact skin exposures.

Exposure Type	Infection Status of Source				
	HIV Positive, Class 1†	HIV Positive, Class 2‡	Source of HIV Unknown Status§	Unknown Source ^l	HIV Negative
Small volume	Consider basic 2-drug PEP [#]	Recommend basic 2-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP [#] for source with HIV risk factors ^{**}	Generally, no PEP warranted; however, consider basic 2-drug PEP [#] in settings in which exposure to HIV-infected persons is	No PEP warranted

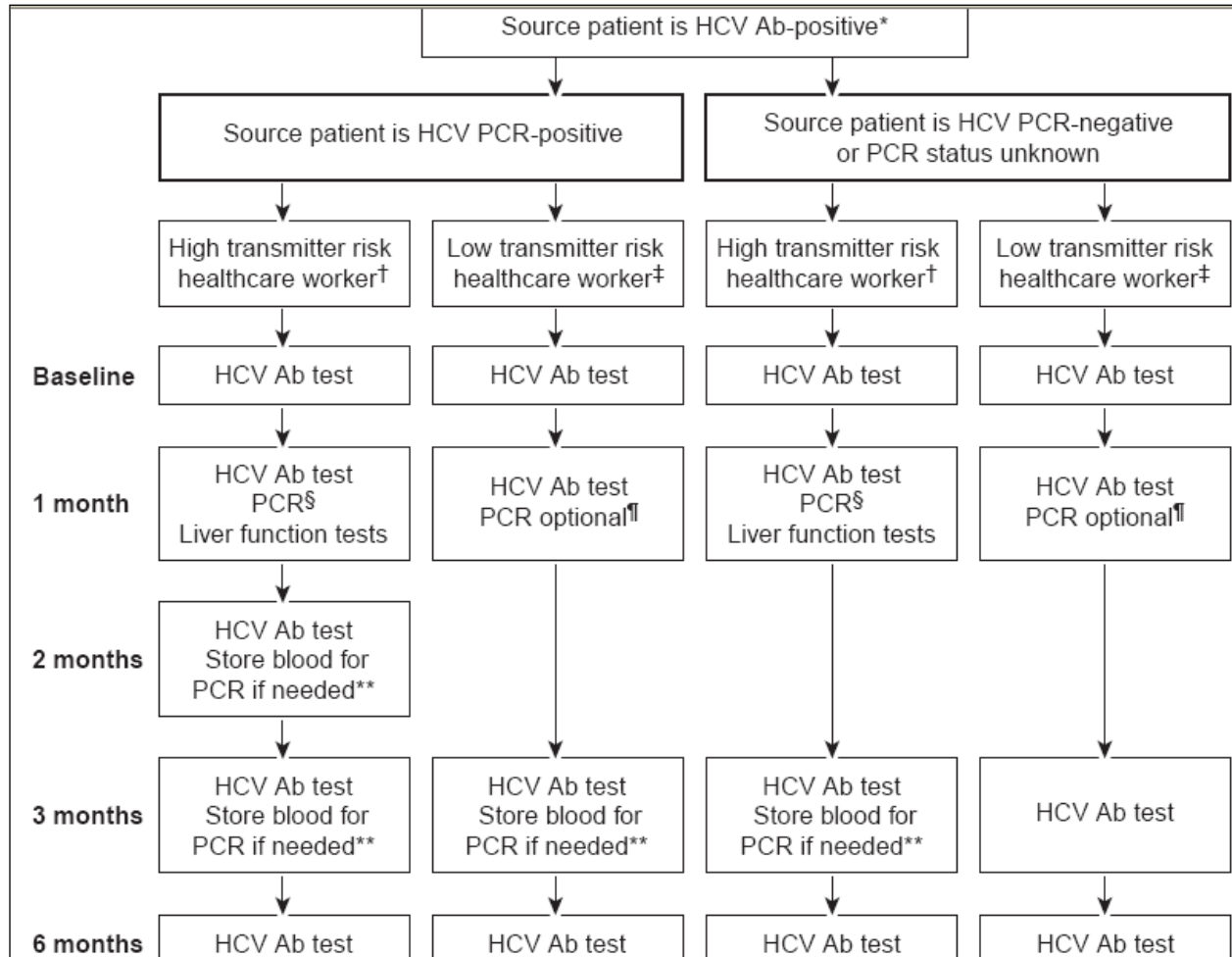
				likely	
Large volume ^{††}	Recommended basic 2-drug PEP	Recommended expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP [#] for source with HIV risk factors ^{**}	Generally, no PEP warranted; however, consider basic 2-drug PEP [#] in settings in which exposure to HIV-infected persons is likely	No PEP warranted

Hepatitis C Post-exposure Management

At time of exposure:

- Determine the type of exposure and assess the associated risk.
- Wash wounds with soap and water; flush mucous membranes with water.
- No post-exposure prophylaxis (immune globulin or antiviral medications) is recommended.
- Counsel the exposed person regarding hepatitis C transmission risk.
- Test source and exposed individual for hepatitis C virus antibody and liver enzymes for exposed individual.
- If source is not available or refuses testing, treat exposed person as if source has active hepatitis C infection.
- If source is hepatitis C virus antibody positive, or is antibody negative and is immunocompromised, test source for qualitative HCV RNA.
- If source is negative for hepatitis C antibody (and HCV RNA, if indicated), no further
- Testing is necessary and no further action beyond initial HCV testing is necessary for the exposed person. If source is positive for hepatitis C antibody and HCV RNA, and exposed person is negative, follow up of exposed person should be done.⁽²⁰⁾

Proposed protocol for follow-up of HCWs after needle stick injury involving a patient with HCV infection:



4. Interventions and challenges for safe injection practices:

Transmission by unsafe inject-table use can be assumed to be increasing. Hence, successful interventions to improve injection practices are the need of the hour, especially in developing countries. Successful implementation requires understanding of the complexities and challenges of the practice. Injection safety is a complex problem requiring involvement of many stakeholders from the individual public to local, state and national governments. Injection safety interventions should combine educational, managerial and regulatory strategies for better results. This integrated approach is cost effective as well and should be considered while planning interventions .(20)

A. Educational strategy.

The educational strategy should mainly focus on the general population (recipient) and HCWs (providers). The intervention planner should know “what the injection means to the community?” and obtain best available evidence of the practice before initiating the strategy. The strategy should target the general population through radio and television advertisements and HCWs through practical training in providing injections.

The strategy for the general population should focus on activities which would make the recipients aware about safe practices so that they would demand for useful and safe injections only. Care should be taken that educational strategies do not adversely affect the use of useful injections such as vaccine, contraceptive and other rational injections. The strategies devised for HCWs should focus on

identifying high risk procedures (like needle recapping, reusing syringe repeatedly by changing the needle, waste segregation, use of multi dose vial etc.)_and methods (like avoiding needle recapping, waste segregation at the point of generation, reducing use of multi dose vial etc.) to avoid hazards of unsafe injection practice. Providing more time to patient and communicating about disease and its rational treatment with emphasis on oral formulations by HCWs also helps to minimize unnecessary injections⁽²⁰⁾.

B. Managerial strategy

Well trained and well intentioned HCWs cannot practice safely unless their working environment is favorable. So, organizational commitment to safe injection practice and healthcare worker safety is essential_and managerial strategies should be directed towards achieving the same. The interventions are not very expensive and even resource constrained hospitals can practice safe injections. This can be achieved by promoting a climate of safety and targeting high-risk areas and practices. Creating a climate of safety includes formation of an infection control committee, ensuring an adequate supply of quality disposable injecting devices and sharps containers at affordable prices, promoting injection safety awareness, vaccination of workers against Hepatitis B and supervising workers with low education levels. Training in safe injection practice for both injection providers and waste handlers can be planned.⁽²⁰⁾

C. Regulatory strategy

It is challenging for a hospital to practice injection safely without support from local, state and national governments. The regulatory strategies of the government should be multidisciplinary addressing policies and systems, smooth and sufficient

availability of quality injectable equipment's, and arrangements for disposal of injection equipment's. Continuous availability of sufficient quantities of injection equipment (including safety boxes) in all health facilities is the key to successful intervention.

To make the intervention effective and affordable, it can be combined with other program like HIV/AIDS, vaccination program, family planning etc., the planned interventions should be implemented simultaneously in the community and health system for positive results. In the health system, all sectors (formal, informal, illegal and domestic) should be targeted simultaneously. System for monitoring the policies should also be included. When a combination of activities was implemented in the Syrian Arab Republic, the injection practice improved significantly. The feedback shows that rapid improvement in injection safety is possible. The change can be sustained by safe injection guidelines, regular supervision and nomination of a person responsible for waste management. In developing countries, people may cooperate in implementation of practical measures to ensure injection safety rather than giving up injections (which they regard as a powerful method of healing). Hence, ensuring administration of safer injection is easier and more effective than reducing the number of unnecessary injections. Overuse of injections can only be addressed by changing the prescribing habits of injection prescribers/providers which can be done if interventions are targeted at lower level HCWs with an alternative to injections being provided. If the informal injection providers are providing a lifesaving injection unsafely, rather than stopping them from providing the same they can be trained in safe injection practices.⁽²⁰⁾

Auto-disable syringe has a mechanism to immobilize the plunger or block the needle or cause the syringe to leak when a second injection is attempted hence it

cannot be reused. The needle is also fixed permanently in the syringe to prevent the reuse of the needle as well. Mandatory use of auto-disable syringes for vaccination is a good step for ensuring injection safety. But associated cost and safe disposal is a serious limitation for developing countries. Although auto-disable syringe cannot be reused, the exposed needle can be risky. Moreover, disposal of auto-disable syringe is also a challenge in developing countries where the infrastructure for disposal is lacking. Despite the growing awareness about the need of safe health care waste management (including disposal of injectable), compliance is lacking. So, pros and cons of each intervention, in context to the implementation region and resources should be analyzed before implementation. The healthcare workers (front line workers) should be actively involved in the planning, implementation and evaluation of new technologies and other changes in the practice, for the practical and successful implementation.⁽²⁰⁾

5. Best practices for injection:

Best injection practices described are aimed at protecting patients, health workers and the Community.

A. General safety practices:

Practices that are recommended to ensure the safety of injection and related practices.

- hand hygiene.
- gloves where appropriate
- Other single-use personal protective equipment.
- Skin preparation and disinfection.

1. Hand hygiene:

Hand hygiene is a general term that applies to either hand washing, antiseptic hand wash, antiseptic hand rub or surgical hand antisepsis. Hand hygiene should be

carried out as indicated below; either with soap and running water (if hands are visibly soiled) or with alcohol rub (if hands appear clean).

Practical guidance on hand hygiene:

Perform hand hygiene BEFORE:

- starting an injection session (i.e. preparing injection material and giving injections);
- coming into direct contact with patients for health-care related procedures;
- putting on gloves (first make sure hands are dry).

Perform hand hygiene AFTER:

- An injection session;
- Any direct contact with patients;
- removing gloves.

You may need to perform hand hygiene between injections, depending on the setting and whether there was contact with soil, blood or body fluids. Avoid giving injections if your skin integrity is compromised by local infection or other skin conditions (e.g. weeping dermatitis, skin lesions or cuts), and cover any small cuts (26)

2. Gloves:

Health workers should wear non-sterile, well-fitting latex or latex-free gloves when coming into contact with blood or blood product.

Other single-use personal protective equipment:

Masks, eye protection and other protective clothing ARE NOT indicated for the injection procedures covered by this document unless exposure to blood splashes is expected.(26)

B .Practical guidance on skin preparation and disinfection:

-To disinfect skin, use the following steps.

1. Apply a 60–70% alcohol-based solution (isopropyl alcohol or ethanol) on a single-use swab or cotton-wool ball. DO NOT use methanol or methyl-alcohol as these are not safe for human use.
2. Wipe the area from the center of the injection site working outwards, without going over the same area.
3. Apply the solution for 30 seconds then allow it to dry completely.⁽²⁶⁾

C. Injection devices and medications:

- Injection devices:

Health-care settings should ensure that an adequate supply of single-use devices is available, to allow providers to use a new device for each procedure.

-Practical guidance on use of injection devices:

When using a sterile single-use device (i.e. a syringe and hypodermic needle that is not separated or manipulated unless necessary

- use a new device for each procedure, including for the reconstitution of a unit of medication or vaccine;
- inspect the packaging of the device to ensure that the protective barrier has not been breached;
- discard the device if the package has been punctured, torn or damaged by exposure to moisture, or if the expiry date has passed. ⁽²⁶⁾

-Practical guidance on giving medications:

- When giving medication:

- DO NOT use a single loaded syringe to administer medication to several patients (i.e. ensure one needle, one syringe, one patient!);
- DO NOT change the needle in order to reuse the syringe;
- DO NOT use the same mixing syringe to reconstitute several vials;
- DO NOT combine leftover medications for later use.
- Single-dose vials
 - Whenever possible, use a single-dose vial for each patient, to reduce cross-contamination between patients.
- Multi dose vials
 - Only use multi dose vials if there is no alternative.
 - Open only one vial of a particular medication at a time in each patient-care area.
 - If possible, keep one multi dose vial for each patient, and store it with the patient’s name on the vial in a separate treatment or medication room.
 - DO NOT store multi dose vials in the open ward, where they could be inadvertently contaminated with spray or spatter.
- Discard a multi dose vial:
 - If sterility or content is compromised.
 - If the expiry date or time has passed (even if the vial contains antimicrobial preservatives);
 - If it has not been properly stored after opening;
 - Within 24 hours of opening, or after the time recommended by the manufacturer, if the vial does not contain antimicrobial preservatives;
 - If found to be undated, improperly stored, inadvertently contaminated or perceived to be contaminated, regardless of expiration date.
- Pop-open ampoules

– Whenever possible, use pop-open ampoules rather than ampoules that require use of a metal file to open. If using an ampoule that requires a metal file to open, protect your fingers with a clean barrier (e.g. a small gauze e pad) when opening the ampoule.⁽²⁶⁾

6. Preparing injections:

Injections should be prepared in a designated clean area where contamination by blood and body fluids is unlikely.

1. Keep the injection preparation area free of clutter so all surfaces can be easily cleaned.

-Practical guidance on preparing injections:

2. Before starting the injection session, and whenever there is contamination with blood or three steps must be followed when preparing injections. Body fluids clean the preparation surfaces with 70% alcohol (isopropyl alcohol or ethanol) and allow drying.

3. Assemble all equipment needed for the injection:

–sterile single-use needles and syringes;

–reconstitution solution such as sterile water or specific diluents;

–alcohol swab or cotton wool;

– sharps container.⁽²⁶⁾

-Procedure for septum vials:

Wipe the access diaphragm (septum) with 70% alcohol (isopropyl alcohol or ethanol) on a swab or cotton-wool ball before piercing the vial, and allow to air dry before inserting a device into the bottle.

- Use a sterile syringe and needle for each insertion into a multi dose vial.
- Never leave a needle in a multi dose vial.

- Once the loaded syringe and needle has been withdrawn from a multi dose vial, administer the injection as soon as possible.⁽²⁶⁾

-Labeling:

- After reconstitution of a multi dose vial, label the final medication container with:

- date and time of preparation;

- type and volume of diluents (if applicable);

- final concentration;

- expiry date and time after reconstitution;

- Name and signature of the person reconstituting the drug.

- For multi dose medications that DO NOT require reconstitution, add a label with:

- date and time of first piercing the vial;

- name and signature of the person first piercing the vial.⁽²⁶⁾

- Administering injections:

An aseptic technique should be followed for all injections.

7. Practical guidance on administering injections;

General:

- When administering an injection:

- check the drug chart or prescription for the medication and the

Corresponding patient's name and dosage;

- perform hand hygiene;

- Wipe the top of the vial with 60–70% alcohol (isopropyl alcohol or ethanol) using a swab or cotton-wool ball.

- open the package in front of the patient to reassure them that the syringe and needle. Have not been used previously;
- using a sterile syringe and needle, withdraw the medication from the ampoule or vial.

-Reconstitution:

- If reconstitution using a sterile syringe and needle is necessary, withdraw the reconstitution solution from the ampoule or vial, insert the needle into the rubber septum in the single or multi dose vial and inject the necessary amount of reconstitution fluid.
- Mix the contents of the vial thoroughly until all visible particles have dissolved.
- After reconstituting the contents of a multi dose vial, remove the needle and syringe and discard them immediately as a single unit into a sharps container.⁽²⁶⁾

-Needleless system:

- If a needleless system is available:
 - Wipe the rubber septum of the multidose vial with an alcohol swab;
 - Insert the spike into the multidose vial;
 - Wipe the port of the needleless system with an alcohol swab;
 - Remove a sterile syringe from its packaging;
 - Insert the nozzle of the syringe into the port;
 - Withdraw the reconstituted drug.

-Delay in administration:

- If the dose cannot be administered immediately for any reason, cover the needle with the cap using a one-hand scoop technique.
- Store the device safely in a dry kidney dish or similar container.

-Important points:

- DO NOT allow the needle to touch any contaminated surface.
- DO NOT reuse a syringe, even if the needle is changed.
- DO NOT touch the diaphragm after disinfection with the 60–70% alcohol (isopropyl alcohol or ethanol).
- DO NOT enter several multi dose vials with the same needle and syringe.
- DO NOT re-enter a vial with a needle or syringe used on a patient if that vial will be used to withdraw medication again (whether it is for the same patient or for another patient).
- DO NOT use bags or bottles of intravenous solution as a common source of supply for multiple patients (except in pharmacies using laminar flow cabinets)⁽²⁶⁾

8. Prevention of sharps injuries to health workers:

-Practical guidance on prevention of sharps injuries:

To avoid sharps injuries:

- ensure that the patient is adequately prepared for the procedure;
- do not bend, break, manipulate or manually remove needles before disposal;
- avoid recapping needles, but if a needle must be recapped, use a single-handed scoop technique.
- discard used sharps and glass ampoules immediately after use in the location where they were used, disposing of them into a robust sharps container that is leak and puncture resistant.
- place the sharps container within arm's reach (preferably in a secured area) to allow for:
 - easy disposal of sharps;

- seal and replace sharps container when the container is three quarters full.⁽²⁶⁾

9. Waste management:

Use of sealed, puncture and leak-proof sharps containers helps to prevent access to used devices.

-Practical guidance on waste management:

To ensure that waste is dealt with safely:

- Transport and store sharps containers in a secure area before final disposal;
- Close, seal and dispose of sharps containers when the containers are three quarters full; assign responsibility in written policy for monitoring the fill level of sharps containers and replacing them when three quarters full;
- discard waste that is not categorized as sharp or infectious in appropriate color-coded bags.
- ensure that infectious waste bags and sharps containers are closed before they are transported for treatment or disposal. ⁽²⁶⁾

Previous studies:

- There is study done about the injection safety among health care workers in Ilorin, Kwara state of Nigeria cross-sectional study among 336 PHCWs in 3 local governmental authorities in Ilorin 2012⁽¹⁴⁾

- across sectional study conducted in Jazan Saudi Arabia about the injection safety among primary health care workers from September 2011 to March 2012. 200 HCWs were recruited (29% physician, and 71% nurses).⁽¹⁵⁾

- Study done in Hodeida governorate, Yemen to determine the nature and the magnitude of unsafe injection practice the study conducted in two hospitals. Total 1600 injections were observed. 2013⁽¹⁶⁾

-Across sectional study was conducted in Gharbiya Egypt in 25 health care facilities 2005 the study revealed that there was lack of national and local infection control polices and lack of most supply needed for safe injection practice (17)

- a descriptive cross sectional study in Nepal carried out from 18 may to 16Jun 2012 using semi structured questionnaire and observation tool was done . The data were analyzed manually by summarizing, tabulating and presenting in various formats the participated in study ranged in age from 30 t0 50 with mean age of 37 years (18)

-Rapid assessment of injection practice in Cambodia 2002 among general population sample n 500 surveyed a random sample of the general population in Takeo Province and convenience samples of prescribers and injection providers in Takeo Province and Phnom Penh city regarding injection-related knowledge, attitudes, and practices. Injection providers were observed administering injections. Data were collected using standardized methods adapted from the World Health Organization safe injection assessment guidelines.(19)

Chapter Three

-Methodology

3. Methodology

3.1 study design:

Descriptive cross sectional community base study.

3.2 study area:

The study was conducted in National Ribat University Hospital located in Khartoum state in Khartoum east, the study conducted in emergency department, dialysis unit, ICU, surgery department, lap department, pediatrics department, medicine, obstetric and genecology.

3.3 Study population:

The study population including different categories of health care workers including physicians, house officers, nurses, midwives, general practitioner and lap technicians.

3.4 Study sample procedures and size:

Sample of 320 out of 712 HCWs where included in the study. The sample size was estimated by the generic equation $\frac{Z^2PQ}{d^2}$

Assuming that Z equals 1.96(a level of precision of 95%. Hence sigma equal 0.05 (a margin of error of 5%) the prevalence of knowledge about safety injection was estimated (assumed) as 28% $n = \frac{1.96 * 1.96 * 0.28 * 0.72}{0.05} = 309$

3.5 Duration of the study:

The study was conducted in the duration from December 2016 to February 2017.

3.6 Data collection tool and technique:

Data was collected by both observation and asking. An observation check list of 12 was prepared. 107 observations were conducted to assess the adherence to the standard procedures according to the checklist. A written questionnaire of 24 questions was used and assessed the knowledge and practice of injection safety. The questionnaire has been pre tested among 10 HCWs from general wards at Sharg Al Nile hospital and the questionnaires were collected, revised and some questions updated accordingly in which some of them were not clear in language.

The data was collected also through direct interview with the director and head department of infection control about the injection safety policies in the hospital, and if they are doing regular training courses for the HCWs about the injection safety.

3.7 Variable under study:

The study variables were including socio – demographic factors such as age, sex.

- Receiving training courses about the safety injection.
- The proper way for disposing sharp instruments like used needles and where they disposed it.
- The availability of written policies about safety injection in the hospital.
- Proper way for doing hand hygiene before injection.
- Did the patient skin cleaned with anti-septic solution.

-Did the health care provider recap the used needle and syringe.

-If sharp containers replace when the fill line is reached.

3.8 Data processing and analysis:

Data was reviewed, edited and entered into computer and analyzed by software program statistical package for social sciences (SPSS) V16. Some variables under study were tested using chi square test with p value less than 0.05 considering significant relation .

3.9 Data presentation:

Data was presented in simple frequency statistical tables and figures.

3.10 Ethical consideration:

The written ethical approval from National Ribat University Faculty of Post graduated and scientific research to National Ribat University Hospital was obtained.

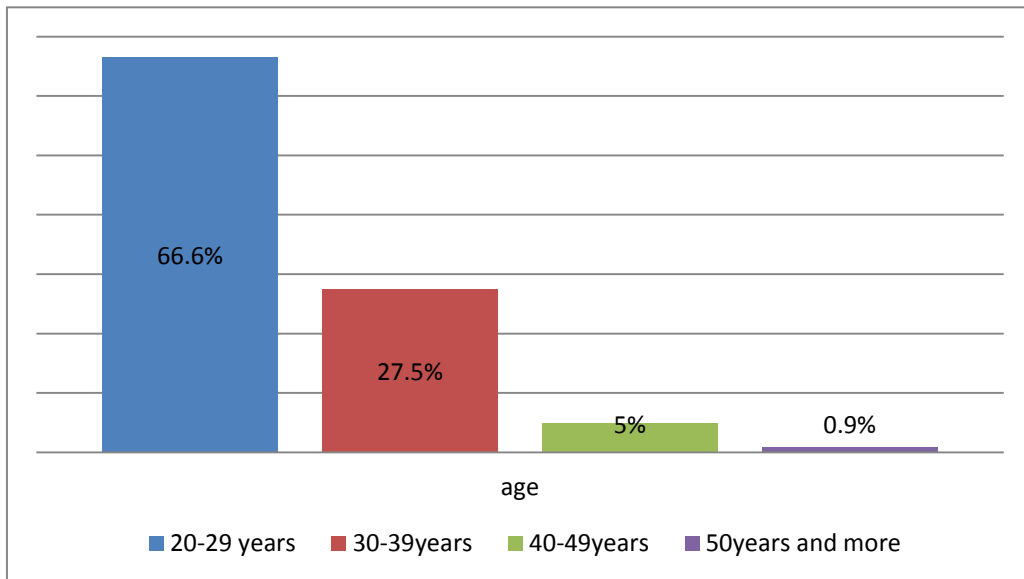
Participating was voluntary and verbal consent from health care workers was done. And the confidentiality of the data obtained was assured.

Chapter Four

-Results

4.Results

Figure (1)
Distribution of HCWs age *at NRUH December2016*
n=320

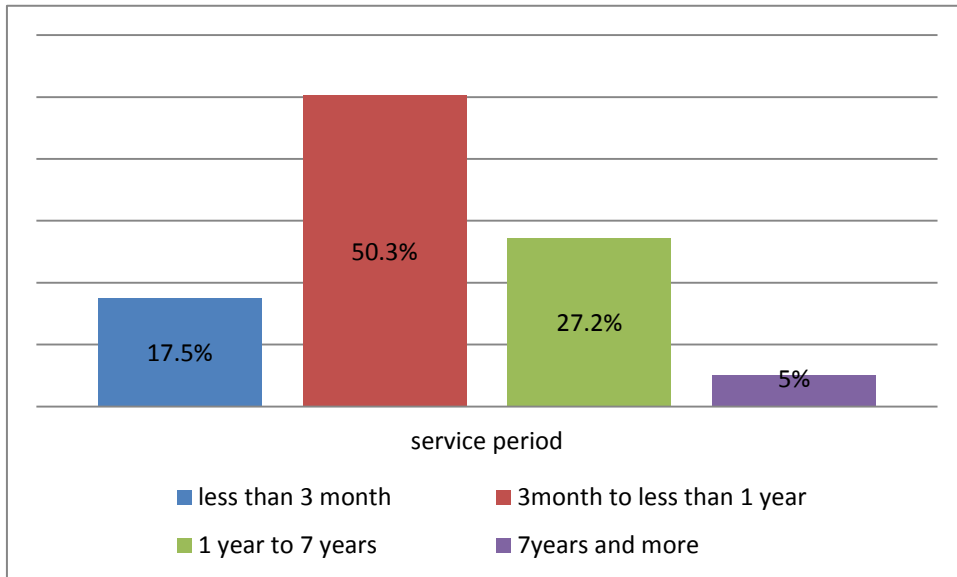


Most of the participants were between 20-29 years 66.6%

Figure (2)

Service period of health care workers *at NRUH December 2016*

n=320

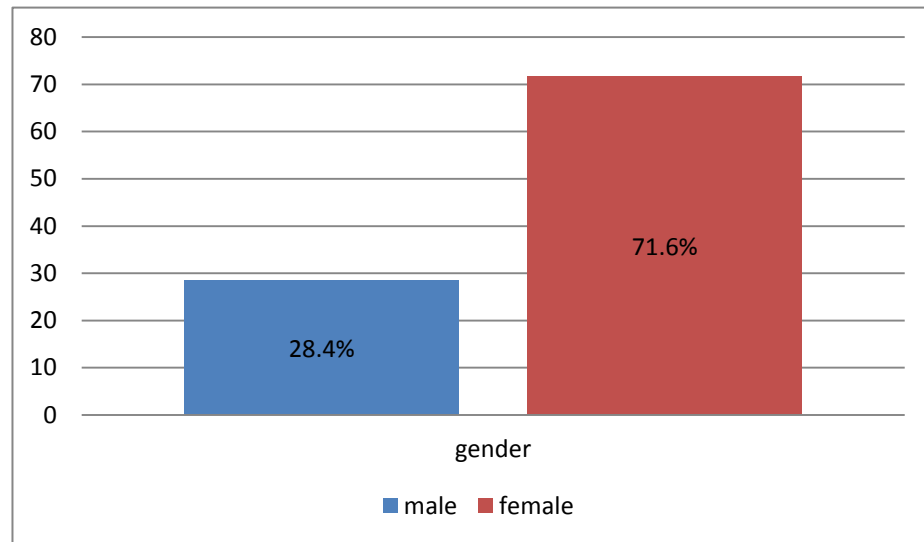


The Service period of most of them between 3 month to less than 1 year

Figure (3)

Gender distribution of Health care workers *at NRUH December 2016*

n=320

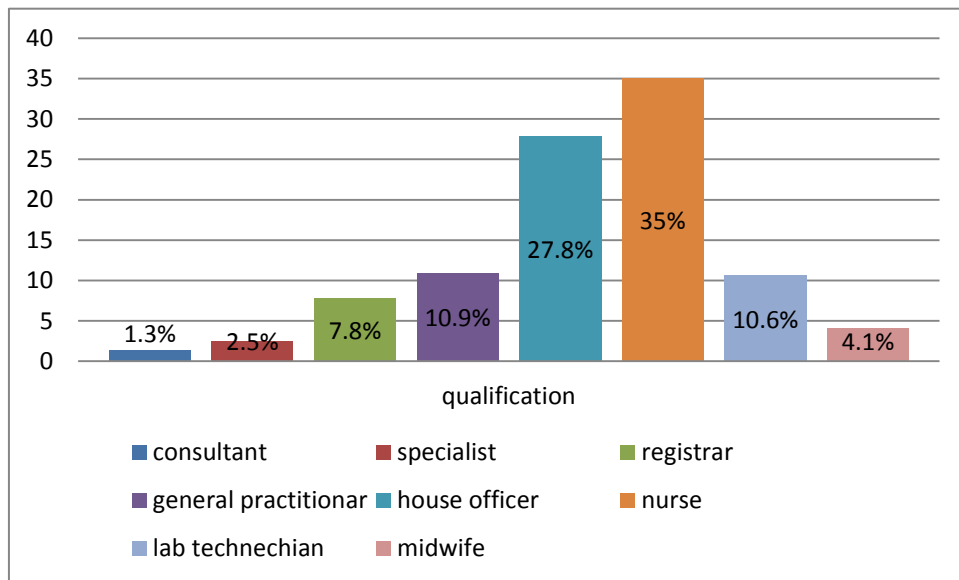


The majority were female 71.6%

Figure (4)

Qualification of HCW *at NRUH December 2016*

n=320

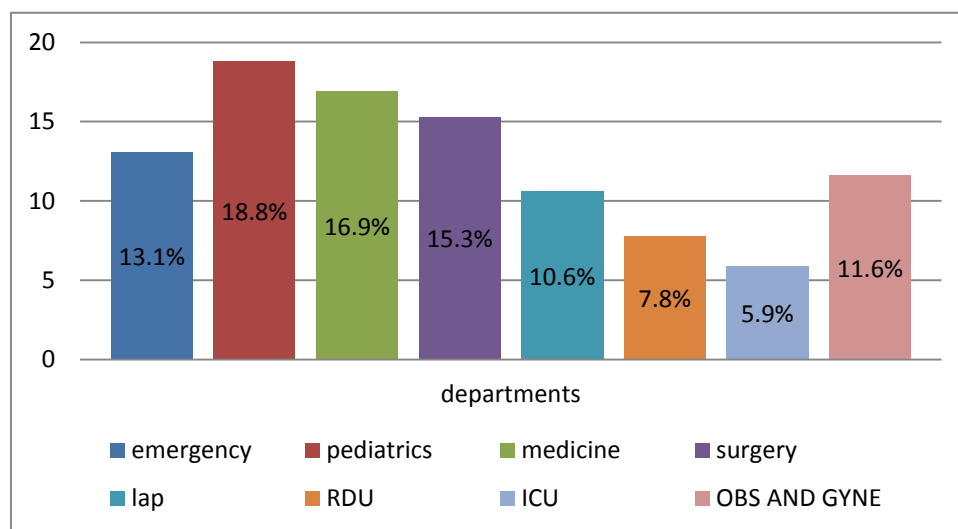


Most of the participants were nurses 35%

Figure (5)

Distribution of HCWs per departments *at NRUH December 2016*

n=320

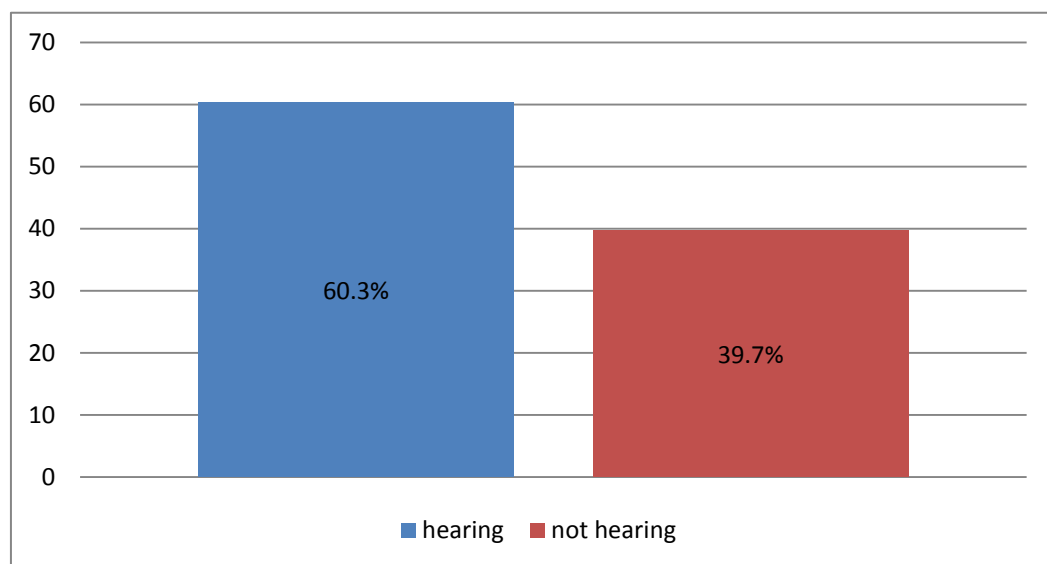


18.8% of HCWs responders were in pediatrics department

Figure (6)

Hearing of HCW about the injection safety *at NRUH December 2016*

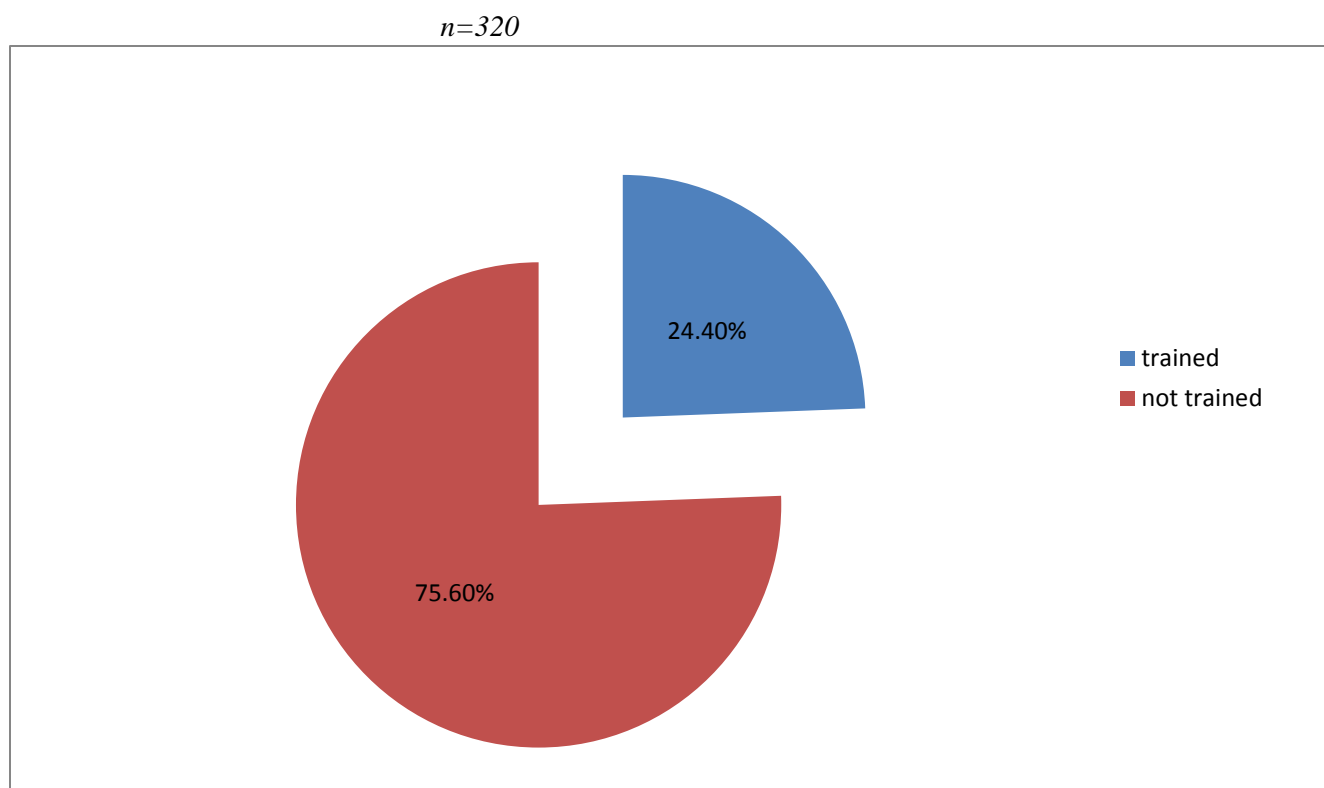
n=320



60.3% of health care workers were hearing about the injection safety.

Figure (7)

Distribution of Health care worker received training about injection safety *at NRUH December 2016*

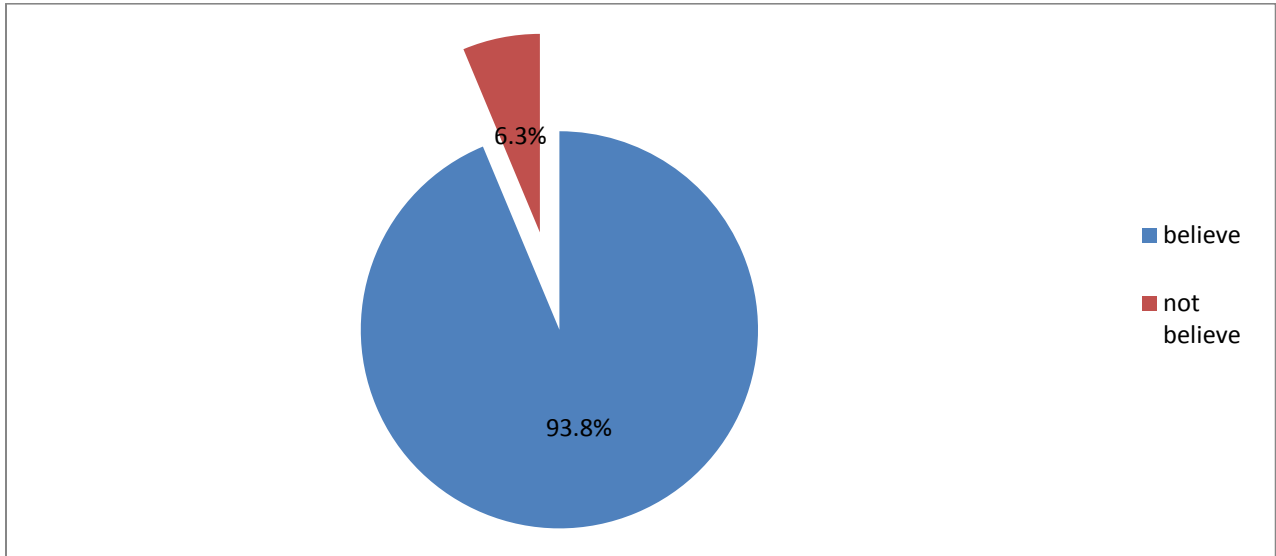


75.60% of HCWs were not trained about the injection safety

Figure (8)

Believe of HCWs about the need of injection safety *at NRUH December 2016*

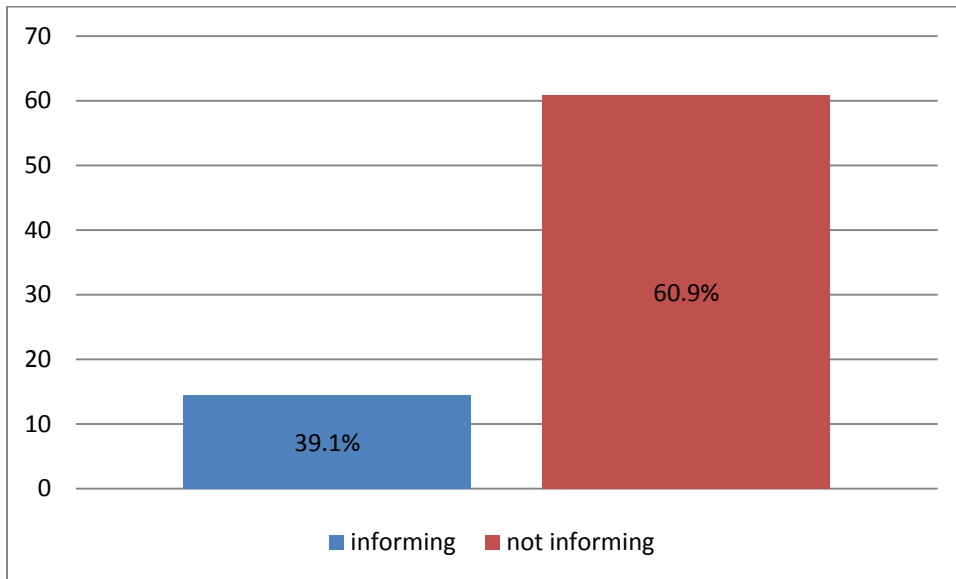
n=320



93.8% of HCWs were believe about the need of injection safety in the hospital

Figure (9A)

Distribution HCWs who informing their colleagues or teach the students about the need of injections safety *at NRUH December 2016* *n=320*

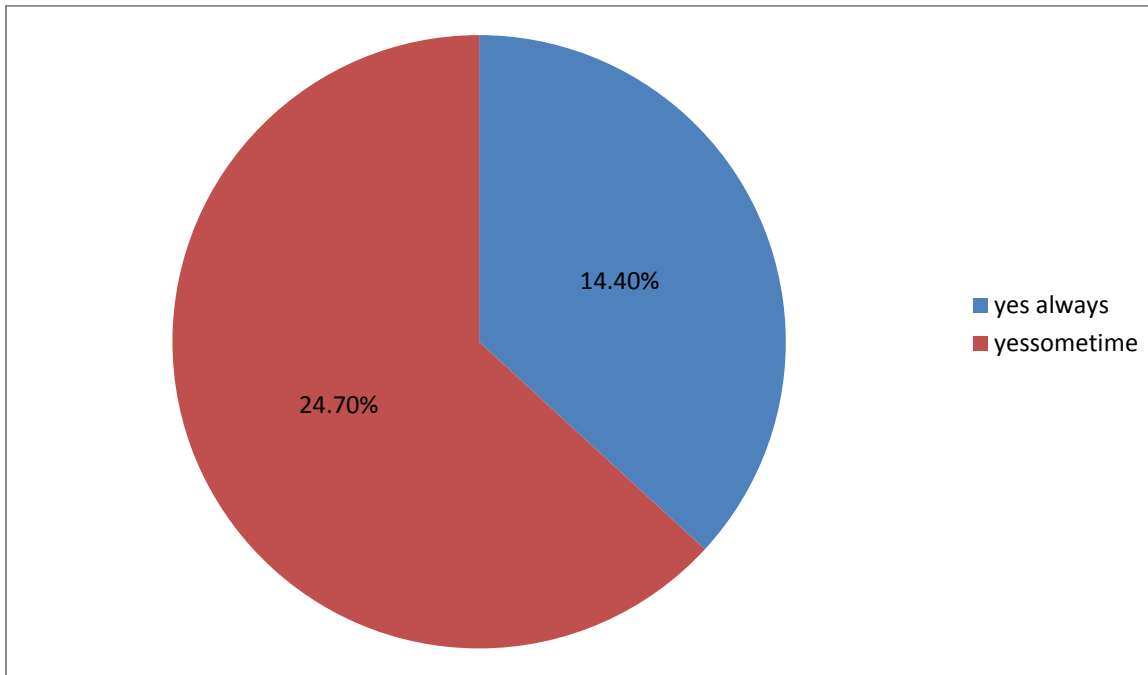


Most of the health care workers there were not informed their colleges or teach the students about the need of injection safety 60.9%

Figure (9B)

Distribution of HCWs who informing their colleagues or teach the students about the need of injections safety *at NRUH December 2016*

If yes

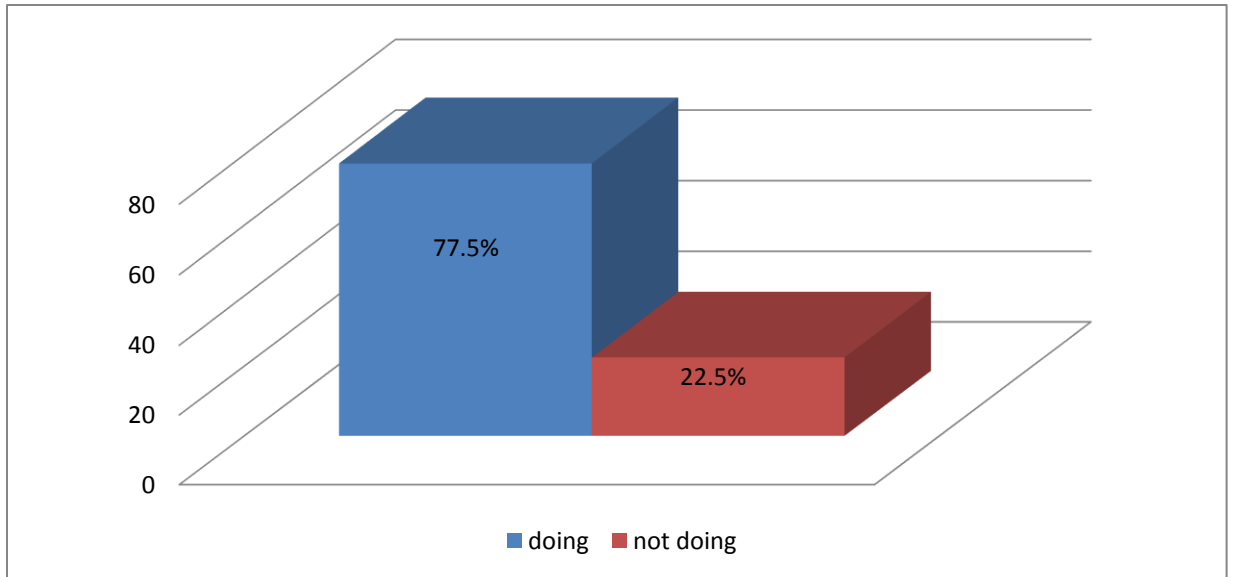


Only 24.7% from the HCWs always informed their colleges or teach the student about the need of injection safety.

Figure (10A)

Shows HCWs doing hand hygiene before inject the patients *at NRUH December 2016*

n=320

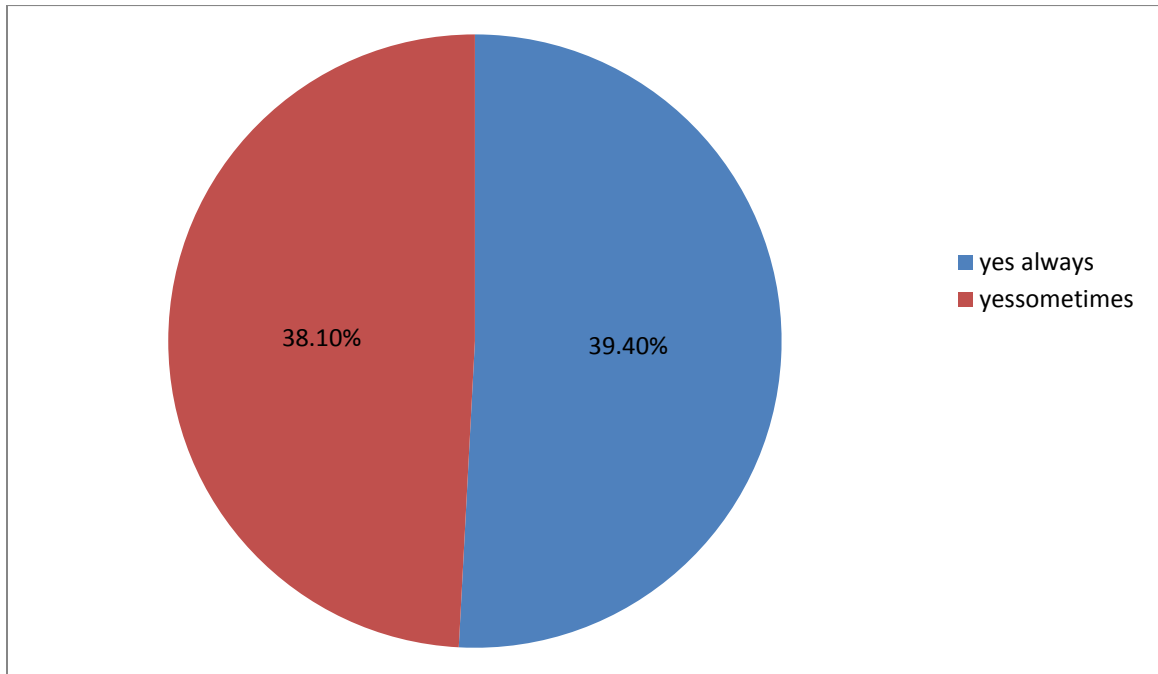


77.5% they were doing hand hygiene before inject the patient.

Figure (10B)

Shows HCWs doing hand hygiene before inject the patients *at NRUH December 2016*

If yes

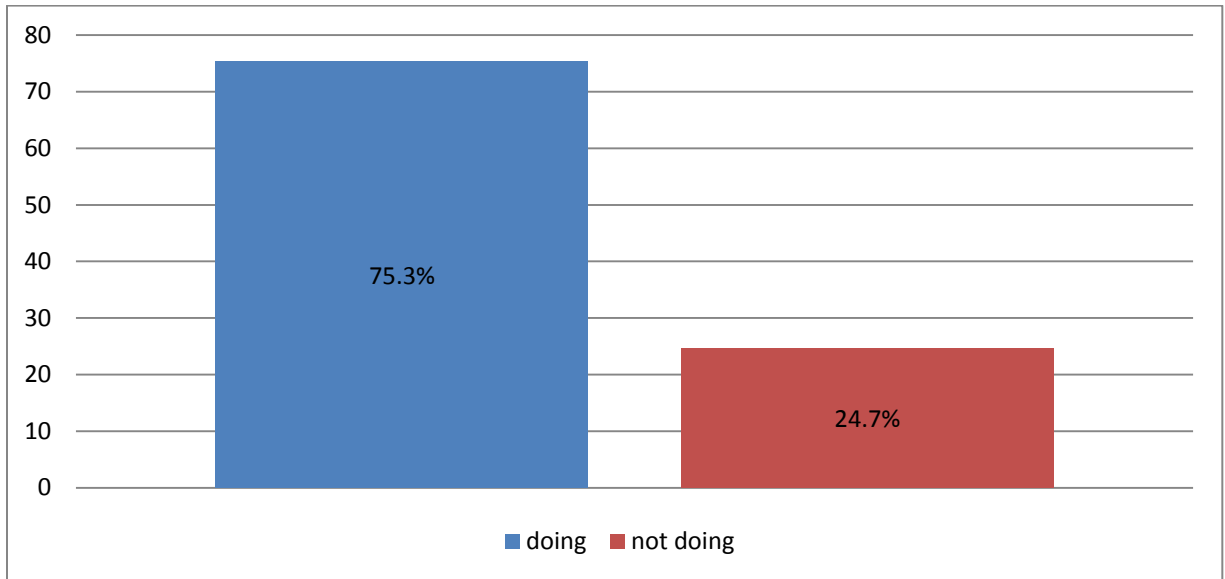


Only 39.40% of HCWs always doing hand hygiene before inject the patients

Figure (11A)

Disinfect the skin area that will inject by HCW s *at NRUH December 2016*

n=320

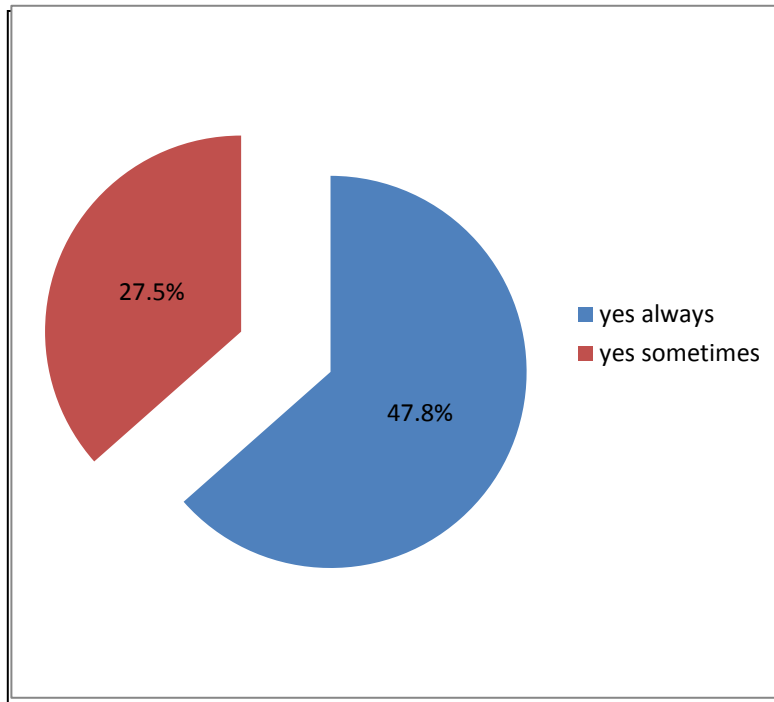


75.3% disinfect the area that will inject

Figure:(11B)

HCWs disinfect the area that will inject

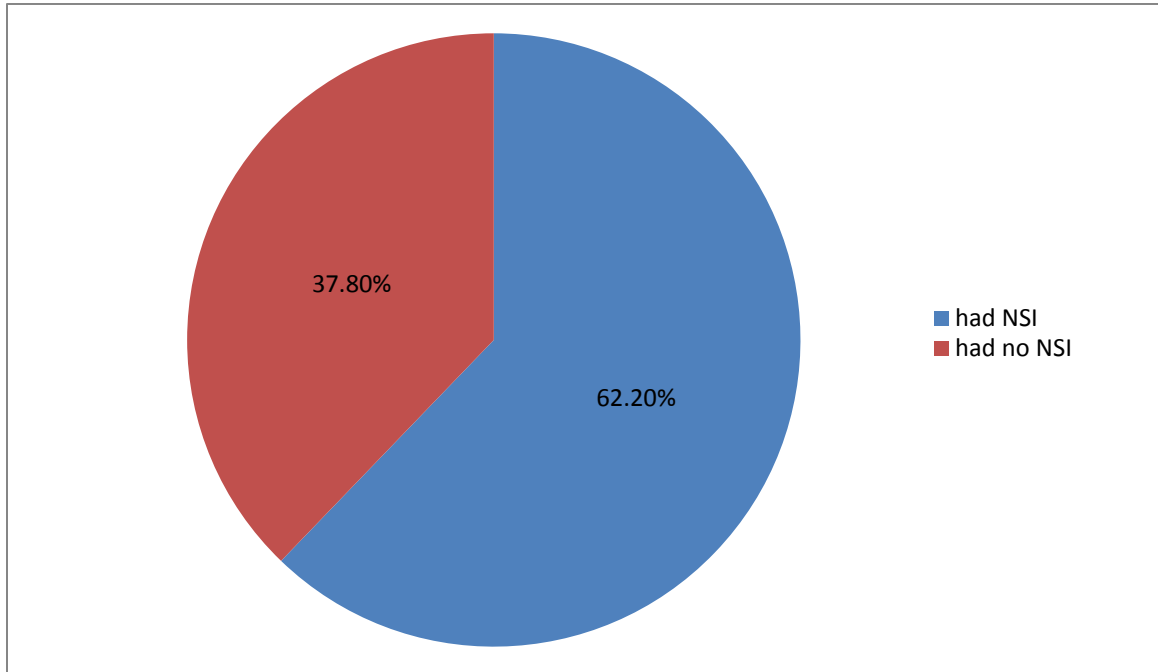
If yes



Only 47.8% from the HCWs disinfect the area that will inject.

Figure (12)
HCWs had needle stick injury while they
work at NRUH December 2016

n=320

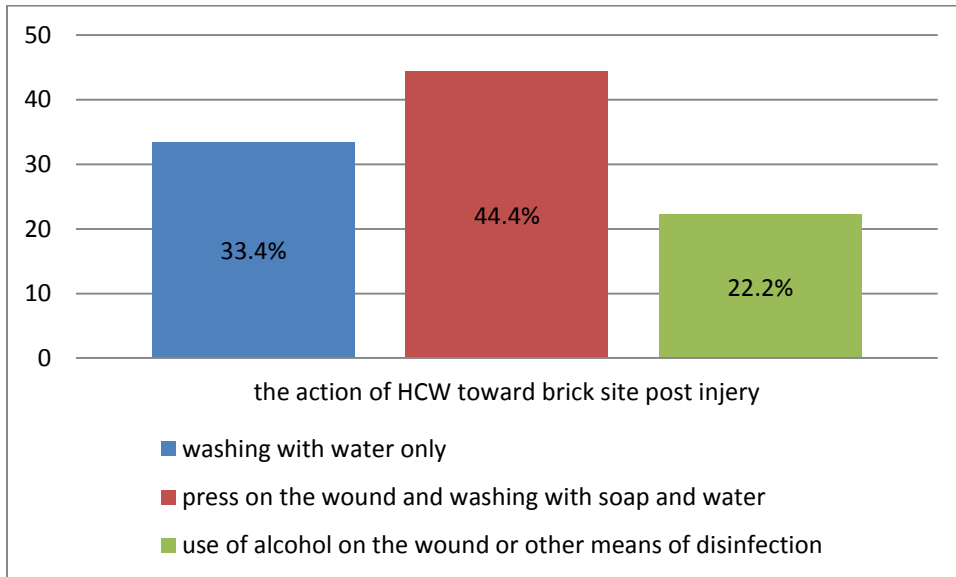


62.20% of health care workers had needle stick injury while they work

Figure (13)

Action of HCWs toward brick site post injury at *NRUH December 2016*

n=320

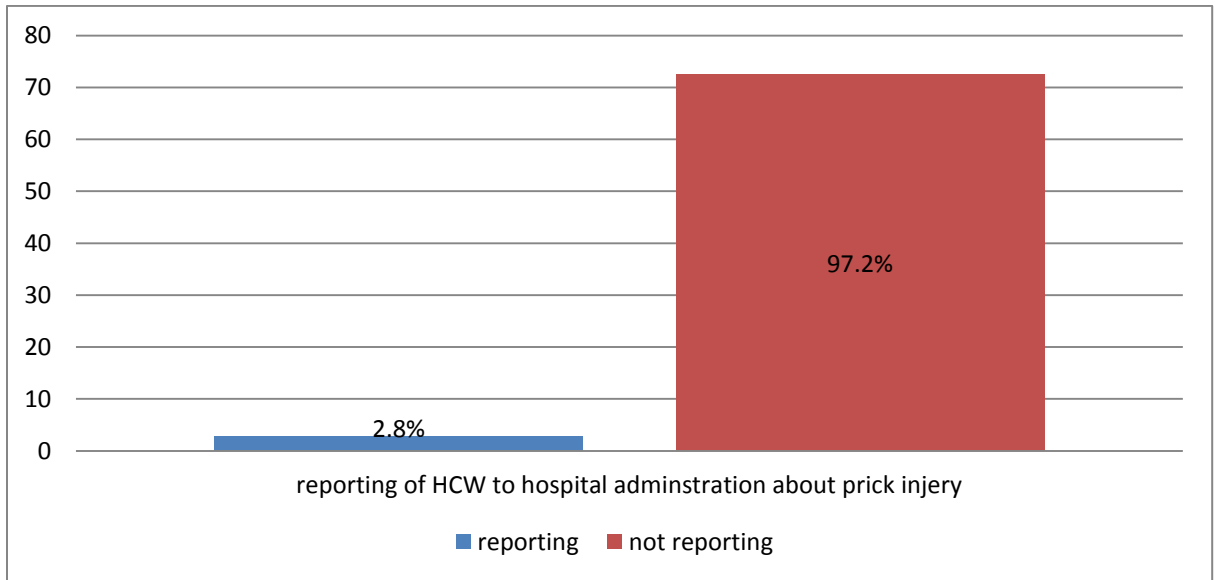


Only 33.4 % from the HCWs washing their hands with water after brick injury

Figure (14)

2016 Reporting of HCW to the hospital administration about prick injury *at NRUH December*

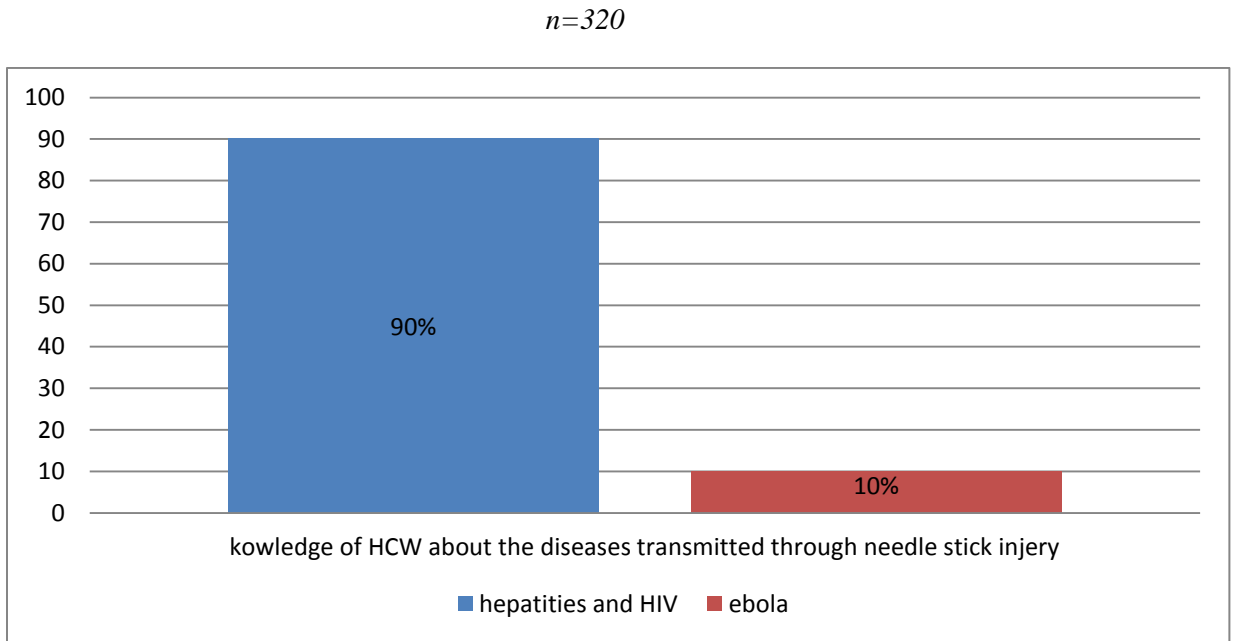
n=320



97.2 % of health care workers they were not reporting to the hospital administration about the prick injury

Figure (15)

Knowledge of HCW about the diseases transmitted through needle stick injury
at NRUH December 2016

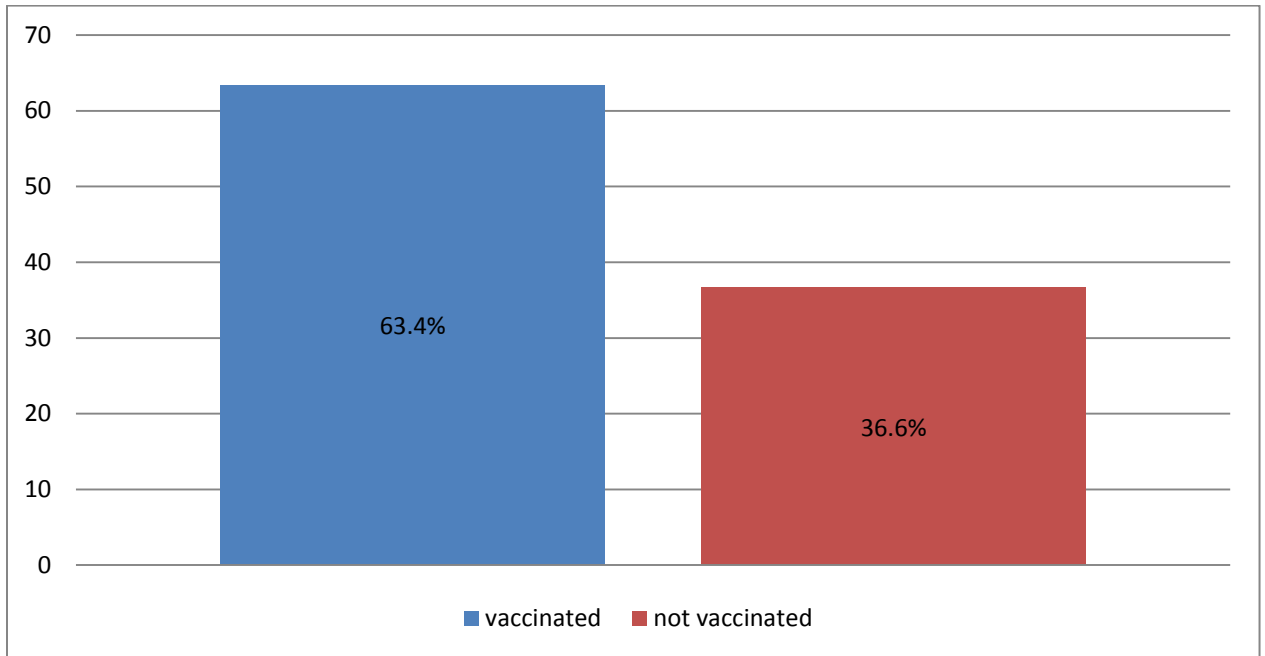


90% from the HCWs they know about the diseases transmitted through needle stick injury

Figure (16)

HCWs received necessary vaccination against HBV *at NRUH December 2016*

n=320

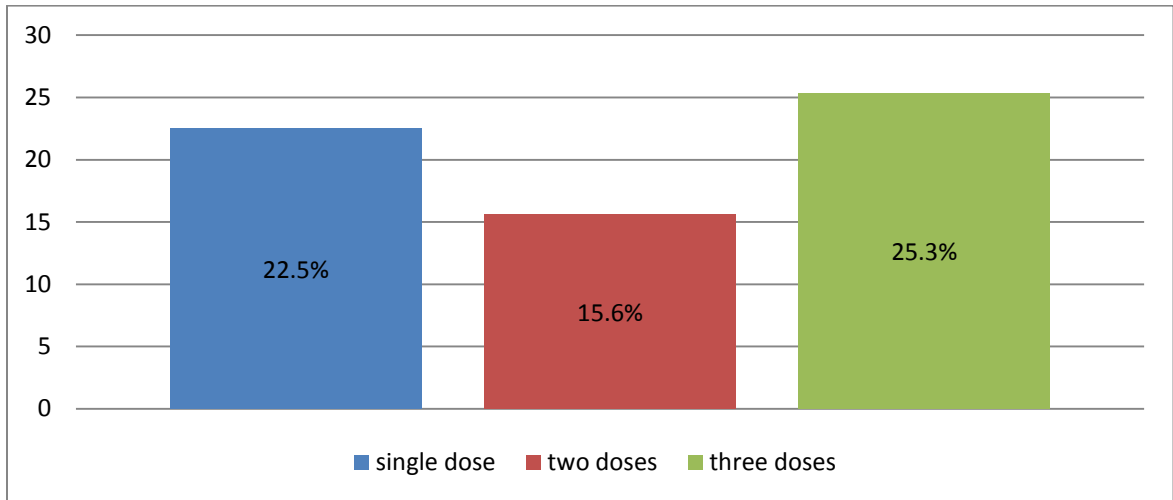


63.4 % of health care workers were received vaccination against HBV

Figure (17)

Numbers of vaccination doses HCWs were received *at NRUH December 2016*

n=320

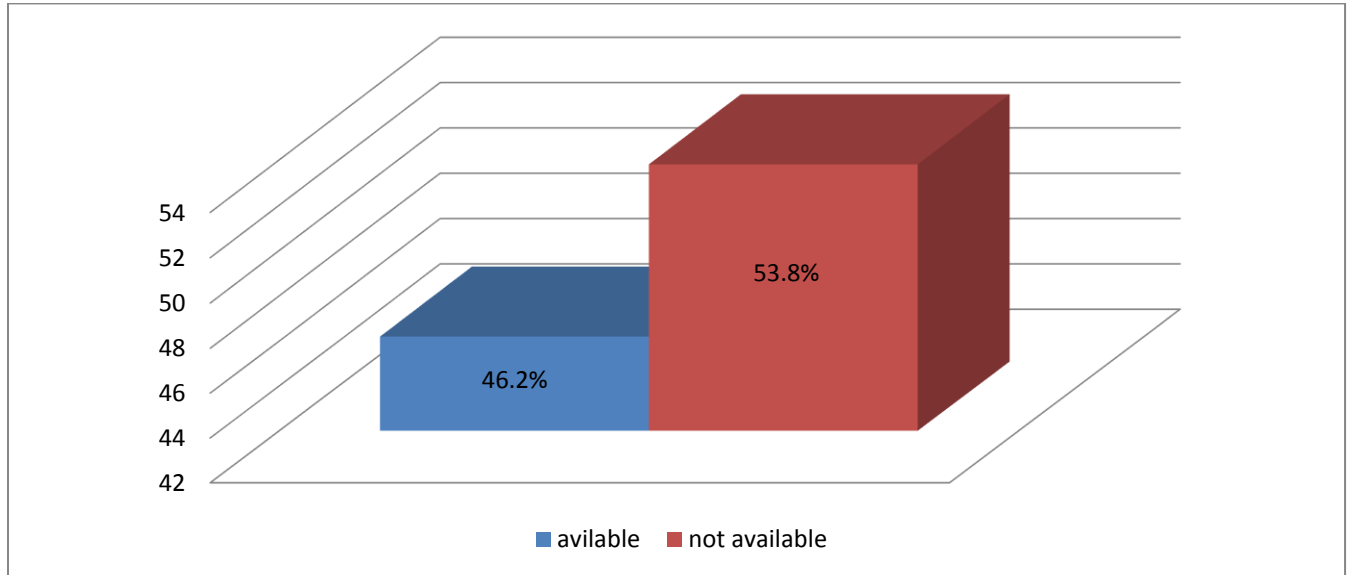


Only 25.3% are received three doses (complete doses)

Figure (18A)

Shows the availability of safety boxes permanently for the disposal of used syringes *at NRUH December 2016*

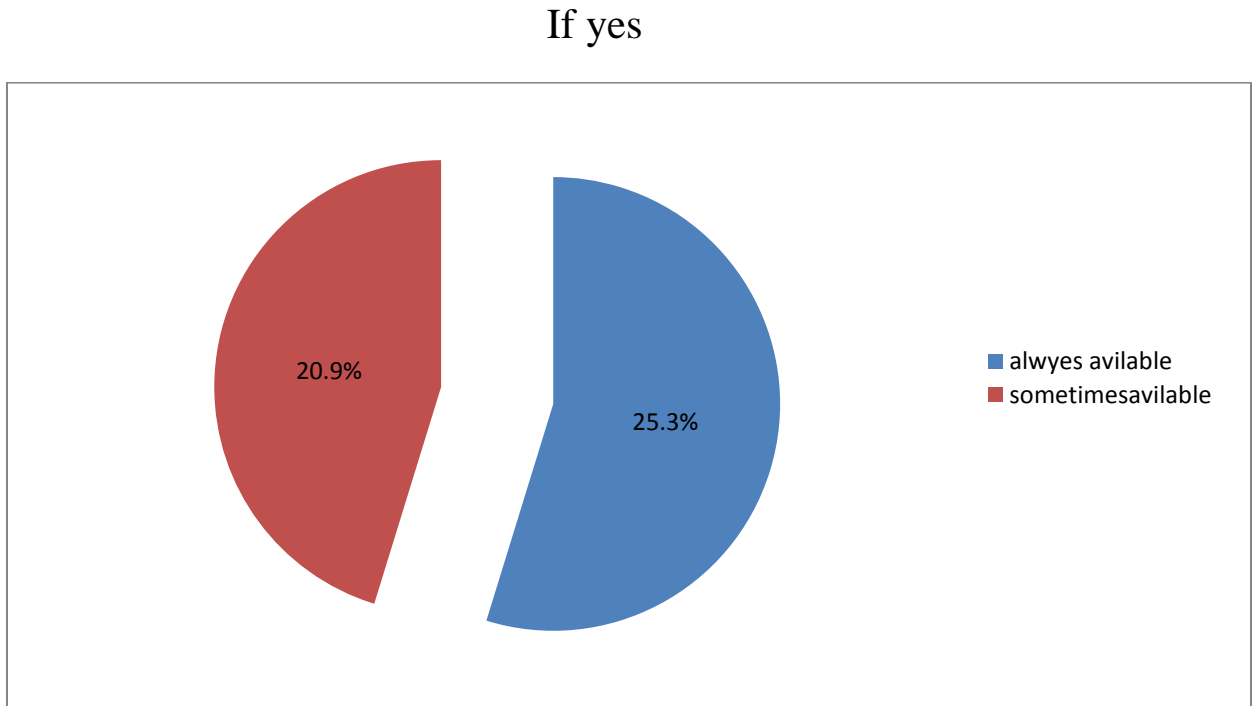
n=320



53.8% of HCWs they said there were no permanent available safety boxes for disposal of used syringes

Figure (18B)

Shows the availability of safety boxes permanently for the disposal of used syringes *at NRUH December 2016*

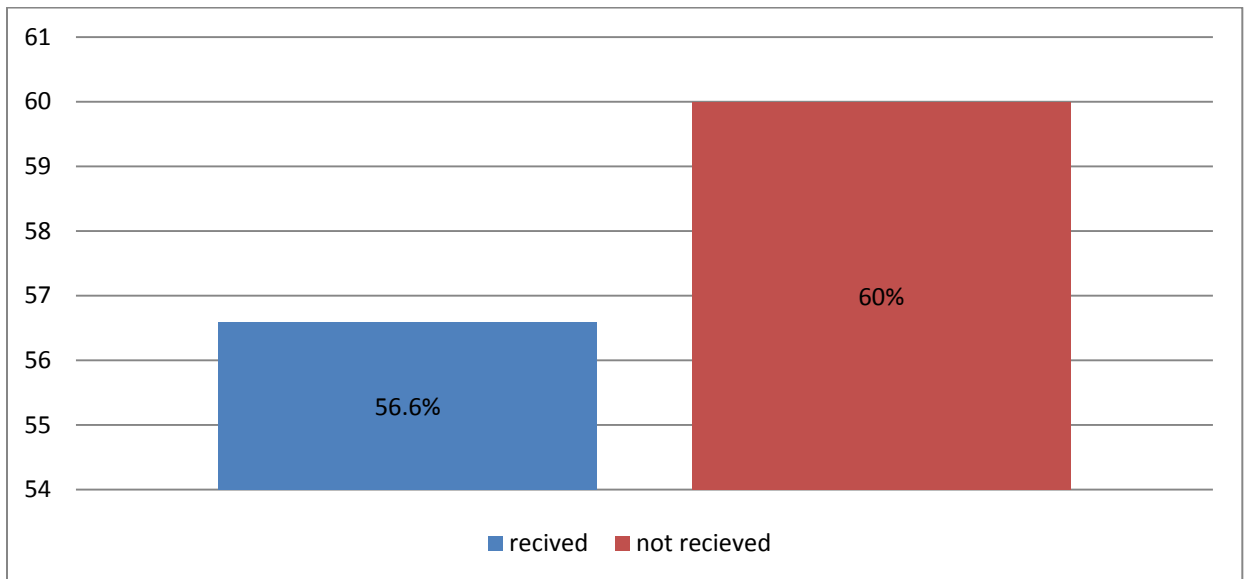


Only 25.3% from HCWs they said there is always permeate available safety boxes in their department.

Figure (19A)

The informing of the hospital for the HCWs about the important of commitment of injection safety at *NRUH December 2016*

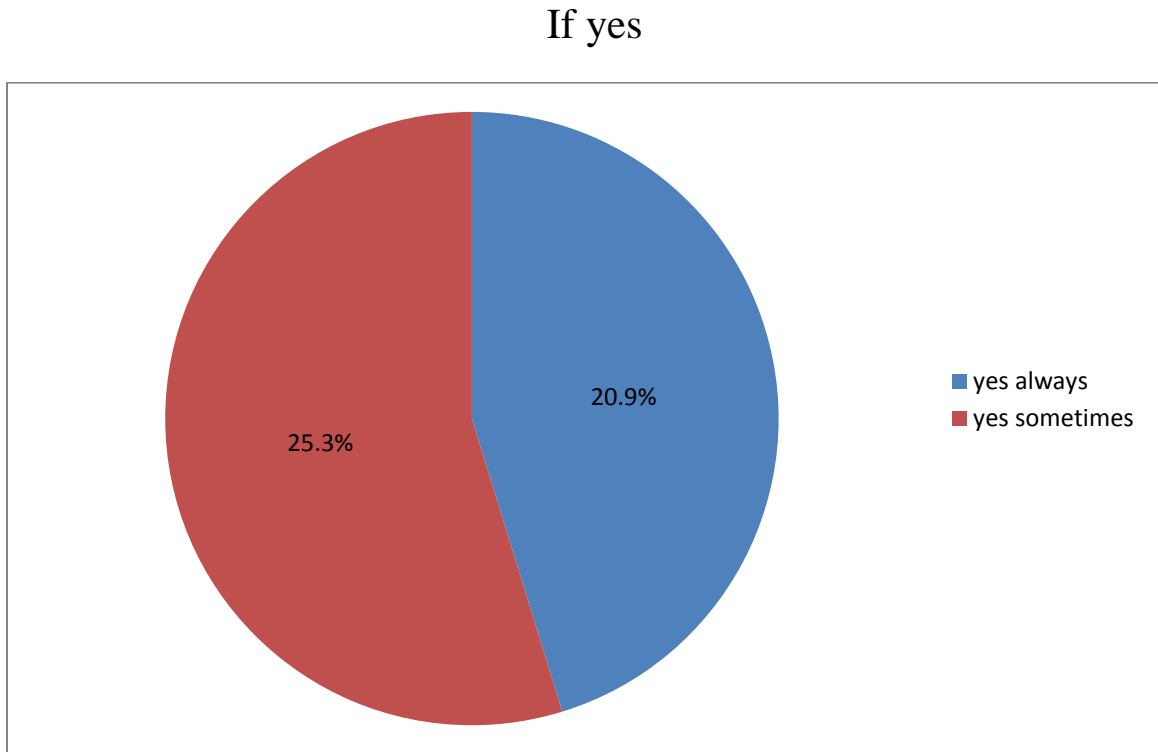
n=320



60% of HCW they said the hospital were not informed us about the important of the commitment of injection safety

Figure (19B)

Informing of the hospital to the HCWs about the important of commitment of injection safety *at NRUH December 2016*

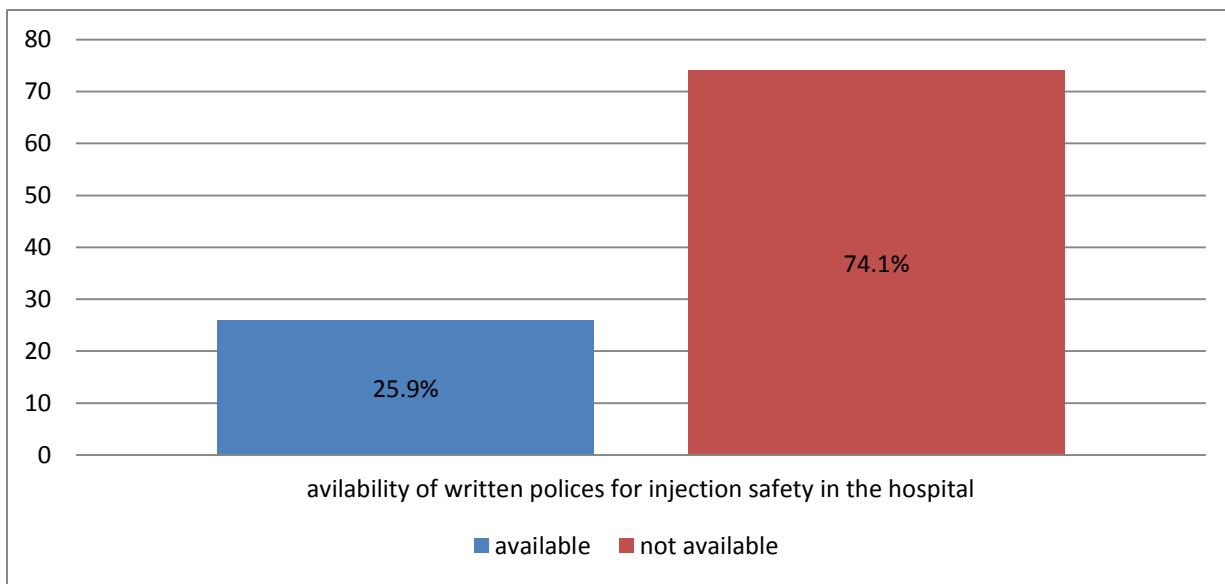


Only 20.9% from the HCWs they said the hospital always informed them about the important of commitment of injection safety.

Figure (20)

Availability of written policies for injection safety in the hospital *at NRUH December 2016*

n=320



74.1% of HCWs they said there were no available written policies for injection safety in their departments .

Table (1A)

Relation between qualification of health care providers and hand hygiene before inject the patients

qualifications	health care workers doing hand hygiene before inject the patients		
	Yes	NO	Total
Consultant	4	0	4
Specialist	8	0	8
Registrar	17	8	25
general practitioner	25	10	35
house officer	74	15	89
Nurse	89	23	112
lab technician	26	8	34
Midwife	5	8	13
Total	248	72	320

Table (1B)

Qualification in relation with the HCWs doing hand hygiene before inject the patient

If yes

Qualifications	HCWs doing hand hygiene before inject the patients		
	Yes always	Yes Some times	Total
consultant	4	0	4
specialists	6	2	8
Registrars	16	1	17
General practitioners	17	8	25
House officer	26	48	74
Nurses	42	47	89
Lab technicians	11	15	26
Mid wife's	4	1	5
Total	126	122	248

Table (2)

Relation between qualification of HCWs and receiving of HCWs training course about the injection safety

Qualifications	training course of health care worker about the injection safety		Total
	Yes	NO	
Consultant	4	0	4
Specialist	7	1	8
Registrar	14	11	25
general practitioner	9	26	35
house officer	13	76	89
Nurse	26	86	112
lab technician	2	32	34
Midwife	3	10	13
Total	78	242	320

Chi square: 54.310

p value: 0.000

There was significant relationship between qualification of HCWs and training course were received about the injection safety.

Table (3A)

Relation between the departments and the availability of safety boxes permanently for the disposal of used needles

Departments	the availability of safety boxes permanently for the disposal of used needles		
	Yes	No	Total
Emergency	13	29	42
Pediatrics	37	23	60
Medicine	33	21	54
Surgery	18	31	49
Lap	22	12	34
RDU	4	21	25
ICU	9	16	19
Obstetric and gynecology	18	19	37
Total	154	172	320

Table (3B)

Departments in relations with the availability of safety boxes permanently for the disposal of used needle

If yes

Departments	The availability of safety boxes permanently for the disposal of used needles		
	Yes always	Yes Some times	Total
Emergency	6	7	13
Pediatrics	15	22	37
medicine	13	20	33
surgery	10	8	18
Laboratory department	14	8	22
RDU	3	1	4
ICU	0	3	6
Obstetrics and Gynecology	6	12	18
Total	67	81	148

Table (4)

Relation between Health care workers had needle stick injury while they work and the reporting of health care workers to hospital administration about prick injury

health care workers had needle stick injury while they work	reporting of health care workers to hospital administration about prick injury		
	Yes	NO	Total
Yes	5	194	199
NO	4	117	121
Total	9	311	320

Table (5A)

Relation between the qualification of HCWs and informing of HCWs their colleagues or teach the students about the need of injection safety

qualification	health care workers informing their colleagues or teach the student about the need of injection safety		
	Yes	NO	Total
Consultant	4	0	4
Specialist	5	3	8
Registrar	19	6	25
general practitioner	34	20	35
house officer	32	57	89
Nurse	37	75	112
lab technician	8	26	34
Midwife	5	8	13
Total	125	195	320

Table (5B)

Qualifications in relations with The informing of HCWs their colleagues or teach the student about the injection safety

If yes

Qualifications	Informing the HCWs their colleagues or teach the students about the injection safety		
	Yes always	Yes some times	Total
Consultants	4	0	4
Specialists	3	2	7
Registrar	10	9	19
General practitioners	3	12	15
House officers	5	27	32
nurses	17	20	37
Mid wife's	1	7	8
Lab technicians	3	2	5
Total	46	79	125

Table (6)

Relation between the training course of health care workers about the injection safety and the action of health care workers toward brick site post injury

training course of health care worker about the injection safety	the action of health care workers toward brick site post injury			Total
	washing with water only	press on the wound and washing with soap and water	use of alcohol on the wound or other means of disinfection	
Yes	43	31	4	78
NO	64	111	67	242
Total	107	142	71	320

Chi square: 28.539

p value:0.000

There was significant relation between the training courses of the health care workers and the action of the HCWs toward the prick site post injury

Table (7A)

Relation between the service period of HCWs and the informing of hospital for health care workers about the important of commitment of injection safety

service period	The awareness of hospital for health care workers about the important of commitment of injection safety		
	Yes	No	Total
less than 3month	36	20	56
3 month to less than 1 year	57	104	161
1 year to 7 years	29	58	87
7 years and more	6	10	16
Total	128	192	320

Table (7B)

The services period in relation with the awareness of the hospital to the HCWs about the important of commitment of injection safety

If Yes

Service period	The awareness of the hospital to the HCWs about the important of commitment of injection safety		
	Yes always	Yes Some times	Total
Less than 3 month	23	13	36
3 month to less than 1 year	36	21	57
1 year to 7 years	12	17	29
7 years and more	4	2	6
Total	75	53	128

Chapter Five

-Discussion

-Conclusion

-Recommendation

Discussion

This study was conducted at National Ribat University Hospital located in Khartoum state Sudan. Which were community based study conducted randomly in 8 departments assessed the knowledge and practice of injection safety among health care workers .the study conducted in duration between December 2016 to February 2017. Total number of health care workers 712 and the responded 320 . The predominate were females 71.6%. Majorities of health care workers were nurses represented 35% and the house officers represented 27.8% working in short duration from 3mounth to less than 1 year. 66.6% within age range from 20-29 years were supposed to be more likely to have high knowledge about the injection safety .

The data collected through interview with the director and the head department of infection control about the injection safety polices in the hospital. The observational checklist was administered to observe health care workers and the total number observe was 107. The study carried out at the hospital during the working hours of the week.

HCWs heard about injection safety was 63.3% and by the experience of their work they knows where they can disposed empty syringes to protect them self. While the majorities from the total observed 65.4% did not disposed it immediately after used. That suggested the knowledge of injection safety and using of safety boxes was incomplete.

In a comparison with a descriptive cross-sectional study carried out among 336 PHCWs in the 3 Local Government Authorities in Ilorin,kwara,state of Nigeria Three quarter, represented 75% of the PHCWS was within the age range 30 – 49

years were older than predominant age group as reported in our study. Females predominate represented 92.9% and the Nurses constitute 63.1% of the PHC work (14) which going with our result the females were predominant in our sample group and the majorities of health providers were nurses . The study in Nigeria also showed that though 95.2% used safety boxes for immediate collection of used needles and syringe. 93.4% of them used safety box in their health facilities to collect used needle and 90.5% claimed that the safety box supply was adequate (14). While in our study 53.4% of HCWs complain from lack of supply of safety boxes in their departments. Sometimes HCWs they made safety boxes by themselves to disposed syringes and did not place it in suitable safe location. As we know sharp containers must be located at approximately waist height and never place it on floor.

The majorities of HCWs in our research 93.3% believed about the need of the injection safety. 77.5% from the total HCWs doing hand hygiene before inject the patients while 39.4% doing hand hygiene sometimes. And we found poor practice as in our observation in about 80 (79.4%) and did not doing proper hand hygiene by using alcohol hand rub or soap and water prior to preparing and administrating medications that because of insuffients material supply from hospital for washing their hands and most of the HCWs they bring their own soap from their homes that's means the HCWs had good knowledge about the important for washing their hands. The need for hand hygiene between injections will vary based on wither there was contact with soil, blood or body fluid. Our study suggested that personal safety measures were poorly adherent to when handling patients.

Over half of the respondents represented 62.2% having had needle stick injury while they work for more than once with poor practice and wrong action toward prick site like pressed in their wound and wash it with soap and water or using

alcohol on it. Which can lead to spread the bacteria deep in the wound site and no evidence exists that using antiseptic for wound or expression fluid by squeezing the wound further reduces the risk of blood pathogen transmission. If an occupational exposure occur the circumstances and postexposure management should be recorded with date and time of exposure where, how and when exposed occur and detail about counseling, post exposure management and follow up. As we see in our study The health care providers 97.2% not reported to the hospital administration and have no any idea about the important of reporting and the hospital does not having writing polices for reporting needle stick injury. which was not acceptable knowledge and practices due to insuffients training program in three quarter 75.60% of the HCWs while in Saudi Arabia primary health care centers most of the of HCWs 60% received continuous medical education on infection control (15). The HCWs in our research did not informing each other or teaches the students about the need of injection safety so that reflect the lack of alternation of knowledge between health care providers. And further work should be done regarding injection safety program and make HCWs more aware about the safe injection program in their environment of work. .

In comparison with across sectional study was conducted in 25 health care facilities in Gharbiya Egypt needle stick injury were common among 66.2% HCWs only 11.3% of HCWs had full course hepatitis B vaccination(17) as in our study 63.4% had been vaccinated against HBV but only 25.3% fully vaccinated.

HCWs should educated concerning the risk for and prevention of blood borne pathogen infection including the need to be vaccinated against hepatitis and access to clinician who can provide post exposure care should be available during all working hours including nights and weekend. The HCWS who are at risk for occupational exposure to blood born pathogen should be familiarized with the

principle of post exposure management as part of job orientation and ongoing job training.

In this study the result showed that 90% of HCWs were aware of fact that hepatitis and HIV can be transmitted by needle stick injury. Similar finding were reported in pervious study in combodia 90% of prescribers and injection providers were aware HBV, and HIV were transmitted through unsafe injection practices. (19).

Further, injection observed in this study was therapeutic injections included intramuscular antibiotic injection such as streptomycin, intravenous injections and blood sampling in the laprotary departments. The intra vinous injections and infusion were documented mainly in the emergency room and ward. on actual observation all the HCWs observed used new needles and syringes which came from serial packet or fitted caps. On other hands the rubber septum on medication vial was disinfected with alcohol only by 14 (13.1%). Insuring safety of injection by providing necessary facilities to make possible appropriate injection preparations such sinks with running water were available in all departments but most of them were not working and there was no availability of soap most of the times. Even in the emergency of obstetric departments there was no sink for washing their hands. The availability of at least one puncture resistant container in area where the injection procedure were performed and immediate disposal of used syringes only in 28% of total observed injections. And all sharp containers were not replaced when fill line reached .Intravenous fluid bags (drip) and used syringes were scattered around inside hospital building (including consultation area and the word) as well. The observation demonstrated that unsafe practices of recapping needle with two hand observed in 70 (65%). while 20 represented (18.7%) not recapped the needles, 10 (9.3%) recapped with one hand.

In comparison with study done on Hodeida government, Yemen the study revealed several unsafe injection practice particularly the recapping of needles after use which occur in 61.1%⁽¹⁶⁾.and during my observation I did not found any visual posters to guide the hospital personnel about injection safety, 56.1% were not used new pair of gloves and they have strong believing on no need for wash their hands after removed gloves . 84% did not cleaned patients skin with an antiseptic solution before injection.

while 80% of HCWs in Jazan Saudi Arabia washed their hands by soap and water and clean them by alcohol before giving injection with good and high level of knowledge about the injection safety⁽¹⁵⁾ . About 55.1% of HCWs were not prepared injections in clean area free from contaminated or contact with blood or body fluid or contaminated equipments. And there was no proper sterilization to the injection equipments like trolleys and kidney dishes for reduction of initially present microorganisms or other potential pathogen and autoclaves was not working properly in surgery department.

Needles and syringes were used for only one patient as well as insulin pens. Medication and administrating tubing and connectors were used only for one patient and the multidose vials were dedicated to individual patient whenever possible. My observation suggests that injection were not provided in safe and hygienic ways.

74.1% of health care providers were reported that no one shows them written policies and they have no any idea about it.

This finding similar to the result in study done in Nepal about 80% reported that the health facilities had written injection safety management policy but no one could show it to the investigator ⁽¹⁸⁾. According to our direct interview with the

director and the head of infection control department they said we have policies about the injection safety but not published to the departments and were not trained the HCWs about it. The infection control department they starting to doing training courses about the injection safety and targeting all categories personal. Duration of the courses it will be from 3 to 7 days 3 times per years to enhance the level of awareness of HCWs toward the injection safety and to improve the way of practice of HCWs to save them self and to save the patients form any hazards related to the unsafe injection . Policy makers and implementer should focus on prevention initiatives in order to promote and ensure safe injection use and practice in the hospital.

Conclusion

- 75.6% of HCWs did not receive any training course about the injection safety.
- 79.4% from total HCWs who observed were not doing proper hand hygiene prior to preparing and administrating medications.
- 65.4% from the total HCWs observed recapped the used needles and syringes with two hands ...
- Over half of the health care workers 62.2% had needle stick injury while they work for more than once.
- only 33.4% of HCWs had good practice toward prick site after injury.
- 97.2% were not reporting to the hospital administration about the prick injury.
- 53.8% Of HCWs complain from the lack of supply of safety boxes in their hospital departments.
- Only 25.3 % of HCWs was fully vaccinated against HBV .
- 74.1% of HCWs not having any idea about the police of injection safety .
- 80% from the total HCWs observed were not clean the skin of the patients with an antiseptic solution before injection.
- 65.4% from total observed health care workers recap the used needle with two hands.
- Sharps containers were not replaced when the full line reached.

Recommendations

- 1- Facilitating the required equipments for safety injection practice in the hospital
- 2-Ensure safe possible working environment for HCWs in the hospital.
- 3-Activate and publish the polices of the injection safety to all hospital departments.
- 4-Ensuring of the permanent availability of safety boxes in all departments of the hospital
- 5- All sharp containers should be replaced when the fill line reached.
- 6-Implement regular training program for all health care workers about the injection safety to avoid hazardous practices such as recapping needles
- 7- Injection safety should be considered as an essential part of infection control activities
- 8- HCWs should stay adherent to the polices and national guidelines of injection safety.
- 9- All health care workers should be fully vaccinated against hepatitis B virus .

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