

## Improvement of safe injection practices among nurses in Zagazig University Hospitals

Ghada M. Khalil

Public Health and Preventive Medicine, Faculty of Medicine, Zagazig University, Egypt.  
Corresponding author: **Ghada M. Khalil, Email: [ghadamahmoud1@hotmail.com](mailto:ghadamahmoud1@hotmail.com)**

### Abstract:

**Aim of the work:** this study aimed to detect assessment of injection practice using WHO safe injection tool then implantation of education program and post intervention evaluation. **Methods:** this study was anon randomized intervention study performed in Zagazig University Hospitals and targeting nurses , 700 observation before and 700 observation after intervention starting by evaluation of injection practice using WHO safe injection tool then training on safe injection practice applied for nurse staff then post training evaluation of practice. **Results:** hand hygiene soap and alcohol rub was available in hospitals sitting in 80%,85% of observation and after intervention increased up to 95% and98% with a significant difference. Safety boxes were available for sharp disposal before intervention and become 100% available after intervention. Hospital supply 100% percent single use syringes for each patient, but the problem was for drug administration process due to deficient in cleaning of drug preparation area 88% of pre intervention observation, but practice improved to 98% after intervention with a significant difference; sharp disposal practice was improved after intervention up to 98% with significant difference. 67% of observation used non touch technique and changed to 95% after intervention with high significant difference .Vaccination coverage reached 100% after intervention and percent of nurses who received training on safe injection was 45% increased to 100% after intervention, also post needle stick injury counseling was 57% reached 100%after intervention. **Conclusions:** training and education of nursing staff on safe injection practice was crucial for improvement of safe injection practice and improved both staff and patient safety.

**Keywords:** safe injection, needle stick, hand hygiene, sharp disposal

### Introduction

Injection is a crucial health care procedure used worldwide for drug administration. Billions of injections are used worldwide for both curative care and immunization <sup>(1)</sup>.In developing countries, approximately 16 thousand million injections are administered a rate of 3.4 (Range 1.7-11.3) injections per person per year<sup>(2)</sup>. Majority of the injections can be replaced by oral drugs<sup>(2,3)</sup> and are not used safely. Reuse of injection equipment without sterilization is common<sup>(4)</sup>.Unsafe injection practices which can transmit hepatitis B, hepatitis C, human immunodeficiency virus (HIV) and other blood borne pathogens have resulted in worldwide burden of preventable blood borne viral diseases (BBVDs)<sup>(5)</sup>.The transmitted BBVDs remain silent for many years without risk identification<sup>(6)</sup>.An injection is said to be safe if it does not harm the recipient, does not expose the provider to avoidable risk, and does not result in wastes that is dangerous for the community<sup>(7)</sup>. This is achieved by using a sterile device (Syringe,

needle and cannula) for drug injection, practicing sterile technique by a qualified trained person and discarding the used devices in safe sharp container specially designed for sharp disposal. Any breach in the process makes the injection unsafe <sup>(1)</sup>.

### Safety of recipient

The risk of harming recipient can be avoided by administering useful medication with a sterile single use device, and practicing proper technique by qualified and well trained health workers to ensure that safety there should be sufficient supply of single use devices throughout the year<sup>(8)</sup>.

### Safety of the provider

Needle stick injury (NSI) is commonly encountered by the provider especially during recapping and it can be reduced by disposing used syringe in a puncture proof closed container immediately after use without recapping. About thirty infectious diseases

may be transmitted by NSI, but the risk of hepatitis B infection is much higher than other infections<sup>(9)</sup>. That is why full immunization against hepatitis B is important to ensure safety of the provider<sup>(10)</sup>. These interventions (proper disposing technique without recapping and vaccination) can provide protection to the healthcare worker from occupational infection with blood born viral disease.

#### **Safety of the community:**

Used syringes and injection devices should be disposed safely according to local and international disposal infection control policy through incineration or grinding, unfortunately half of injection wastes through developing countries are improbably disposed and threat the communities<sup>(9)</sup>.

#### **Injection safe practice and infection control:**

Injection safety is an important component basic infection control. The concept of “standard precautions”, with mandatory safe practices, must be routinely applied in all healthcare settings, and every person in working through health care setting should be considered a potential source of infection. Best practices for injection, the collection and handling of blood samples, and waste management should be strictly followed<sup>(11)</sup>. All healthcare workers should understand and adhere to standard of safe Injection practices; that is why principles of infection control and aseptic technique need to be reinforced in training programs and incorporated into institutional policies that are monitored for adherence<sup>(12)</sup>. This study aimed to detect improvement of safe injection practice among nurse in zagazig university hospitals.

#### **-Objectives:**

Assessment of injection practice among nurse in Zagazig University Hospitals.

Education and training intervention program for nurses.

Post intervention evaluation for education program.

#### **Subject and methods:**

**Place of study:** Zigzag University (9 hospitals)

#### **Study time:**

2weeks for observation pre intervention-15-30 September 2016, 3 months interval. October-November-December 2016

2weeks for collection of observation post intervention.1-15 January 2017

#### **Study population:**

All nurses practice injection , the study observes practice of safe injection and counted per observation not by person.

#### **Study design:**

This was a randomized intervention study, pre and post.

#### **Sample size and sampling technique:**

Sample size wascalculated according to practice rate based on occupancy rate, 770 observations divided to 10 hospitals according to occupancy rate we used EPI-INFO program to calculate sample size.

#### **Study tool:**

WHO safe injection C tool revised was used to checklist preparation.

Designed on job practical training work shop for all staff worked on collecting observation at higher education council, boosters and practical training were used during education workshop.

Web based program for data entry (Higher education council web site )

#### **Analysis:**

Spss20, comparative analysis using chi square test.

#### **Research ethics:**

Verbal consent was obtained from nurses prior to study and permission for hospital administration gained prior of study.

## Results

**Table 1: availability of hand hygiene supplies as mandatory for safe injection practices at 9 hospitals**

Availability of hand hygiene practice supplies	Pre-intervention Number Total 700	Pre-intervention Percent	Post-intervention Number Total 700	Post-intervention Percent	Significant Chi-square
hand soap	560	80%	665	95%	0.001 sig
Hand drying towels	140	20%	245	35%	0.001 sig
Alcohol hand rub	595	85%	686	98%	0.001 sig
Single use latex gloves	525	75%	651	93%	0.001 sig
Safety boxes	665	95%	700	100%	0.001 sig

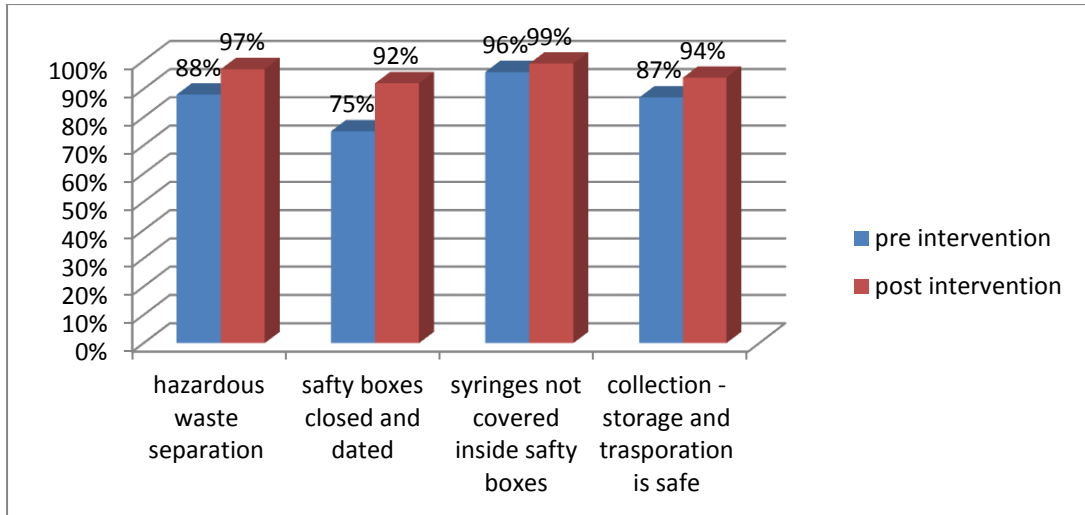
**Table 1:**

Availability of hand hygiene supplies in hospital area were evaluated using checklist and we found that hand washing soaps was available in 80% of observation and availability increased to 95% after intervention but hand drying towels was not available except in 20% increased to 35% after intervention also alcohol hand rub was available at 85% increased to 98% after intervention single use latex gloves were present in 75% increased to 93% after intervention and safety box for sharp disposal was available in 95% increased to 100% and all previous values showed a significant difference after intervention .

**Table 2:availability of safe injection tools and supplies according to patient flow**

Availability of safe injection tools and supplies	Pre-intervention Number Total 700	Pre-intervention Percent Total 700	Post-intervention Number Total 700	Post-intervention Percent Total 700	Significant Chi-square
Single use syringes	700	100%	700	100%	1 not sig
Single use peripheral catheters	700	100%	700	100%	1 not sig
Intravenous devices	665	100%	700	100%	1 not sig
Skin antiseptics	686	98%	700	100%	0.001 sig
Plaster and cotton covers	651	93%	700	100%	0.001 sig

Single use syringes and IV catheter and devices were available in 100% of cases before and after intervention which is better than Ismail et al<sup>(13)</sup> where there was shortage in syringe supplies reached 60%. Skin antiseptic and plaster coverage after injection was available before intervention by 93% increased to 100% after intervention. Syringes, intravenous devices and peripheral catheter were available in 100% pre and post intervention sittings but plastic and cotton covers show shortage as 97% pre intervention increased to 100% after intervention.



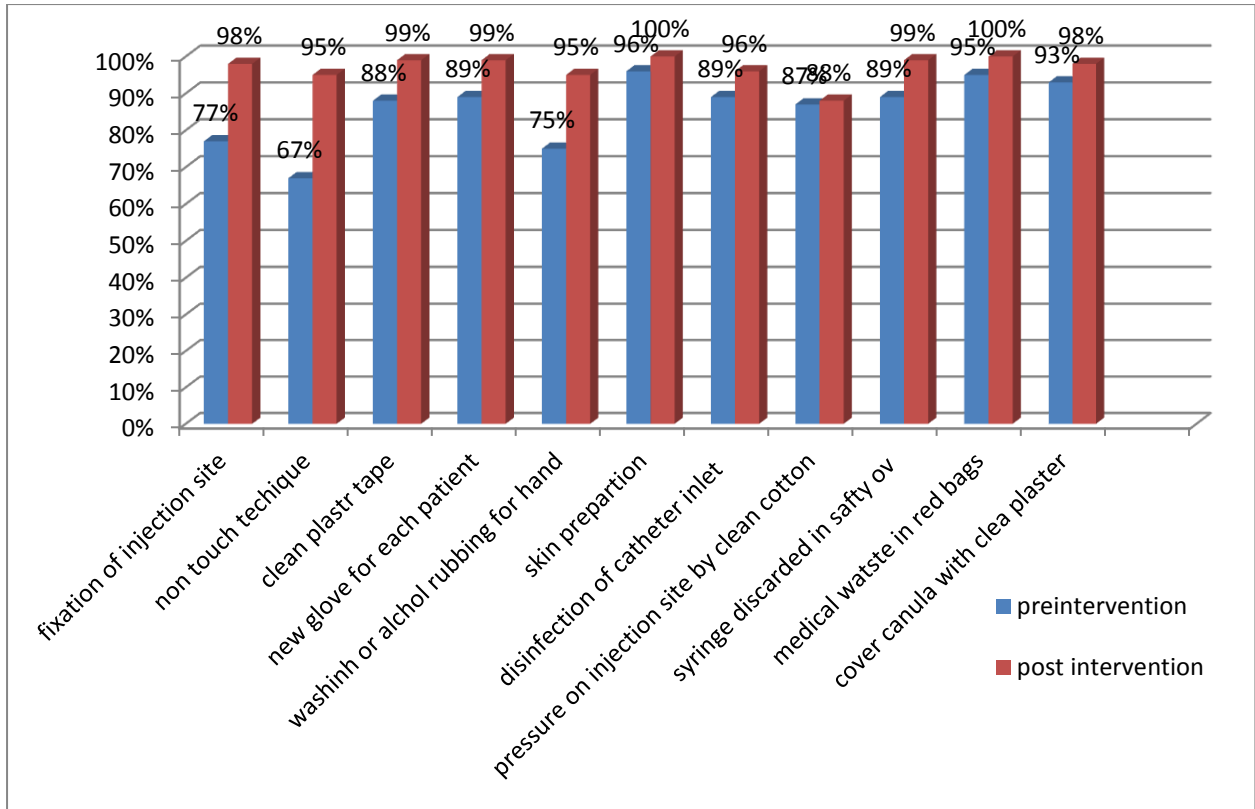
**Figure 2: sharp disposal practices chart:**

**Fig.2** showed difference between sharp disposal practice before and after intervention which showed marked improvements in all steps specially waste separation and waste storage from 88% and 87% before intervention to 97% ,94% after intervention .

**3- Table 3:preparation process for safe injection**

Preparation process for safe injection	Pre-intervention Number	Total	Pre-intervention Percent	Post-intervention Number	Total	Post-intervention Percent	Significant Chi-square
Clean drug preparation area	616	700	88%	686	700	98%	0.001 sig
Clean drug tray	546	700	78%	623	700	89%	0.001 sig
Closed drug vial for each patient	693	700	99%	693	700	99%	1 not sig
Closed sterile syringes ,catheter, IV devices for each patient	686	700	98%	700	700	100%	0.001 sig
Disinfection of drug plastic cover before use	553	700	79%	665	700	95%	0.001 sig
Storage and refill of disinfectant in proper way	455	700	65%	630	700	90%	0.001 sig

Preparation process for safe injection include many steps 1<sup>st</sup> step was preparation for clean area for drug preparation which was 88% increased to 98% after intervention with significant difference and presence of clean drug tray was 78% increased to 89%after intervention with significant difference and uses of single syringe and catheter for each patient were 99% reached to 100% after intervention.



**Figure 3:safe injection practice steps**

This Fig. showed safe injection steps included non touch technique was performed in 67% of observation improved to 95% after intervention also washing hand or alcohol hand rubbing before injection improved to 75% to 95% after intervention with high significant difference

**Table 4:staff training, education and vaccination:**

Staff training and vaccination	Pre-intervention Number Total 700	Pre-intervention Percent	Post-intervention Number Total 700	Post-intervention Percent	Significant Chi-square
Vaccination coverage	686	98%	700	100%	0.001 sig
Training on safe injection	315	45%	700	100%	0.001 sig
Training on blood born pathogen	350	50%	700	100%	0.001 sig
Needle stick injury notification	623	89%	700	100%	0.001 sig
Post injury counseling	399	57%	700	100%	0.001 sig

95% of nursing staff was vaccinated increased to 100% after intervention and 45% of nursed only received training on safe injection practice improved to 100% after intervention .only 57% of nurses perform post needle stick

injury counseling before intervention improved to 100% after intervention .

**Discussion**

Our study involved 700 working nurses in 9 Zagazig University Hospitals according to sample size calculation based on injection rate,

we used WHO safe injection tool as performance evaluation tool for nurse's injection practices and we used the same tool for designing intervention training materials. Availability of hand hygiene supplied as crucial step before and after safe injection practices, we found that hand soap was available for 85% study population increased to 95% after intervention with significant difference, considering hand drying towels there was shortage in it up to 20% raised to 35% after intervention with significant difference and that result matched with results of **Ismail et al.**<sup>(13)</sup> where soap shortage reached 58% in Gharbiagovernrate , Egypt .Alcohol hand rub and single use latex gloves showed marked increase in availability percentage after intervention with asignificant difference and that result.differ extremely from **Bobby et al.**<sup>(14)</sup> where latex gloves used only in 3.7% of injection practice **Daly et al.**<sup>(15)</sup> recorded presence of safety boxes at 75% of facilities while in our study safety boxes covered 100% of our facilities after intervention.

Considering sharps disposal practice all steps were improved up to 99% at uncovering syringes inside safety boxes that result was compared to results of **Bobby et al.**<sup>(14)</sup> where sharp disposal practice was only 42% .

Considering preparation practices for safe injection the most improvement taken place on cleaning practice for drug preparation area and drug tray with a significant difference before and after intervention and our result matched with those of **Ismail et al.**<sup>(13)</sup>.Availability of single use syringe and drug vial for each patient were not significantly changed after intervention as it were reached 99% before intervention ,the practice which showed great improvement was refilling disinfectant which changed from 65% to 90% after intervention and that is matched with results of **Daly et al.**<sup>(15)</sup>. Post intervention practices showed improvements in all steps off safe injection techniques, specially: fixation of injection site . Non touch and alcohol hand rubbing before injection arematched with results of **Mantaletal.**<sup>(8)</sup> .

Improvement reached 100% with high significant difference in vaccination coverage and staff training on injection practice and infection control basic knowledge especially post needle stick injury notification and counseling and that result is much more satisfied than results of **Mantaletal.**<sup>(8)</sup> .

### Conclusion:

Improvement of safe injection practices need continuous training and monitoring of staff daily practices and hospital management support by offering one use supplies is very crucial for success of improvement efforts.

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