Effect on In-service Training in Improving Nurses’ Knowledge and Practices Regarding Safe Injection in Wad Medani Teaching Hospital, Gezira State, Sudan, (July 2010 – June 2012).

By

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Examination date: 6/16/2012
DEDICATION

To my father who gives me all his kindness,
To my mother soul who gave me my life,
To my husband who helps and supports
My sons Jamal Eldeen, Yussri, Yassin and my Daughter Abeer who are the source of my happiness.
ACKNOWLEDGEMENT

My thanks owed to the main supervisor Dr. Ibtissam Mohammed Elshiekh and co-supervisor Dr. Hanan Mabrouk Ramadan for their continuous assistance and encouragements and guidance throughout the study.

Especial depth of gratitude to Dr. Magada Elhadi who supports me with kindness to continue my study.

Special thanks to my colleagues who helped me in carrying out the intervention training program.

More thanks go to my son Jamal Eldeen for his effort in preparing the program, and special thanks to whom assisted me in typing and preparing the thesis.
ABSTRACT

Giving an injection safely is considered basic fundamental nursing activity that required adequate knowledge of human anatomy, physiology, pharmacology, psychology, communication and clinical skills. This is an interventional hospital based study conducted at Wad Medani Teaching Hospital, Sudan, during the period from July to September 2010. The study aimed at assessing the impact of in-service training in improving nurse’s knowledge and practices regarding safe injection. Thirty nurses from medical and surgical wards were selected by stratified methods randomly. Data were collected using direct interview structured questionnaire pre and post the training and observation checklist for three month pre and post the training. Data analysis was preformed through using Statistical Package for Social Sciences (SPSS). The results showed a significant improvement post training in relation to knowledge specially for methods of injection administration, sterilization of equipments, and safe dispoaed P. value: (0.08, 0.080 and 0.347) respectively, also in practices regarding safe injection practices and use of protective equipments P. value (0.34 and 0.080) respectively. In conclusion the nurses’ knowledge and practices improved regarding safe injection post training. The study recommended that continuous training program with closed supervision for improvement of nurse’s practices towards safe injection.
ملخص الدراسة

يعتبر الزرق العلاجي الآمن من أساسيات الأنشطة التمريضية التي تتطلب المعرفة الكافية لعلوم التشريح البشري ووظائف أعضاء الإنسان وعلم الأدوية وعلم النفس ومهارات التواصل والخبرة الكافية. أجريت هذه الدراسة بمستشفى ود مدني التعليمي في الفترة من يوليو وحتى سبتمبر 2010م، وهدفت إلى تقييم أثر برنامج تدريبي أثناء الخدمة على معرفة وأداء الممرضين والممرضات تجاه الزرق العلاجي الآمن، أشتملت العينة على عدد (30) ممرض وممرضة تم اختيارهم عن طريق العينة العشوائية الطبقية من بين العاملين بما يعادل الباطنية والجراحة. تم جمع البيانات باستخدام استبيان صمم بغرض الدراسة واستخدم قبل وبعد البرنامج التدريبي، كما استخدمت قائمة لملاحظة أداء الممرضين أثناء الزرق العلاجي (قبل وبعد البرنامج التدريبي) لفترة ثلاثة أشهر. تم تحليل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS). أظهرت النتائج أنه يوجد تحسن ذو دلالة إحصائية في المعرفة بعد البرنامج التدريبي وخصوصاً بالنسبة إلى طرق الزرق وتعقيم الأدوات والتخلص من النفايات، وخصوصاً بالنسبة إلى طرق الزرق وتعقيم الأدوات والتخلص من النفايات.

خلاصة

خلصت الدراسة إلى تحسين مستوى المعرفة والآداء تجاه الزرق الآمن بعد البرنامج التدريبي، وأوصت إلى ضرورة تنفيذ برامج تدريبية مستمرة أثناء الخدمة مع الإشراف الجاد لتحسين أداء الممرضين تجاه الزرق الآمن.
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<td>Health education programme</td>
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<td>KAP</td>
<td>Knowledge, Attitude and Practice.</td>
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<td>EPI</td>
<td>Expanded Programme Immunization</td>
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<td>IM</td>
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<td>WHO</td>
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<td>HIV</td>
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1. Introduction

1-1 Background:

Unsafe injection practices are associated with substantial morbidity and mortality particularly from hepatitis (B) and (C) and Human Immunodeficiency Virus (HIV) infection. These advertently transmitted blood borne diseases become manifest some considerable time after injection and hence may not be appropriately accounted for annually more than 1.3 million deaths and 535 millions side effects were estimated to be due to current unsafe injections practices. With the global increase in the number of injections for vaccination and medical services, safe injection technologies such as auto disposal syringes must be budgeted for investment on health education. Safe disposable will also reduce infection associated with unsafe injecting practices. Safe injecting practices are more expensive than more current less safe practices, but the additional cost is more than offset by the reduction in diseases that would result. (Janszen, E, et al, 2003).

1-2 Problem statement:

World wide studies a recent issue of the Bulletin World Health Organization (WHO, 2005) highlighted the extent of the problem posed by unsafe injections in developing countries. According to a study conducted between 1989 and 1994, unsafe injection-practices are widespread in West and East Africa. For example, in West Africa 1989, the annual rate of injury associated abscesses was 23 per 100000 population (Kan A et al., 2009). In East Africa, in 1994 it was found that 37% of house-hold had at least one member who had developed an abscess following injection (Ashwath. D et
al., 2003). In 1997 to 1998, injury associated abscesses were reported from 40% of health centers in Swaziland (where disposable syringes and needles were used) and 55% of health centers (HCs) in Chad (where a mixture of disposable and sterileizable syringes were used (Whyte S. R. 2008).

In Africa in 1995, the WHO regional office for Africa launched a logistics project which cover the four main areas of Immunization logistics, the cold chain, transport of vaccine and supply and quality, and the safe injections in the countries of the region. The impact of this logistics approach on immunization injection safety was evaluated through surveys of injection procedures and analyze of the injection materials (e.g. sterileizable or disposable syringes) chosen by Expand Programme on Immunization (EPI) and those actually seem to be used. Administration of injection materials without sterilization, accidental needle – stick injuries among health care workers and injections related abscesses in inpatients were common. Unsafe injection practices in these countries were generally due to failure to integrate nursing practices and public awareness with injection safety issues an absence of the influence of EPI managers on health care services delivery. Holistic rather than logistics approach should be adopted to achieve safe injection in immunization and the broader context of promoting safe vaccines and safety of all injections (Whyte S. R. 2008).

In Sudan, the use of injection is very common and it is a common practice for both medical professional and the public who believe in injectable medication more than on oral medication. Most of those injections are yet not used safely.
1-3 Justification and Rationale

It was observed that, there is a high use of injections in Wad Medani Teaching Hospital. Most of these injections were delivered unsafely to the patients. It was judged that, there were multiple factors behind the unsafe injection practice, such as lack of proper disposable syringes, health providers and the absence of continuous inservice training to health providers. Therefore this study was proposed to assess the impact of inservice training programme in improving safe injection practices among nurses.

1-4 Objectives

1-4-1 General objective

To assess the impact of inservice training program about safe injection practices among nurses in Wad Medani Teaching Hospital during the period from July 2010 to January 2011.

1-4-2 Specific objectives

1- To assess the current nurses knowledge and practices regarding safe injections.
2- To implement a training program for nurses on injection safety.
3- To assess the effect of the applied training program on the nurses knowledge and clinical performance about safe injection.
2. Literature Review

2.1 Definition of In-service training:

In-service training activities enable people working in the field of adult learning to undertake a training course abroad. Participants should improve their practical teaching, coaching, counselling or management skills and gain a broader understanding of adult learning in Europe.

To receive funding, training must relate to the candidate’s professional activities in any aspect of adult learning, whether formal, non-formal or informal. Relevant topics include:

- the content and delivery of adult education, in particular course content and teaching methodologies;
- the accessibility of learning opportunities for adults, in particular for disadvantaged social groups;
- the management of adult learning, including governance at local and regional level, administration, quality assurance, support services such as counselling and guidance and developing community-based schemes for adult learning;
- the system/policy-related aspects of adult education including all types of strategic issues, funding models, development of co-operation between providers in the context of learning regions, indicators and benchmarking.

In-service training can last from five working days to six weeks. Grants for more informal training such as a placement or observation period (job-shadowing) in an adult education organisation or a public or non-
governmental organization, are available under the Grundtvig Visits and Exchanges for Adult Education Staff.

**How to participate**

- The Comenius-Grundtvig training database, helps applicants to identify training which best meets their needs and is eligible for funding under this action. However, applicants may also choose training which is not listed in the database, provided that it meets the necessary criteria. This will be determined by the relevant national agency.
- More details for organizations wishing to register an in-service training course in the Comenius-Grundtvig training database. (World Health Organization; 2005).

**2.2 Definition of injection**

An injection is skin – piercing event performed with a syringe and needle with the purpose of introducing a curative substance or vaccinate a patient by intramuscular (I.M), intra-venous (I.V), subcutaneous (SC) and Intra-dermal (I.D) route, this excludes all other skin piercing such as tattoos and body piercing (Kan A et al., 2000).

**2.3 History of injection:**

Injection therapy was first introduced to the developing world population with mass campaigns against Yaws and Kala-azar in 1920, it became wide spread after the second World War following the introduction of penicillin (Kan A et al., 2000). Anthropologists have described the
flourishing business of untrained “injection doctors” in several developing countries (Weistoin (2000), (Reeter AV. 2002).

2.4 Perception of efficacy of injection:

The principle reason from many developing countries. Seems to vary with the culture concerned, biomedicine and have often been portrayed as such in health and vaccination campaigns. Since professionals frequently use injections to treat serious illness, it is understandable that injections have been perceived as powerful and technologically advanced. However, injections are often classified and used in ways that are markedly at variance with biomedical intentions, and may even be irrational from the biomedical point of view. This is because injections have been introduced into cultural context where others explanatory models for illness prevail in certain culture, injections may be considered more appropriate for some age groups than for others. The pain associated with inserting a needle may be perceived as a sign of strong medicine. Injections may also be perceived as particularly effective because of the direct entry into the blood stream or because they are believed to “run in the blood stream (Etkin NL, 2008). Another explanation is that they are “hotter” than other type of medicine (or they constitute a cold substance (Cunningham CE, 2002).

2.5 Frequency of Injection:

Data on the prevalence of injection were collected from WHO reports, published anthropological household surveys and epidemiological case control studies (injection-used among healthy control) and were converted into conservative estimates of the number of injections per person per year. From anthropological interview surveys by weekly household injection-rate were converted to estimate the average yearly rate per person. The number
of injection per person per year was estimated for 13 countries representing five regions. The highest injection frequency documented was 500 per year an institutionalized orphan in a country in the former Soviet Union; A healthy infant received 20 injections and institutionalized children 120 injections per year on average (Khan A, J, et al, 2009).

2.6 Anatomy and complications of injection’s routes:

2.6.1 Intramuscular injection:

- Anatomy

Following a major operation, a patient was placed on a course of antibiotics which were to be delivered via intramuscular injection to the buttocks. After one of these injections, the patient complained of more pain than usual in the region of the injection. Later, as the patient was taking his afternoon walk in the hall, the nurse noticed that he was walking with a limp that had not been present before--his left hip dropped every time he lifted his left foot off the floor, but on the right side, his pelvis remained level when he lifted up his right foot. The doctor was called, and after a brief examination, she concluded that the injection had damaged a nerve that resulted in muscle weakness, which caused the patient's unusual limp. (Peterson, L. et al 2006).

- The Complications:

Intramuscular injection or IM injection is an injection given directly into the central area of specific muscle. It is used for administration of certain drugs that cannot be delivered in other ways such as intravenous, orally or subcutaneously. The blood vessels of the muscle dispense injected drug through cardiovascular system.
The intramuscular method provides faster rate of absorption comparing to subcutaneous one, but much slower comparing to intravenous route. IM injection shouldn’t be given if size and condition of the muscle can’t sustain adequate absorption of the medication. Also, these injections shouldn’t be given at painful site. (Mahdi Sahal. 2012).

2.6.2 Intravenous injection:

- Anatomy

The simplest way to learn anatomy is to observe and dissect specimens. However, most students are not going to have a cadaver or anything of that nature lying around at home (well you’d hope not). As such, somehow the knowledge that usually has been briefly picked up in a practical class has to be reinforced in a sterile environment. (Aaron Sparshott, 2010)

The Complications:

Complications of gaining I.V. may include infiltration, hematoma, an air embolism, phlebitis, extravascular drug administration, and intraarterial injection. Intraarterial injection is more rare, but as threatening.

a. Infiltration: Infiltration is the infusion of fluid and/or medication outside the intravascular space, into the surrounding soft tissue. Generally caused by poor placement of a needle or angiocath outside of the vessel lumen. Clinically, you will notice swelling of the soft tissue surrounding the IV, and the skin will feel cool, firm, and pale. Small amounts of IV fluid will have little consequence, but certain medications even in small amounts can be very toxic to the surrounding soft tissue.
b. **Hematoma**: A hematoma occurs when there is leakage of blood from the vessel into the surrounding soft tissue. This can occur when an IV angiocatheter passes through more than one wall of a vessel or if pressure is not applied to the IV site when the catheter is removed. A hematoma can be controlled with direct pressure and will resolve over the course of 2 weeks.

c. **Air Embolism**: Air embolism occurs as a result of a large volume of air entering the patient's vein via the I.V. administration set. The I.V. tubing holds about 13 CCs of air, and a patient can generally tolerate up to 1 CC per kilogram of weight of air; small children are at greater risk. Air embolisms are easily prevented by making sure that all the air bubbles are out of the I.V. tubing; fortunately, it is an extremely rare complication.

d. **Phlebitis and Thrombophlebitis**: Phlebitis and thrombophlebitis occur more frequently. Phlebitis is inflammation of the vein which occurs due to the pH of the agent being administered during the administration of the I.V, while thrombophlebitis refers to inflammation associated with a thrombus. Both are more common on the dorsum of the hand than on the antecubital facia and may occur especially in hospitalized patients where an I.V. may be in for several days, where use of an angiocatheter, as opposed to a needle, can increase the risk of phlebitis, as the metal needle is less irritating to the endothelium. (Needles are generally used for short term IV access of less than three hours, while angiocaths are used for longer periods of time.) The infusate itself may cause phlebitis and may be irritating to the skin. Older patients are also more susceptible to phlebitis.
Treatment is generally elevating the site, providing warm compresses and administering non-steroidal agents to the patient. Anticoagulants and antibiotics are usually not required. (Hawkins, J.M. et al, 2008).

2.6.3 Intradermal Injection:

- Anatomy

The simulator features a forearm from the wrist to just below the elbow. Vinyl skin provides realistic feel and appearance to ensure a realistic training experience. The simulator features eight sites for practicing intradermal injections. If fluid is properly injected, a characteristic skin welt will form. The welt is removed by withdrawing the fluid after practice. Each site is reusable by dozens of students. (WHO 2010)

- Complications

Intradermal injections are injections given to a patient in which the goal is to empty the contents of the syringe between the layers of the skin.

Intradermal injection is often used for conducting skin allergy tests and testing for antibody formation. This is a painful procedure and is used only with small amounts of solution. The nurse should ensure that the needle is inserted into the epidermis, not subcutaneously, as absorption would be reduced. It is imperative that the following information is reviewed prior to administration of any medication: the right patient, the right medicine, the right route, the right dose, the right site, and the right time. Because this method of injection is often used in allergy testing, it is important that latex-free syringes are used. (WHO 2010)
2.6.4 Subcutaneous Injection

- Anatomy

Subcutaneous infusion ports (SIPs) represent a valid method for long-term chemotherapy. The SIPs have several advantages over other methods of venous access: they are easy to implant under local anaesthesia, have less discomfort for the patients, allow low costs, can be implanted in day hospital, and can be managed ambulatorily. However, SIPs have delayed complications, frequently related to clinical conditions of the neoplastic patients, and immediate complications, often due to the placement technique. From March 1992 to March 1997 we placed, under local anaesthesia and under fluoroscopic control, 102 SIPs in 99 general oncology patients for long-term chemotherapy (88% solid, 12% haematological tumours). (Lee; H C et al 2002).

- Complications:

Subcutaneous emphysema, pneumomediastinum, and tension pneumothorax are previously unreported complications of shoulder arthroscopy with subacromial decompression. Three patients developed extensive subcutaneous emphysema, pneumomediastinum, and bilateral tension pneumothorax during or immediately after shoulder arthroscopy with subacromial decompression. The procedure was terminated and appropriate treatment was given. All three patients recovered completely with no residual damage. The complications are thought to be associated with the extravasation of air that may be drawn in from the lateral portal when the arthroscopic infusion pump and power shaver with suction are turned on.
Early diagnosis, followed by immediate termination of the infusion pump and suction shaver along with appropriate treatment can be life-saving. (Lee; H C et al 2002).

2.7 The indication of injection:

Children under five years of age have been reported to receive an inordinate number of injection. This may happen because a belief of that it is more appropriate for children to be given injections than to make them swallow medicine. (Ashwath. D et al., 2004).

2.8 The injections techniques:

2.8.1 Air bubble technique:

This is a technique that was popular in the Untied State (US). It arose historically from the use of glass syringes which required an added air bubble to ensure an accurate dose was given. It is no longer considered necessary to allow for the dead space in the syringe and needle, as plastic syringes are calibrated more accurately than glass ones, and it is no longer recommended by manufacturers. However, two recent studies into depot (oil-based, slow release) injections in the United Kingdom (UK) (Wolffers, I 2003). Compared the z track with the air bubble technique, which is also intended to seal the medication in after injection, suggested that the air bubble technique is more successful at preventing leakage than the z track technique, but findings were inconclusive.(Browner CH, 2008)

There are issues related to the accuracy of the dose when using this technique it may significantly increase the dose. Further research on this
technique needs to be undertaken as it is relatively new to the UK. However if it is used, the nurse should ensure that patient's dosages are adjusted to accommodate the addition of the air bubble, and that the technique is used consistently to ensure an accurate dose. (Browner CH, 2008).

2.8.2 Aspiration:

Although aspiration is no longer recommended for subcutaneous (SC) injections, it should be practiced in IM injections. If a needle is mistakenly placed in a blood vessel, the drug may be given intravenously by mistake and could cause an embolus as a result of the chemical components of the drug. Following insertion into the muscle, aspiration maintained for several seconds to allow blood to appear, especially if a narrow bore needle is used. If blood is aspirated, the syringe should be discarded and a fresh drug prepared. If no blood appears, proceed to inject at a rate of approximately 1 ml every ten seconds. This may seem slow, but it allows time for the muscle fibers to expand and absorb the solution. There should also be a ten second wait before withdrawal of the needle, to allow the medication to diffuse into the muscle before the needle is finally withdrawn. If there is seepage from the site, slight pressure using a gauze swab can be applied. A small plaster may be required at the site. Massage of the site should be discouraged because it may cause the drug to leak from the needle entry site and irritate local tissues (Browner CH, 2008).

2.9 Definition of safe injection:

Safe injection is defined as one that does not harm the recipient, the health care worker or the community (Sciortino R, 2003).
2.9.1 Safe injection methods

2.9.1.1 The checking of Ten rights:

Those are the rights that must be checked before introduction of any medication to the patient to avoid medication's mistakes between the patients (Lillis, C. et al, 2004).

1. The right patient: The health worker must checked the patient's name from his first name to his grand grandfather's name.
2. The right drug: The health worker must checked the medical compound of medication which were prescribed by the doctor (Doctor).
3. The right route: The health worker must introduced the drug according to the route which was prescribed by the Doctor orally. Inhalotry, injectable etc.
4. The right dose: To introduce the exact dose to the patient as Doctor ordered e.g. if the Doctor prescribed a quarter million of Benzile-penicillin to a child every four hours (q4 hr), it must be introduced exactly neither exceed nor decrease.

   The proper administration of a medication depends on the nurse's ability to compute medication doses accurately and measure medications correctly. A careless mistake in placing a decimal point or adding a zero to a dose can lead to a fatal error. The nurse is responsible for checking the dose before giving a medication. (Sara L. 2007).
5. The right duration: The health workers must check the frequency of the drug is given to the patient which it is twice a day (bd), three times a day (tds) or every 6 hours (q6hs) or when needed (sos)…etc..
6. The right time: The health worker must check the period of time for how long, the date of starting and the date of ending.
7. The right date: The health worker must check that if the medication on date or expired.
8. The side effect: The health worker must be aware about the side effect of the medication to report to the Doctor when needed e.g.: to avoid occurrence of dehydration if the side effect of medication is diarrhoea
9. Chemical compounds: The health worker must introduce drug formula as Doctor ordered to avoid complications of medication that not prescribed as Doctor orders.
10. The medical register: The health worker must never and ever introduce any medication to the patient that is not registered in the ministry of Health. (Lillis, C. et al, 2004).

2.9.1.2 Communication with patient:

The nurse must explain and discuss the procedure with patient. A survey which conducted in developing county (Bangladesh) on ten HC revealed that 42% of the patients seeking treatment in the HC during two weeks period received one or more injections. In many cases, the patient did not know what type of injection was administered. (Browner CH. (2008)).

2.9.1.3 Hands washing:

2.9.1.3.1 Purpose of hands washing during giving injection therapy:

As hand washing is essential for protecting one self it is very essential when nursing practice by hand washing before giving any injection. Hand
washing is a simple habit that can help keep the person healthy. Learn the benefits of good hand hygiene, when to wash the hands and how to clean them properly. Hand washing is something most people do without thinking. Yet hand washing, when done properly, is one of the best ways to avoid getting sick. This simple habit requires only soap and warm water or an alcohol-based hand sanitizer (a cleanser that doesn't require water). (Qadhi S. A. 2003).

Despite the proven health benefits of hand washing, many people don't practice this habit as often as they should - even after using the toilet. Throughout the day people accumulate germs on the hands from a variety of sources, such as direct contact with people, contaminated surfaces, foods, even animals and animal waste. Infectious diseases that are commonly spread through hand-to-hand contact include the common cold, flu and several gastrointestinal disorders, such as infectious diarrhea. While most people will get over a cold, influenza can be much more serious. Some people with the flu, particularly older adults and people with chronic medical problems, can develop pneumonia. The combination of the flu and pneumonia, in fact, is the eighth-leading cause of death among Americans. Inadequate hand hygiene also contributes to food-related illnesses, such as salmonella and E. coli infection. According to the Centers for Disease Control and Prevention, it was found that about 76 million Americans get a food-borne illness each year and about 5,000 of them were died as a result of their illness. (Qadhi S. A. 2003)

Good hand-washing techniques include washing the hands with soap and water or using an alcohol-based hand sanitizer. Antimicrobial wipes are
just as effective as soap and water in cleaning the hands but aren't as good as alcohol-based sanitizers. Antibacterial soaps have become increasingly popular in recent years. However, these soaps are no more effective at killing germs than regular soap. Using antibacterial soaps may lead to the development of bacteria that are resistant to the products' antimicrobial agents - making it even harder to kill these germs in the future. In general, regular soap is fine. The combination of scrubbing the hands with soap - antibacterial or not - and rinsing them with water loosens and removes bacteria from the hands. (Qadhi S. A. 2003)

2.10 Safe disposal of waste:

After any injection procedure care of equipment and returned back and dispose the sharp such as needles, blood glucose lancets, intravenous cannula and catheter stylets, it is important not only in relation to maintaining a safe environment, but also in preventing cross-infection. In a critical review the (indicated that sharps injuries are the most common cause of blood-borne cross-infection in health-care professionals. (Ugalde A, Homedes, N, 2008)

The main reason for the need to dispose off sharps safely is the prevention of cross-infection through needle stick injuries. The most common infections arising from blood-borne transmission are bacterial infections and viral infections, such as hepatitis B, hepatitis C and HIV. In the first instance, it is the injured health-care professional who is at risk of contamination from a patient source. However, the professional may then pass the infection back to other patients. (Ugalde A, Homedes, N, 2008).
A second important reason for ensuring the safe disposal of sharps is the professional and moral responsibility held by nurses to protect patients and colleagues from mental harm. The distress which almost invariably occurs following sharps injuries is concerned with individuals' understandable fear of the blood transmission of bacteria and viruses. (Ugalde A, Homedes, N, 2008).

Re-sheathing needles is said to increase the risk of injury from accidental stabbing. (Ugalde A, Homedes, N, 2008) found a reduction in needle stick injuries following the introduction of policies which advocate that needles should not be re-capped. Russell (2000) suggested that if uncapped needles are placed in flimsy trays, there is a risk that the needle will penetrate the container. Russell (2000) supported this view by added that staff may intuitively re-sheath needles, despite the official policy, in an assumption that transporting unsheathed needles places themselves and others at a greater risk. Nevertheless, recommendations that needles should not be re-sheathed, continue to inform most local clinical policies. (Ugalde A, Homedes, N, 2008)

2.10.1 Risk of sharps injuries:

As noted by Weltman (2005), sharps boxes placed more than four feet above the ground are associated with increased risk of sharps injuries. On children's wards, however, sharps boxes must always be positioned where young children cannot gain access to them, and for this reason should not be placed on the floor. Preferably take a sharps bin to the patient. Always place sharps carefully into the container and never drop or throw them from a
distance. Never put fingers into the sharps container, not kick or shake the container in order to make more room. Do not attempt to clean the sharps container, particularly around the lip. If there is a concern regarding the container, it should be disposed regardless of how full it is. The responsibility for the disposal of sharps lies with the individual who has been using them (Weltman, 2005).

2.10.2 Disposing of needles and syringes at home:

Community Trusts should have clear polices on the disposal of sharps used in clients' homes. Kiernan (2004), suggested that sharps containers should be located in the individual's home and that they should be removed, two-thirds full, by the local clinical waste disposal collection services. Syringes can be disposed off in Opaque, hard plastic containers, which are then sealed. With the specific agreement of local authorities, the containers can be disposed of with the household waste. (Kiernan, 2004)

Sharps containers should not be over-filled. Generally, this means that they should be sealed once they are two thirds full. Containers should be sealed according to the manufacturer's instructions. On many containers these may be found on the outside of the box. In addition, Trusts may request extra precautions e.g. sealing over the lid with tape marked 'hazard'. Sealed containers should be left at identified collection points in the manner prescribed by the local policy, and labeled with date and source. "The cost of unsafe injection". (Kiernan, 2004)
2.11 Sharps injuries:

All health-care employers are required to develop mechanisms for dealing with sharps injuries. These mechanisms include identifying the employee's responsibility to report the injury and here subsequent entitlement to be provided with counseling and testing services. However, before this stage is reached emergency action should be taken. Although the evidence suggested that vigorous washing of the wound is beneficial following a sharps injury as said by Miller, there is no evidence to indicate that promoting bleeding at the site is effective in 'cleaning' the wound. Nevertheless, current practice is based upon the apparent logic of this idea. (Miller, M. A, 2000).

2.12. Definition of unsafe injection:

An unsafe injection is the one in which the syringes, needles or both, have been reused without sterilization (Cunningham CE, 2002).

2.12.1 The causes of unsafe injection:

a) Wrong indications: Clearly the administration of injection in developing countries often leaves much to be received many injections are given for the wrong indication, such as acute respiratory infection, diarrhea, fever, skin infections. In some countries children seem to be receiving alarmingly large number of injection (Cunningham CE, 2002).

b) Lack of specialized practitioners: The domestic sector is characterized by lack of specialization and by the absence of payment for injection administered. Family members and friends administer injection as a sign of concern and care. In some countries it is common to have their own
injecting equipment. For example, 213 Hispanic women in Los Angeles, stated that, some body in the household or volunteer administered an injection for them the previous six months.

(c) Sharing of injection equipment: Some group (people in Los Angeles of household regarded the sharing of injection equipment as being comparable to sharing a thermometer. Injection equipment was cleaned with water (sometimes with soap and alcohol Cunningham CE, 2002).

d) Unsatisfied sterilizing practices: Administration and sterilization practices are insatisfactory in many places (7,11). Because health workers’ have insufficient knowledge or there is a lack of equipment.

e) Wide spread popular use of injection: Qualitative studies from developing countries have pointed to the wide spread populatary used of injections in addition to their use by formal and informal providers, evidence of the use of injection and injection equipment by lay people (Weistoin ,2000).

f) Rare of proper materials: Proper disposal of used materials were rarely applied (Haile D, Behane Y, 2004).

g) Lack of awareness: Although the official EPI choice was to use disposable equipment, use of combination of sterilizable and disposal equipment was observed in the field. (Cunningham CE, 2002).

h) Failure of nursing practices: Unsafe injection in developing countries was generally due to failure to integrate nursing practices and public awareness of safety issues and absence of influence of Expanded Program Immunization (EPI) managers on health care delivery.

i) The rapid change occurring in societies:
It is important to recognize that, the rapid changes in societies have impact on the use of injections. The social and economic change brought about by education, migration and urbanization altered models of production and new family patterns can be expected influence people’s treatment’s strategies and the accessibility of different providers. (Ashwath. D et al., 2003).

j) Lack of knowledge of sterilization: The lack of trust of government in institution and the fear of AIDS have led people to apply their own ideas on how to make injection safe. Ashwath suggested that trust in injection administration in public institution may be restored by demonstrating the sterile chain procedures. This might also give people ideas on how to improve sterilization practice in their homes (Ashwath. D et al., 2003).

2.12.2 Complications of unsafe Injections:

a- Blood borne pathogen infection:

Epidemiological research links the large number of unsafe injections such as viral hepatitis B & C and Acquired Immunodeficiency Syndrome (AIDS). The unnecessary or unsafe use by different types of providers. Intervention aimed at reducing the risk of unsafe injections are discussed in relation to cultural and social factors as well as these factors associated with health system (Simonsen L. et al. 2001).

b) Human Immunodeficiency Virus:

Over the period 1989 – 1991 it was found that 10% of all orphan in Romania became infected with HIV. Through a large number of unsafe injections given in hospital and institutions while transmission have been seen in the population by a practice of micro-transfusion involving imported
HIV. Contaminated blood product. In Ukraine, 1% of all children in a township were infected with HIV. Over one year period these transmissions were linked to unsafe injection IV. Antibiotics and routine immunizations were identified as the major risk factor, after blood transfusion and surgery had been ruled out (Simonsen L. et al, 200).

c) Transmission of hepatitis (B) through unsafe injection:

Nine studies convincingly linked unsafe injection and transmission of hepatitis B virus. In six, the population attributable risk of unsafe injection i.e.: the proportion of infection attributable to unsafe injection was estimated to be in the range between 20 – 80% for children and adult in China (including province of Taiwan), prior to the introduction of hepatitis B vaccination, exposure to unsafe injection was at least as risk a sharing sibling who was carrier of hepatitis B (Simonsen L. et al, 200).

d) Hepatitis (C) occur through unsafe injection:

Hepatitis C in Egypt nation wide campaigns against schistosomaisis in 1920 and hepatitis C virus, leading to the high current prevalence of the virus in the population over the course of weeks and the reuse of syringe without sterilization. In a village hyper endemic for hepatitis C in China (province of Taiwan). So unsafe injection is the major public health problem because it is considered the cause of infectious disease and transmission of blood borne pathogen infections that could be protected by immunization and protective measures. (Simonsen L. et al, 200).
2.12.3 Methods of protection from unsafe injection:

1. Hands washing with bactericidal soap and water or bactericidal alcohol hand rub.
2. Doctor, nurse and other health worker should be trained well about safe injection practice.
3. Sterilization of injection equipments pre and post administration of injections.
4. Prepare the drug as prescription using aseptic technique.
5. Check the required medication and the expiry date.
6. Avoid reuse of syringe and needle to decrease the prevalence of infectious diseases and blood borne pathogens.
7. Increase the knowledge about sterilization at home.
8. Health education programme to limit the popular use of injection.
9. Aware the community that injections should be administered under aseptic technique by an authorized person to avoid injection hazards.
10. Tell the practitioner to use nursing barrier during administration of injection (mask, gloves, caps, coat etc.). to protect himself and the patient.
11. All injections should administered as prescribed
13. All injection should be administered after checking the following: drug, dose, route and method of administration, time and date of drug, signature of doctor, diluents as appropriate and the prescription as legible ((Lisa Daugherty & Sara Lister, 2007)).

Sharps pose a potential hazard to nurses, other staff and the public. So all nurses must follow and trust local policy and handle and dispose of
sharps safely in order to prevent the risk of needle stick injury to themselves and colleagues. All Trusts have agreed procedures to follow in the event of a needle stick injury and these should be adhered to carefully.

Clients with acute or chronic alterations in their health have many modalities to help restore or maintain their health. A medication is a substance used in the diagnosis, treatment, cure relief, or prevention of health alterations. In fact, medications are the primary modality clients associate with restoration of health. Where these clients receive their health care either from hospitals, clinics or home. The nurse plays an essential role in medication administration, medication teaching, and evaluating maintenance of their health. The role of the nurse in medication activities is modified based on the setting of the client nurse interaction. In the primary care setting, the client often uses self-administrations medications. The nurse is responsible for evaluating the effects of the medications on the client's health status, teaching clients about their medications and their side effects, ensuring client technique when the client administers medications that are not given by mouth. In the acute care setting, nurses spend a great deal of time administering medication to clients. The nurse also ensures that clients are adequately prepared to administer their medications when they return to the community. In the home care setting clients usually administer their own medications. When clients cannot administer their own medications, family members or home health aids may be responsible for doing so. The nurse assesses the effect of the medications have in restoring or maintaining health and provides continued education to the client, family, or home health care personnel on mediation purpose and side effect. (Bhatia J C, et al, 2005)


2.13 Factors affecting the route of injection administration

The route prescribed for administering a medication depends on the medication's properties and desired effect and on the client's physical and mental condition. A nurse collaborates with the physician in determining the best route for a client's medication. (Sciortino, R. 2003).

Medications vary considerably in the way they act and their types of action. Factors other than characteristics of the medication also influence medication actions. A client may not respond in the same way to each successive dose of a medication. Likewise, the same medication dosage may cause very different responses in different clients. Therefore it is essential for the nurse to understand all the effects that medications can happen when taken by or given to clients. (Sciortino, R. 2003)

Nurses often have knowledge of factors that may alter or impair absorption of the medications that have been prescribed for their clients. This information is based on an understanding of medication pharmacokinetics, the nursing history, and the physical examination and knowledge gained through daily interactions with clients. The nurse uses this knowledge to ensure that all prescribed medications are administered correctly. It may be appropriate for the nurse to administer medications given 1/2 hour before, 1/2 hour after, and with meals or withhold medications if absorption is not likely to occur. The nurse consults and collaborates with the client's prescribers to ensure that the client achieves the therapeutic effect of all medications. Before administering any medication, the nurse should consult pharmacology books or drug references, package
inserts, or pharmacists to identify medication-medications interactions or medication-nutrient interactions. (Sciortino, R. 2003).

2.14 Medication regulations and nursing practice.

Nurse practice acts have the most influence over using practice by defining the scope of a nurse's professional functions and responsibilities. In general, most nurses use practice acts are purposefully broad so as not to the professional responsibilities of the nurse. For example, most Nurse Practice Acts state that nurses can "execute medical regime prescribed by a licensed physician". Institutions and agencies may interpret specific actions allowed under the act's intent. The primary intent of the state Nurse Practice Acts is to protect the public from unskilled, undereducated, and unlicensed personnel. (Flaskerud JH, Nyamathi AM, 2006).

2.15 Related Studies:

Study done in Franc hospital found that 52.5% of the subjects were protecting by hepatitis (B) vaccination. Only 12.5% of nurses washed their hands with soap and water. While 3.7% of nurses used sterile gloves before administration of injection. The finding revealed that most of the nurses not followed protective measures and used sterile injection equipments. (Lyon, 2004).

In a study conducted in Geneva hospitals during 2001 – 2004 to assess nurses compliance with hand washing and the effect of hand washing in reduction of neonatal infection. Following a health education programme for nurses, the results showed significant improvement in nurses compliance
with hand washing from 42.6 to 55.6 and this was associated with infection risk reduction among neonatal and bacteremia caused by related pathogens markedly decreased. (Miller M. A. (2004).

There were many studies conducted in Africa regarding safe injection practice. One of them was conducted in Burkina Faso to observe 116 injections in 52 health units, it was found that 99% of injection were given single in 29 health units and 74% of staff recapped needless using the two hands. Also the results showed that the health units in Burkina Faso were using sterile injection equipments (Simon S. L. et al. (2006).)

In Sudan, injectable therapy is common but not yet was delivered unsafely which increased the incidence of infectious diseases, sterile abscesses and blood borne pathogen infections. Many studies were conducted regarding safe injection practice, one of them the one that conducted in Gezira state, at pediatric teaching hospital, Wad Medani to asses the effect of training programs on the knowledge and practices of 81 nurses about safe peripheral intravenous cannulation. The results revealed that the nurses identified the proper sites of I.V cannulation and followed aseptic technique. (Ahmed, B 2011).
3. Material and Methods

3.1. Study design:

A prospective interventional study was conducted in Wad Medani Teaching Hospital, Gezira State, Sudan, during the period from July 2010 to June 2011 to assess the outcome of inservice training program of nurses about safe injection in improving their administration of injection to patients.

3.2 Study area:

This study was conducted in Wad Medani Teaching Hospital, Gezira state, Sudan. Gezira state is one of the central states of Sudan, with an area of 25,000 Km2. And a total population of 3.5 million (CBS 2008). It is the second populous state after Khartoum state.

Wad Medani Teaching Hospital is the main teaching hospital in the state. It receives patients from all localities plus patients from neighboring states. There are many departments in the hospital, mainly medical and surgical departments plus chest, psychiatry, ear nose throat and orthopedics units.

The total number of nurses working in the hospital were estimated to be 142 nurses, 92 of them were working in medical and surgical wards.

There are six medical wards and four surgical wards.
Table (3.1) Shows distribution of nurses in surgical and medical wards in Wad Medani Teaching Hospital

<table>
<thead>
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<th>No of nurses</th>
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<tbody>
<tr>
<td>4</td>
<td>Male in medical wards</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Male in surgical wards</td>
<td>16</td>
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<tr>
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<td>Female in medical wards</td>
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<tr>
<td>2</td>
<td>Female in surgical wards</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>Total</td>
<td>92</td>
</tr>
</tbody>
</table>

3.3 Study population:

The populations of this study the nurses who were working in the 6 medical wards and 4 surgical wards at Wad Medani Teaching Hospital.

3.3.1 Inclusion criteria:

The nurses who worked in medical and surgical wards.

3.3.2 Exclusion criteria:

The nurses who worked in the other wards and under training.

3.4 Sample Size:

The total number of the nurses who worked in medical and surgical wards was estimated to be 92 nurses one third of them were selected due to limitation of staff nurse as follows:

A convent 30 nurses from them were selected $92/30 = 3$

(every third nurses were chosen from the nurses’ name list content, by stratified methods randomly).
Ethical clearance:

Permission from the head manager of the hospital and the Matron of nursing to collect the data through official letters was obtained.

3.5 Sampling technique:

1) Pre interventional phase:

   a) A pilot study was carried out on 10 nurses to test the validity and reliability of the tools.

   b) Observation checklist for 10 nurses was checked three month pre training program

2) Implementation phase:

   The researcher oriented the selected nurses about the program.

   - The researcher distributed the programme jacket containing handout about injection. (Appendix III)

   1) The training program was implemented for the selected nurses for two days starting from 8 am to 3 pm.

   2) The interview questionnaire was distributed to each nurse as pre test to be completed within 30 minutes under the guidance of the researcher.

   3) The researcher used audiovisual material, equipments and supplies to conduct the selected program (Theoretical and practical sessions).

   4) Every nurse participated in the procedures of injection by different route of administration under the supervision of the researcher.

3) Post interventional Phase:
a) The questionnaire was distributed to the selected subjects as post test to be completed within 30 minutes.

b) After three months memory gap from the training programme, the researcher observed each nurses during the injection administration using observation checklist to test their progress.

3.6. Data collection tools:

There were two tools used to collect the data:

**Tool I:**

A structured questionnaire was developed as a tool of data collection in order to measure the nurses knowledge concerning safe injection practices.

The questionnaire consisted of two parts:

- The first part: was about demographic characteristics of respondents (name, age, marital status, work, resident, education etc.)

- The second part: was about the respondent’s knowledge regarding safe injection practices. It included (definition of injection, risk factors, techniques, routes of administration, sterilization and protective measures.)(Appendix I).

**Tool II:**

**An observation checklist:**

- This tool was developed for assessing respondent's clinical performance, the checklist included, (injection techniques, equipments, protective equipments, route of administration, etc.). (Appendix II)

**Plan of action:**
Aims of courses:

The aim of this training program was to evaluate the respondent's knowledge and practices regarding safe injection practices.

Learning outcome:

By the end of this training program participants should be able to:

- Define the injection practices.
- Describe the factors that increase susceptibility of unsafe injections practices.
- Apply strategies measures for prevention of unsafe injections.
- Demonstrate the clinical nursing procedures regarding injection (I.M, SC, I.V, etc).
- Describe the important use of sterilization and hands hygiene pre and post procedures.

3.7 Data analysis:

The data were coded and analyzed using statistical package for social sciences (SPSS).
4. Results and Discussion

4.1 Results

The age group:

Table (4-1): Showed age distribution of the nurses

\[\text{No} = (30)\]

<table>
<thead>
<tr>
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<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>26.7</td>
</tr>
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<td>56.7</td>
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<tr>
<td>31 – 35</td>
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<td>36 &lt; 40</td>
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<td>Total</td>
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<td>100.00%</td>
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</tbody>
</table>

\[\text{Chi-Square} \quad 0.000(b) \quad \text{Df.} \quad 1 \quad \text{P.value} \quad 1.000\]

This table showed that all of the nurses under 40 years of age where 56.7% of them their age raised between 26 – 30 years.
The nurses’ qualifications:

Figure (4-1) showed Distribution of the nurses according to their qualification. No = (30)

This figure showed that the majority of the nurses had nursing certificate (63.3%).
The nurses’ experiences:

Table (4-2) showed the distribution of nurses according to their years of experiences.

<table>
<thead>
<tr>
<th>Years of experience</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>1 - 5 years</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>6 - 10 years</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>2</td>
<td>6.6</td>
</tr>
</tbody>
</table>

This table showed that 40% of nurses’ their years of experience ranged between 6 to 10 years.

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>.271(b)</th>
<th>Df 1</th>
<th>P.value</th>
<th>.602</th>
</tr>
</thead>
</table>

- 36 -
The nurses’ knowledge:

Table (4-3): Showed the knowledge of the nurses about injection's practices pre and post training program.

No=(30)

<table>
<thead>
<tr>
<th>Nurses knowledge about:</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Injection's routes</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Sterilization of equipments</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Site of injection</td>
<td>18</td>
<td>60</td>
</tr>
</tbody>
</table>

This table showed the nurses knowledge increased in post training program regarding routes of injection administration.

**Chi-Square 3.068(b) Df 1 P.value .080**
The nurses’ knowledge:

Table (4-4) Distribution of the selected nurses according to their knowledge about safe injection procedures in pre and post training program.

No = (30)

<table>
<thead>
<tr>
<th>Correct Knowledge about:</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Safe injection's practice</td>
<td>15</td>
<td>50.7</td>
</tr>
<tr>
<td>Precaution of safe injection practices</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Complications of unsafe injections</td>
<td>11</td>
<td>36.7</td>
</tr>
</tbody>
</table>

There was a significant improvement in the nurses knowledge regarding safe injection practices, whereas the correct knowledge regarding, safe injection practice (50.7% to be 100%), precaution of safe injection practice (40% to 93.3%). Complication of unsafe injections (36.7% to 100) respectively after training.

| Chi-Square | 3.068(b) | DF 1 | P.value .080 |
The nurses’ performance:

Figure (4-2): Distribution of the nurses according to their performance about correct methods of hands hygiene pre and post training program.

This figures showed that proper hands hygiene had significantly improved from 46% pre program to be 66.7% post program.


The nurses’ performance

Table (4-5) Distribution of the selected sample according to their performance about injection procedures

<table>
<thead>
<tr>
<th>Injection procedures</th>
<th>Pre</th>
<th>post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>correct and complete</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>correct and incomplete</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>incorrect</td>
<td>4</td>
<td>13.3</td>
</tr>
</tbody>
</table>

This table showed the performance of the nurses regarding steps of injection procedures was improved from 56.7% pre intervention program to 83.3% post interventional program
The Nurses’ performance:

Table (4-6) Distribution of the study subject related to their performance regarding care of the equipments.

<table>
<thead>
<tr>
<th>Care of injection equipments</th>
<th>Pre</th>
<th>post</th>
</tr>
</thead>
<tbody>
<tr>
<td>correct and complete</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>correct and incomplete</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Incorrect</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

This table revealed that the nurses’ performance about caring of injection equipment was improved from 33% to 73.3% post training program.

Chi Square .131(b)   Df 1   P.value .718
The nurses’ performance:

Table (4-7) Nurses distribution according to the using of protective equipments during injection practices

No = (30)

<table>
<thead>
<tr>
<th>Using of protective equipments</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used</td>
<td>Used</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Gloves</td>
<td>10</td>
<td>33%</td>
</tr>
<tr>
<td>Antiseptic solution</td>
<td>13</td>
<td>43.3%</td>
</tr>
<tr>
<td>Safety boxes</td>
<td>9</td>
<td>30%</td>
</tr>
</tbody>
</table>

About one third 33% of the nurses used gloves during injection, 43.3% of them used antiseptic solution, and 30% used safety boxes, pre training program, these respectively increased post training program.

| Chi-Square | .884(b) | Df  1 | P.value .347 |
The nurses’ performance:

Table (4-8) showed the proper site of injection through different routes.

No = (30)

<table>
<thead>
<tr>
<th>The proper site of injection</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Intra-venous injection</td>
<td>21</td>
<td>70</td>
</tr>
<tr>
<td>Intra-muscular</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>Sub-cautious injection</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>Intra-dermal injection</td>
<td>12</td>
<td>40</td>
</tr>
</tbody>
</table>

There was a significant improvement of nurses’ performance regarding proper site of injection post training.

Chi-Square .884(b) Df 1 P.value .347
The nurses’ performance:

Figure (4-3): Showed performance of the nurses regarding the administration of injection through the recommended angles.

\[ \text{No} = (30) \]

![Bar chart showing the percentage of nurses' performance in different injection angles before and after the program.]

This figures revealed that the majority of the nurses were skill about the degree of angles of injection post program.

| Chi-Square | 3.068(b) | Df 1 | P.value .080 |
The nurses’ performance:

Table (4-9) Clinical Performance Pre & Post training programme

<table>
<thead>
<tr>
<th>The correct injection procedures:</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>1- Check the 10 rights (drug, dose, time etc.)</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>2- Check the patient prescription chart.</td>
<td>17</td>
<td>56.7</td>
</tr>
<tr>
<td>3- Explain and discuss the procedure with the patient.</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>4- Screen the patient when necessary</td>
<td>19</td>
<td>63.3</td>
</tr>
<tr>
<td>5- Comfort the patient</td>
<td>30</td>
<td>100</td>
</tr>
<tr>
<td>6- Recording: time, date, procedure and signature</td>
<td>19</td>
<td>63.3</td>
</tr>
</tbody>
</table>

This table shows the overall performance of nurses regarding safe injection were improved post training program.
4.2 Discussion

Injection therapy is considered routes of choice for the treatment of many chronic diseases especially in developing countries.

This study was conducted to assess the knowledge and practices of the nurses in medical and surgical wards at Wad Medani Teaching Hospital from the period July 2010 to January 2011 in order to improve their knowledge and practices regarding safe injection practices through training program.

Regarding qualification of the study groups there was 63.4% had a nursing certificate and 36.6% of them had either technical diploma or B.Sc. graduate degrees, this reflect that there was a lack of a skill in qualification of nurses to wards diploma and bachelor degree as in (Figure 4.1). This goes in line with (Cunningham CE, 2002) which stated that giving an injection safely is considered a basic fundamental nursing activity which required knowledge of anatomy, physiology, pharmacology, psychology, communication, skills and experiences.

Long period practices acquired good experience, most of the nurses who were working in medical and surgical wards were expended ranged between 6 to 10 years as shown in (Table 4.2) with percentage 40%. This goes in line with (Flaskerud JH, Nyamathi AM, 2006) who reported that in Los Angeles, domestic sectors characterized by lack of
specialization so family members and friends administer injection as a sign of concern and care.

Hands hygiene which is a very basic and important practicing the care given (nurse), the patient and other patients know causes of infection. This practice was improved from 40% the pre test to be 66.7% the post test (Figure 4.2). This finding similar to the results conducted in Geneva to assess the reduction of health care associated infection in neonate by successful hands hygiene promotion in which nurse compliance with hand washing increase from 41% pre interventional phase to 55% the post interventional phase (Miller M. A. 2004).

Regarding safe injection practices, the nurses’ knowledge of sterilization were 73.3% in the pre test, this increased in post test to be 100% (Table 4-3). This finding similar to some groups in Los Angeles were cleaned injection equipments with water, sometimes with water and alcohol and used sterile gloves during administrating injection (Cunningham, 2002).

Also (Cunningham, 2002) reported that administration and sterilization practices are unsatisfactory in many places because health workers had insufficient knowledge or there was a lack of equipments, this results go in accordance with this results as (Table 4-3).
Regarding routes and sites of injection the knowledge was increased post training from 66% to 100% and from 60% to 90% respectively. This result similar to study by Flakerud JH, Nyamathi AM, (2006) who conducted that the nurses knowledge about injection routes and sites were significantly increase post program.

Regarding the complications of unsafe injection practices as in (Table 4-6) the knowledge of the nurses improved from 36% to 100% in the post training program. This finding goes in line with (Workman, 2000) who reported that epidemiological research links the large number of unsafe injections such as viral hepatitis B and C and acquired Human Immunodeficiency Virus (AIDS) in unnecessary or unsafe different types of providers.

The nurses’ performance regarding injection practice improved from 56.7% in the pre-test to be 83.3% in the post test (Table 4-4). This finding stated that the major causative of unsafe injection practices is the absence of in service training program. This finding similar to unsafe injection in developing countries were generally due to failure of integrate nursing practices and public awareness of safety issues and absence of influence expanded program managers on health care delivery (Ashwath, D, et al, 2003).

Regarding the recommended angles the performances of the nurses improved to 100% the post training program. This findings goes in line with (Bulletin of the WHO, 2002) which revealed that an
injection is skin – percing event performed with needle and syringe with the purpose introducing a curative substance or vaccinate a patient by intramuscular (I.M), intravenous (I.V), intradermal (I.D) or subcutaneous routes (SC), as in table (4-8) also. This similar to a study that conducted at Pediatric Teaching Hospital at Wad Medani to assess the knowledge and practice among 81 nurses regarding peripheral intravenous cannulation and cannula care. The finding stated that the knowledge and performance were improved in the post training phase. (Ahmed, B, 2011).

Regarding care of injection equipment the performance of the nurses improved from 43.3% to 16.7% in the post phase (table 4-6), while using of protective gloves increased from 33% in the pre phase to 73.3% in the post phase (Table 4-7). This finding goes in line with (WHO, 2000) which revealed that some trust polices that required gloves and apron to be worn during injection procedure. It should be remember that glove protect the nurses from drug – included allergy and does not offer any protection against needle stick injuries. These findings similar to the study which conducted in France Hospital to protect 52.5% subjects by Hepatitis B vaccination, most of the nurses washed their hands with soap and water while the others used sterile gloves. The finding stated that all nurses followed aseptic techniques and used sterile injection equipments (Lyon, 2004).
Using of safety boxes for sharp disposed had increased from 30% in pre test to 87% in the post test (Table 4-7). In the study conducted in Burkina Faso to observe 116 injection in 52 health units. It was found that 66% of health units discarded the sharp in open. (Simon S. L. 2006), which goes with the finding of this study in pre interventional phase.

Counseling of the patient, explanation and discussion the procedure with the patient is a universal recommendation (Fundamental of nursing, 2003), only 46.7% of the nurses explained the procedure with the patient, in the pre test. This finding similar to a survey which conducted in developing countries (Bangladesh) for ten health center revealed that 42% of the patients seeking treatment in the HC during two weeks period received one or more injections. In many cases, the patient did not know what type of injection was administered.(Browner CH. 2008).

Using of alcohol disinfectant prevent injection site against infection (Table 4-7). This procedure developed from 43.3% in pre test to be 100% in the post phase. This goes in line with what was reported by (Alexander C, et al, 2007) skin disinfectant is practiced, the skin should be cleaned with an alcohol swab for at least 30 seconds then allowed to dry for at least 30 seconds, otherwise it is in effective, so this method must be considered to avoid occurrence of infections. (Alexander C, et al, 2007)
5. Conclusion and Recommendation

5.1 Conclusion

Based on the results of this study the researcher concluded that:

- The knowledge and practices of the nurses about safe injection in pre intervention phase were lacking but it significantly improved following the intervention training program, and hence the importance of in-service training.
5.2 Recommendations:

Based on the conclusion of this study, the researcher recommended the following:

1- Continuous inservice training program for the nurses on safe injection practices.

2- Development of standard operational procedures guideline (log book) and should be available at all units in the hospitals

3- Periodic monitoring and supervision of staff nurse in the hospital to assess their level of performance and to ensure plans of action were taken and implemented.
References


2. AHMED B. M (2011). The Impact of a Training Programme on Nurses’ Knowledge and Practice Regarding Peripheral Intravenous Cannulation at Wad Medani Paediatric Teaching Hospital, Department of Nursing Faculty of Applied Medical Sciences. University of Gezira Gezira state, Sudan.


17. **Mahdi Sahal. (2012).** Complications of IM injections


27. **Simon S. L. et al. (2006).** Unsafe injections practices – Reducing the risk factors of unsafe injections practice in parental injection, effectiveness implementation, health units staff in Burkina Faso.


Appendix I (a)

Questionnaire about safe injections among the nurses in Medical and Surgical Wards in Wad Medani Teaching Hospital

1/ Personal data:
Name: .................................................................
Age: .................................................................
2/ Sex: 1) Male ( ) 2) female ( )
3/ Experience: ........................................................
4/ Academic qualifications:-
   1) Primary ( )
   2) Secondary ( )
   3) University ( )
5/ Employment:
   1) Nursing technician ( )
   2) Nursing certificate ( )
   3) Administrator ( )
   4) Other. ( )
6/ Employment qualifications:
   1) Bachelor Nursing ( )
   2) Nursing Diploma ( )
   3) Nursing certificate ( )
4) Other ( )

7/ Safe injection means:
1) Injection does not harm the patient ( )
2) The one that not harm the health worker ( )
3) The one that not harm the community ( )
4) Other ( )

8/ Methods of administration of injections:
1) Intramuscular injection (I.M) ( )
2) Intradermal (I.D) ( )
3) Intravenous injection (I.V) ( )
4) Abdominal injection ( )

9/ Which method do you practice more:
1) Intramuscular ( )
2) Intravenous ( )
3) Subcutaneous ( )
4) Intradermal ( )

10/ Answer with Yes, or No.
1) Is there any water in the ward ( )
2) Do you wash your hands pre and post injections ( )
3) Is there soap or antiseptic solution in the ward ( )

11/ Indication for canulation:
1) For an open intravenous line ( )
2) To comfort the patient ( )
3) For fluids replacement ( )
4) For surgical preparations ( )

12/ The positions for intramuscular injections:
1) Deltoid muscles ( )
2) Gluteal muscle ( )

13/ What do you do during injection complications

14/ When conulation be changed:
1) After 48 hours in adult ( )
2) After 72 hours in children ( )
3) According to Drs orders  

15/ Which antiseptic solution used for injections:
   1) Detol  
   2) Phenol  
   3) Yamedine  
   4) Spirit  

16/ Does the syringe reused for the same patient:
   1) Yes,  
   2) No,  

17/ when does injection be saved:
   1) Reused of syringe  
   2) Using of treatment measures  
   3) Using of protective measures  
   4) Thra-washing of equipments  
   5) Other  

Unsafe injections for
   1) Viral hepatitis  
   2) Abscesses  
   3) Aids  

18/ Pre administration of injection you should do:
   1) Check the  5 rights  
   2) Medical hands washing  
   3) Surgical hands washing  
   4) Explain and discuss the procedure with the patients  

19/ Which method of injection is quick action:
   1) Intra-muscular  
   2) Intra-dermal  
   3) Intra-abdominal  
   4) Intra-venous  

20/ The 10 rights are:
   1) The right date  
   2) Side effects  
   3) The right does  

- 59 -
4) The right times

21/ Hands washing means:
1) Thra-washing with soap & water
2) Using of antiseptic soap
3) Rotating washing of every finger
4) Washing of palm & surface of hands

22/ Asepsis means:
1) Killing of all vital & microorganism factors that surrounded
2) The surgical equipments
3) Surgical environments
4) Equipment from micro-organisms

23/ The methods of sterilization are:
1) Boiling
2) Steam under pressure
3) Using of antiseptic solution
4) Exposure to sunlight
## Appendix II (a)

### Observation checklist

<table>
<thead>
<tr>
<th>The general injection procedures:</th>
<th>Applied correctly</th>
<th>Applied not correctly</th>
<th>Not applied at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>7- Check the 10 rights (drug, dose, time etc).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8- Check the patient prescription chart.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9- Explain and discuss the procedure with the patient.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10- Remove jewels, wash hands &amp; wear gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11- Screen the patient when necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12- Follow a septic techniques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13- Choose proper position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- Clean and sterile the position with swab saturated with alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15- Comfort the patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16- Use clean and sterile equipments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17- Keep sharp instruments in safety boxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18- Wash hands post procedure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19- Equipments care and return back</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20- Records: time, date, procedure &amp; signature</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table showed proper position applied correctly by 22 nurses and the same number took care of equipments correctly.
**Observation checklist**

<table>
<thead>
<tr>
<th>The general injection procedures:</th>
<th>Applied correctly</th>
<th>incorrectly</th>
<th>Not applied at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Check the 10 rights (drug, dose, time etc).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2- Check the patient prescription chart.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3- Explain and discuss the procedure with the patient.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4- Remove jewels, wash hands &amp; wear gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5- Screen the patient when necessary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6- Follow a septic techniques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7- Choose proper position</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8- Clean and sterile the position with swab saturated with alcohol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9- Comfort the patient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10- Use clean and sterile equipments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11- Keep sharp instruments in safety boxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12- Wash hands post procedure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13- Equipments care and return back</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- Records: time, date, procedure &amp; signature</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table revealed that the performance of the nurses was improved and the steps of injection were applied properly.
Appendices I (b)

بسم الله الرحمن الرحيم

استبيان حول الحقن الآمن للمرضين بعناية الباطنية والجراحة بمستشفى ودمدنى التعليمي

أ/ البيانات الشخصية:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-</td>
<td>الاسم :</td>
</tr>
<tr>
<td>2-</td>
<td>العمر :</td>
</tr>
<tr>
<td>3-</td>
<td>النوع : ذكر/ أنثى</td>
</tr>
<tr>
<td>4-</td>
<td>عدد سنوات الخبرة :</td>
</tr>
<tr>
<td>5-</td>
<td>المؤهل الأكاديمي:</td>
</tr>
<tr>
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<td></td>
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<tr>
<td></td>
<td>أساس مكتمل</td>
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<tr>
<td>6-</td>
<td>الوظيفة :</td>
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<td>تقني تمريض</td>
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<tr>
<td></td>
<td>شهادة تمريض فنية</td>
</tr>
<tr>
<td></td>
<td>أخرى حدد</td>
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</tbody>
</table>

ب/ معلومات عن الحقن الآمن:

المقصود بالحقن الآمن:

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1-</td>
<td>الحقن الذي لا يضر بالمريض</td>
</tr>
<tr>
<td>2-</td>
<td>الحقن الذي لا يضر العامل الصحي</td>
</tr>
<tr>
<td>3-</td>
<td>الحقن الذي لا يضر بالمجتمع</td>
</tr>
<tr>
<td>4-</td>
<td>كل ما ذكر صحيح</td>
</tr>
</tbody>
</table>

9- طرق إعطاء الادواء عن طريق الحقن هي:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1-</td>
<td>عن طريق عضل الساعد</td>
</tr>
<tr>
<td>2-</td>
<td>تحت الجلد</td>
</tr>
<tr>
<td>3-</td>
<td>عند نخاع العظم</td>
</tr>
<tr>
<td>4-</td>
<td>حول جدر السرة</td>
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</tbody>
</table>

10- ما هي أكثر طريقة لزرق الادواء التي مارستها:

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<thead>
<tr>
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<tbody>
<tr>
<td>1-</td>
<td>الزرق الوريدى</td>
</tr>
<tr>
<td>2-</td>
<td>الزرق العضلي</td>
</tr>
<tr>
<td>3-</td>
<td>الزرق تحت الجلد</td>
</tr>
<tr>
<td>4-</td>
<td>زرق سطح الجلد</td>
</tr>
</tbody>
</table>
أجب بلا أو نعم:

1) هل يتوفر حوض ماء في العنصر؟
2) هل تغسل يدك قبل وبعد الحقن؟
3) هل يوجد بالعنبر صابون (أو مادة مطهرة)؟

الغرض من تجهيز الخط الوريدى:

1- تجهيز خط ورئيسي مفتوح
2- لراحة المريض
3- للتروية الوريدية
4- للتحضير الجراحي

أجب بلا أو نعم: إحراء نقل الدم هو إجراء:

1- تمريضي ( ) طبي ( )

متى يجب تغيير الكانيولا:

1) بعد 24 ساعة عند الكبار
2) بعد 72 ساعة عند الصغار
3) حسب تعليمات الطبيب

ما هو المحلول المطهر المستخدم في الحقن:

1- الإسبرن
2- فينول
3- البوذ

هل تكرر استعمال السرنجة للمريض الواحد:

1- نعم ( )
2- لا يجوز ( )

متى يكون الحقن آمناً:

1) بتنكر السرنجة
2) باتباع التحويلات الوقائية
3) باتباع التحويلات العلاجية
4) بتعقيم المعدات
5) أخرى (حدد)
الحقن غير الأمان يعرض المريض لعدة أمراض منها:

1. الخراج
2. الالتهاب الكبد الوبائي
3. نقص المناعة المكتسبة (الإيدز)

ما هي الخطوات المتبعة عند إعطاء الدواء:

1. التأكد من الخمسة الصحة
2. غسل الأيدي البابتي
3. غسل الأيدي الجراحى

أى طرق الزرق أسرع فعالة:

1. الزرق تحت الجلد
2. الزرق العضلي
3. الزرق حول جدر السرة (البطن)

من العشرة الصلاحية تشتمل:

1. تاريخ صلاحية الدواء
2. معرفة الآثار الجانبية
3. الجرعة الصحيحة
4. الزمن المحدد للدواء

كيفية غسل الأيدي:

1. غسل الأيدي بماء وافرة
2. استخدام صابون مطهر
3. غسل باطن اليد وظاهرها
4. وضع الكف الأيمن فوق الكف الأيسر وبالعكس
5. تخليل الأصابع
6. غسل الكفين مع تخليل الأصابع مع بعضهما جيداً بالماء والصابون

التعقيم يعني:

1. قتل وإبادة كافة المكورات الحيوية والجرثومية
2. قتل الجراثيم العالقة بمعدات الحقن
3. قتل الميكروبات العالقة بملبس الممرض
4. إبادة الجراثيم العالقة ببيئة المريض

ما هي طرق التعقيم المختلفة:

1. الغليان
2. الضغط البخاري
3. التعقيم الفيزيائي
4. التعقيم الكيميائي
تحضير الدواء من أمبولة أو فتيل

<table>
<thead>
<tr>
<th>لم تنفذ</th>
<th>نفذت بطريقة خاطئة</th>
<th>نفذت بطريقة صحيحة</th>
</tr>
</thead>
</table>

يقوم الممرض بالآتي:

1/ مطابقة دباجة الفتيل أو الأمبولة مع وصفة العلاج - في حالة الأمبولة:

1- التأكد من أن الدواء في أسفل الأمبولة
2- نشر جزء من عنق الأمبولة
3- وضع قطعة شاس معقمة بالانطاج الآخر لعنق الأمبولة وكسره برفق.
4- فتح الحقنة وإدخالها في الأمبولة لحسب الدواء.

في حالة الفتيل:

إذا كان الدواء سائلًا:

1- إزالة غطاء الفتيل الخارجي وتثبيت رأس الفتيل بمطهر.
2- فتح الحقنة وسحب المكبس إلى الخلف لسحب كمية من الهواء مساوية لكمية الدواء المراد اخذه
3- حقن الحقنة في الفتيل وتفريغ كمية الهواء وسحب الجدوء.
4- إخراج الإبرة من الفتيل وتعيينها.

إذا كان الدواء بدرة:

1- فتح غطاء الفتيل وتطهيره بمطهر
2- سحب كمية الماء المقطر المحددة لتجهيز الجرعة.
3- سحب الإبرة من فتيل الماء المقطر.
4- إضافة الماء المقطر إلى البدرة وحرك الفتيل بين كفكيه.

5- سحب الدواء من الفتيل
6- إعادة غطاء الإبرة وتغبرها.
7- تسجيل الإجراء والزمن والتاريخ والإمضاء والملاحظات.
处罚注射臂

<table>
<thead>
<tr>
<th>أجراء الممرض بالآتى:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- تجهيز حوض كلوي ووضع المعدات</td>
</tr>
<tr>
<td>بداخله</td>
</tr>
<tr>
<td>2- إخطار الممرض.</td>
</tr>
<tr>
<td>3- غسل الأيدي وليس الجونت.</td>
</tr>
<tr>
<td>4- تجهيز الحقبة</td>
</tr>
<tr>
<td>5- تحديد موضع الوخز حسب كمية ونوع الدواء.</td>
</tr>
<tr>
<td>6- نظافة موضع الوخز بالطرير.</td>
</tr>
<tr>
<td>7- وخز المريض في المكان المحدد.</td>
</tr>
<tr>
<td>8- سحب المكبس قليلاً للتثبت من عدم مصادفة شعيرات دموية وذلك يدل على أن الإجراء صحيح.</td>
</tr>
<tr>
<td>9- حقن الدواء بسرعة تناسب مع نوع الدواء</td>
</tr>
<tr>
<td>10- سحب الإبرة من جسم المريض.</td>
</tr>
<tr>
<td>11- الضغط في مكان الوخز بالشاشة لمدة دقيقة.</td>
</tr>
<tr>
<td>12- أرجاع الأدوات والعناية بها.</td>
</tr>
<tr>
<td>13- غسل الأيدي حسب الإجراء.</td>
</tr>
</tbody>
</table>
إعطاء حقنة بالجلد

<table>
<thead>
<tr>
<th>لم تنفذ</th>
<th>نفذت بطريقة خاطئة</th>
<th>نفذت بطريقة صحيحة</th>
</tr>
</thead>
</table>

يقوم الممرض بالآتي:

1- التأكد من العشرة الصحاح
2- غسل الأيدي حسب الإجراء
3- تجهيز حقنة الدواء المراد إعطاؤه
4- شرح العملية التمريضية للمرض
5- تحديد موضع الحقن
6- مسح ونظافة موضع الحقن بمطهر
7- ودخ الإبرة داخل الجلد
8- سحب المكبس قليلاً إلى الخلف
9- حقن الدواء
10- سحب الإبرة والتخلص منها في المكان المخصص للإبادة
11- غسل الإيدى حسب الإجراء وتسجيل الزمن والتاريخ والامضاء

إعطاء حقنة تحت الجلد

<table>
<thead>
<tr>
<th>لم تنفذ</th>
<th>نفذت بطريقة خاطئة</th>
<th>نفذت بطريقة صحيحة</th>
</tr>
</thead>
</table>

يقوم الممرض بالآتي:

1- التأكد من العشرة الصحاح
2- غسل الأيدي الطبي
3- تجهيز الدواء حسب الإجراء التقني الصحيح
4- اخطار المريض وتحديد مكان الرزق (حول السرة أو أعلى الفخذ، أعلى الساعدين) ونظافة مكان الرزق
5- شد جلد المريض السمين باليد الأخرى وإذا كان نخيفاً جمع الجلد إلى أعلى
6- سحب مكبس الحقنة إلى الخلف للتأكد من صحة الرزق
7- تفريغ الدواء
8- سحب الإبرة والضغط على مكانها
9- إرجاع الأدوات اللازمة والتخلص من الإبرة المستعملة (في مكانها الخاص)
10- تسجيل زمن الجرعة وكميته ومكان الرزق والإمضاء
11- غسل يديه حسب الإجراء
<table>
<thead>
<tr>
<th>نفذت بطريقة صحيحة</th>
<th>نفذت بطريقة خطأ</th>
<th>لم تنفذ</th>
</tr>
</thead>
</table>

**إعطاء حقنة بالوريد**

يقوم الممرض بالآتي:

1- اخبار المريض وشرح العملية
2- تجهيز الحقنة حسب الإجراء
3- احضار المعدات اللازمة بجانب المريض
4- غسل الأيدي وليس الجونت
5- مسح الأوردة لاختيار المكان المناسب للوخز
6- ربط التورنكيت أعلى موضع الوخز
7- تطهير موضع الوخز ووخز المريض
8- سحب المكمس إلى الخلف قليلاً للتأكد من صحة الوخز
9- حل التورنكيت وتصريف الادواء حسب نوع الادواء
10- سحب الإبرة والضغط على مكانها بالشاش المعقم.
11- غسل الأيدي حسب الإجراء
12- تسجيل الإجراء

**تركيب كانيولا**

يقوم المريض بالآتي:

1- إخبار المريض وشرح العملية
2- تحضير الأدوات اللازمة بجانب المريض
3- غسل الأيدي وليس الجونت
4- اختيار الأوردة المناسب
5- ربط التورنكيت أعلى موضع الوخز
6- تطهير موضع الوخز
7- وخد الأوردة بالكانيولا
8- سحب إبرة الكانيولا بعد ظهور الدم في نهايتها
9- فك التورنكيت
10- إدخال الكانيولا كلياً في الوريد
11- توصيل الكانيولا بمحلول وردي أو إدخال قليل من ملح الطعام.
12- تثبيت الكانيولا بمصمع لاصق
13- أرجاع الأدوات وال꾸الية بها
14- غسل الإيدى وتسجيل الإجراء.
تركيب الدرب

<table>
<thead>
<tr>
<th>نفذت بطريقة</th>
<th>لم تنفذ</th>
<th>صحيحة</th>
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<tbody>
<tr>
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</tbody>
</table>

يقوم الممرض بالآتي:

1. التأكد من العشرة الصحاح.
2. مراجعة التعليمات بدقة.
3. تجهيز الدرب المطابق للتعليمات.
4. شرح العملية التمريضية للتعليمات.
5. إحضار الأدوات اللازمة بجانب المريض.
6. غسل الأيدي وليس الجونت حسب الإجراء.
7. فتح جهاز الدرب وتصنيعه بالزجاجة.
8. تعليق الزجاج بحامل الدرب وملء الجهاز بالحلول وفقًا للصمام بعد طرد الهواء.
9. مسح الأوردة لاختيار الوريد المناسب.
10. ربط التورنكتيت أعلى منطقة الوخدة وتركيب كانيولا حسب الإجراء وفك التورنكتيت وتوصيل الجهاز بالكانيولا.
11. فتح الصمام وضبط النقاط حسب التعليمات.
12. تثبيت الكانيولا ومراقبة مكان الحقن.
13. إرجاع الترولى والعناية بالأدوات.
14. غسل الأيدي وتسجيل الإجراء والزمن والإمساء.
تغذية لبحث

<table>
<thead>
<tr>
<th>نفذت بطريقة صحيحة</th>
<th>لم تنفذ بطريقة خطأ</th>
</tr>
</thead>
<tbody>
<tr>
<td>يقوم الممرض بالآتي:</td>
<td></td>
</tr>
</tbody>
</table>

1. اخطار وتثبيت المريض وأهله.
2. التأكد من تطابق الفصيلة والتجانس.
3. مقارنة فصيلة المريض والفصيلة المكتوبة على زجاجة الدم.
4. إحضار الأدوات اللازمة بجانب المريض وحامل الدرب.
5. أخذ العلامات الحيوية مع تسجيلها حسب الإجراء.
6. غسل الأيدي وليس الجونتر حسب الإجراء.
7. تركيب الكانيولا حسب الإجراء.
8. تركيب درب ملح الطعام بالجهاز الخاص بنقل الدم.
10. تركيب الدم.
11. ضبط النافطة بمعدل 5 نقطة في الدقيقة في خلال 15 دقيقة الأولى مع مراقبة مراقبة العلامات الحيوية في هذه الفترة وتسجيلها.
12. في حالة عدم وجود تفاعل خلال 15 دقيقة الأولية زيادة معدل النافطة إلى حوالي 30 نقطة في الدقيقة أو على حسب تعليمات الطبيب.
13. مراقبة المريض حتى نهاية نقل الدم مع تسجيل العلامات الحيوية وتسجيل م ضماعفات ودستاء الطبيب.
14. إيقاف عملية نقل الدم عند حدوث ماضعفات وإخراج المريض.
15. إعطاء حقنة اللازكس بالوريد عند نهاية نقل الدم على حسب تعليمات الطبيب.
16. إرجاع زجاجة الدم لبنك الدم بعد نهاية الإجراء.
17. غسل الأيدي حسب الإجراء.
18. تسجيل زمن بداية الإجراء والملابسات أثناء العملية التمريضية وحزم النهاية وكمية الدم.
Appendix III
The training program jacket

1. Preparation of injection:
Multi-dose vial: powder:
Action:

- Clean the rubber cap with chosen antiseptic and let it dry.
- Insert 21G needle into the cap to vent the bottle.
- Inject the correct diluents slowly into the powder within the ampoule.
- Remove the needle and the syringe.
- Place sterile topical swab over the venting needle and shake to dissolve the powder.

(the nurse may encounter other presentation of drugs for injection, e.g; vial with transfer needle, and should follow the manufacture’s instruction in these instance).

- Inspect the solution for cloudiness or particulate matter. If this is present, discard. Follow hospital guidelines on what action to take, e.g: return drug to pharmacy.
- Clean the rubber cap with appropriate antiseptics. Let it dry.
- Withdraw the prescribed amount of solution and inspect for solution pieces of rubber which may have cored out the cap.

Note: coring can be minimized by inserting the needle into the cap, level up, at an angle of 45° to 60°.

Before complete insertion of the needle tip, the needle to 90° and proceed.

- Remove air from syringe without spraying into the atmosphere by injecting air back into the vial or replace the sheath on the needle and tap the syringe to dislodge any air bubble expel air.
2. Administration of Safe injection:

Every procedure must be introduced properly according to routes and site as prescription as following:

Administration of intramuscular injection:

a. **Intramuscular (or IM) injection** is the injection of a substance directly into a muscle. In medicine, it is one of several alternative methods for the administration of medications. It is used for particular forms of medication that are administered in small amounts. Depending on the chemical properties of the drug, the medication may either be absorbed fairly quickly or more gradually. Intramuscular injections are often given in the deltoid, vastus lateralis muscles and the ventrogluteal and dorsogluteal areas. ([http://en.wikipedia.org/wiki/Intramus](http://en.wikipedia.org/wiki/Intramus), 2002)

The sites:

b. Gluteal muscle.
In gluteal muscle the injection must introduce with 90 degree angle. This site includes dorsogloteal, ventrogloteal, vastuslateralis for adult, rectus femorus for children

c. Deltoid muscle:

In this muscle the injection must be introduced with 45 degree angle. This muscle includes the upper third of the arm, scapula and the areas around scapula.

d. Lateral tibia – for anti inflammatory drug and muscle relaxant substances.

e. Around the ambilical wall of the abdominal muscle e.g. insulin injection and anti rabies vaccine. (Wikipedia, the free encyclopedia, 2002)

**The procedure:**

1. Explain and discuss the procedure with the patient.

2. Consult the patient’s prescription sheet, and a certain the following rights:
   a) Drug.
   b) Dose.
   c) Date and time of administration
   d) Route and method of administration.
   e) Diluents as appropriate.
   f) Validity of prescription.
   g) Signature of doctor.

3. Assist the patient into the required position.

4. Remove the appropriate garment to expose the chosen site.
5. Clean the chosen site with swab saturated with isopropyl alcohol 70% for 30 seconds and allow to dry for 30 seconds.
6. Stretch the skin around the chosen site.
7. Hold the needle at an angle of 90° quickly plunge it into the skin.
8. Pull back the plunger if no blood is aspirated, depress the plunger at approximately 1ml every 10 seconds and inject the drug slowly. If blood appears, withdraw the needle completely, replace it and begin again.
9. Wait 10 seconds before withdrawing the needle.
10. Withdraw the needle rapidly. Apply pressure to any bleeding point (Reetor. A.V 2005).

3. Administration of subcutaneous injection (SC):
The site: The site of this injection is in the subcutaneous tissues with 45 degree angle e.g.: insulin injection

![An insulin pump with a subcutaneous injection site.](image)

A subcutaneous, injection (abbreviated as SC, SQ, sub-cu, sub Q or sub-cut with SQ being the preferred abbreviation, since it is the only abbreviation listed under the entry for "subcutaneous" in Dorland's 28th
edition) is administered as a bolus into the subcutis, the layer of skin directly below the dermis and epidermis, collectively referred to as the cutis. Subcutaneous injections are highly effective in administering vaccines and medications such as insulin, morphine, diacetylmorphine and goserelin. Subcutaneous, as opposed to intravenous, injection of recreational drugs is referred to as "**skin popping**". (Wikipedia, the free encyclopedia, 2002)

**The procedure of subcutaneous injections:**

1- Explain and discuss the procedure with the patient.
2- Consult the patient prescription chart, and ascertain the following rights:
   a) Drug.
   b) Dose
   c) Date and time of administration
   d) Route and method of administration.
   e) Diluents as appropriate.
   f) Validity of prescription.
   g) Signature of doctor.
3- Assist the patient into the required position.
4- Remove appropriate garments to expose the chosen site.
5- Choose the correct needle size. Clean the chosen site with swab saturated with isopropyl alcohol 70%.
6- Alcohol 70% for 30 seconds and allow to dry for 30 seconds
7- Stretch the skin around the chosen site.
8- Holding the needle at an angle of 45° quickly plunge it into the skin.
9- Pull back the plunger if no blood is aspirated, depress the plunger at approximately 1ml every 10 seconds and inject the drug slowly. If blood appears, withdraw the needle completely, replace it and begin again.

10- Wait 10 seconds before with drawing the needle.

11- With draw the needle rapidly. Apply pressure to any bleeding point (Reetor A.V, 2005).

4. Administration of intravenous injection (I.V):

The site:

An intravenous injection is introduced in the median cubital vein and cubital fossa, for a diagnostic purpose e.g. blood sampling or for a curative substance e.g. aminophiline injection.

Injection of soluble materials into the venous system will ensure that the materials injected will reach the spleen quite rapidly. (eople.rit.edu/~gtfsbi/hytc/PDFfiles/ Intravenous.pdf, 2006)

Procedure of intravenous injection (I.V):

Continuous infusion:

Equipment:

1- Clinically clean receiver or tray containing the prepared drug to be administer.

2- patient prescription chart.

3- Recording chart or book as required by law or hospital policy.

1. Protective clothing as required by hospital policy for specific drugs.

2. Container of appropriate I.V. infusion fluid.
3. Swab saturated with isopropyl alcohol 70%.
4. Drug additive label.

Procedure

1- Explain and discuss the procedure with the patient.
2- Inspect the procedure in progress.
3- Before administrating prescribed drug check that it is due and has not already been given.
4- Before administrating any prescribed drug, consult the patient’s prescription chart and ascertain the following:
   a) Drug
   b) Dose
   c) Date and time of administration
   d) Route and method of administration.
   e) Diluents as appropriate.
   f) Signature of doctor.
   g) The prescription is legible.
5- Wash hands with bactericidal soap and water or bactericidal alcohol hand rub, and assemble the necessary equipment.
6- Prepare the drug for injection described in the procedure guidelines:
7- Check the name, strength and volume of intravenous fluid again the prescription chart.
8- Check the expiry date of the fluid.
9- Check that the packing is intact and inspect the container and contents in a good light for crocks, punctures, air bubbles.
10- Inspect the fluid for discoloration, haziness, and crystalline or particulate matter.
11- Check the identify and amount of drug to be added, points to be emphasized:-
   a) Compatibility of fluid and additive.
   b) Stability of mixture over the prescription.
   c) Any special directions for dilution, e.g: pH, optimum concentration.
   d) Sensivity to external factors such as light.
   e) Any anticipated allergic reaction.

If any doubts exist about the listed points, consult the pharmacist or appropriate reference workers.

12- Wash hand thoroughly using bactericidal soap and water or bactericidal alcohol hand rub.

13- Place infusion bag on flat surface.

14- Remove any seal present.

15- Clean the site with swab and allow it to dry.

16- Inject the drug using new sterile needle into the bag bottle or burette.
    A 23 or 25 G needle should be used.

17- If the addition is made into a burette at the side

18- Invert the container a number of times specially of adding to a flexible infusion bag.

19- Check again for haziness, discoloration and particles this can occur even if the mixture is theoretically compatible, thus making vigilance essential.

20- Complete the drug additive label and fix it on the bag, bottle or burette (Lisa Daugherty & Sara Lister, 2002).
5. Intermittent infusion:

Equipment:

1- Intravenous administration set.
2- Intravenous infusion stand.
3- Clean dressing trolley
4- Clinically clean receiver or tray.
5- Sterile needles and syringes.
6- 20 ml for injection of compatible flush solution, e.g., 0.9% sodium chloride or 5% dextrose.
7- Sterile dressing pack.

Procedures:

1- Explain and discuss the procedure with the patient.
2- Before administering any prescribed drug, check that it is due and has not been given already. Check that the information contained in the prescription chart is complete, correct and legible (Lisa Daugherty & Sara Lister, 2002).

6. Administration of Intra-dermal injection (I.D)

The site:

This injection should be introduced in the middle layer of the skin (derm) at 10 – 15 degree angle e.g. for allergic reaction.

Is the injection of a small amount of fluid into the dermal layer of the skin. It is frequently done as a diagnostic measure, such as for tuberculin testing (screening test for tuberculosis referred to as a tine test) and allergy testing (placing very small amounts of the suspected antigen or allergen in a
solution under the skin). The intradermal injection is made in skin areas of the body that are soft and yielding. (Fundamental of nursing, 6th Arabic edition, 2006).

**Procedure:**

1. Explain and discuss the procedure with the patient.
2. Consult the patient prescription chart, and ascertain the following rights:
   h) Drug.
   i) Dose
   j) Date and time of administration
   k) Route and method of administration.
   l) Diluents as appropriate.
   m) Validity of prescription.
   n) Signature of doctor.
3. Assist the patient into the required position.
4. Remove appropriate garments to expose the chosen site.
5. Choose the correct needle size. Clean the chosen site with swab saturated with isopropyl alcohol 70%.
6. Alcohol 70% for 30 seconds and allow to dry for 30 seconds.
7. Stretch the skin around the chosen site.
8. Holding the needle at an angle of 10°-15° quickly plunge it into the skin.
9. Pull back the plunger if no blood is aspirated, depress the plunger at approximately 1ml every 10 seconds and inject the drug slowly. If blood appears, withdraw the needle completely, replace it and begin again.
10. Wait 10 seconds before withdrawing the needle.
11- With draw the needle rapidly. Apply pressure to any bleeding point (Lillis, C et al, 2004).
Appendix IV
Injection Sites
Extract injected under the skin
Appendix V
Safe injection workshop