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# A TRAINING PROGRAM FOR NURSING STAFF REGARDING BLOOD PARASITES ACQUIRED BY NEEDLE STICK INJURY IN A MILITARY HOSPITAL

**By**

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## Abstract

Nurses are likely to be exposed to microorganisms during their daily practice due to their close and frequent direct contact with patients. This could be one of the main causes of transmitting infection to the patients. Therefore, nurses should demonstrate the ability to effectively utilize principles of infection control, nurses should have professional and ethical responsibilities to make sure that their knowledge and skills regarding infection control are up-to-date and they practice safely and competently at all times. Aim: At assessing the effect of a training program for Military nursing staff knowledge, performance and attitude related to blood parasites acquired by needle stick injury.

Setting: The study was carried out at two military hospitals. Design An interventional study (pre-post study) was used. Subject: The studied subjects were 90 nursing staff who accepted to participate in the study (10) of them pilot study were excluded from the study sample, (30) from The Military Fever Hospital and (50) from The Military General Hospital. Tools: The study tools used were composed of five tools as follows: (1) Educational needs assessment tool. (2) Knowledge questionnaire sheet (pre / post-test) (3) Observation check list (4) Attitude tool and (5) Participants 'evaluation Questionnaire sheet. Results: Educational the intervention showed statistically significant improvements in nursing staff knowledge, performance and attitude. Recommendation: Continues training programs about blood parasites acquired by needle stick injury must be developed and provided on regular basis, this will enable nursing staff to improve their knowledge, performance and attitude about blood parasites acquired by needle stick injury.

**Key words**: Military Nursing Staff, blood parasites, needle stick injury

## Introduction

The blood and infectious body fluids (BBF) exposures are common safety problems for health care workers (HCWs) and analyzed reported BBF exposures. Over a 3-year period at a teaching hospital the needlestick injuries were the commonest reported BBF exposure, accounting for 80% of reported cases. Nurses had the highest percentage (60.6%) of BBF exposures and other job categories including physicians, technicians, cleaning staff, and interns accounted for about 10% each. Injuries occurred most commonly during the daytime (57.0%). Three-quarters (74.9%) of the injured HCWs had appropriate immediate care (Hsieh *et al*, 2006).

Sharps injuries pose a serious threat to health professionals, patients, and downstream workers. Medical Sharp means object or instrument which is used for carrying out activities to healthcare and which is able to cause injury by means of cutting or piercing the skin; Injury includes infection (Adams *et al*, 2013). Safer sharp means a medical sharp that was designed and constructed to incorporate a feature or mechanism which prevents or minimizes the risk of accidental injury from cutting or piercing skin (Statutory Instrument, 2013).

The renewed interest in parasitic diseases in the United States markedly increased numbers of persons in clinical and research laboratories have the potential for exposure

to parasites and therefore are at risk for acquiring parasitic infections concentrated on protozoan diseases that frequently have been reported to be laboratory acquired: malaria, leishmaniasis and toxoplasmosis (Herwaldt and Juranek, 1993). These diseases can be severe, even fatal, and may be difficult to diagnose. Even persons who are expert on parasitic diseases often do not know what clinical manifestations to be expected when natural modes of transmission are bypassed, how to monitor for infection after accidental exposures, and whether to begin the presumptive antimicrobial therapy before infection is documented (Galazzi *et al*, 2014).

Nursing remains at the front line of patient care, satisfaction and safety by identifying and addressing patient problems in a timely fashion, improve the quality and consistency of medical care in acute hospital settings have been highlighted in a number of UK and international reports (Mackintosh *et al*, 2014) to maintain the ability of the profession to respond effectively to a dynamic health care system, the Institute Of Medicine (IOMs) Future of Nursing indicated the need for nurses to practice to the fullest extent of their education, achieve higher levels of education, and become full partners in the redesign of healthcare (IOM, 2010).

The changing in the nature of nursing practice with the delivery of more acute care support, including medications is incumbent upon practitioners to minimize these risks and other occupational hazards with the careful assessment of risk and the adoption of recommended practices to maintain their safety and wellbeing. Employers have a duty of care to their employees, but nurses also have responsibilities as employees (Abdenour *et al*, 2013).

Infection control standards become an integral part of the accreditation program for all medical setting in Egypt, where the National Guidelines for Infection control (NGIC) are produced and established by the infection control team at the Ministry of Health & Population (MOHAP) since the year 2003 (Ibrahim and Hamdy, 2013). Infection control standard precautions include certain measures such as hand hygiene, sharps safety, staff health, use of personal protective equipment (PPE), equipment safety, single use policy, waste management and environmental cleaning. Many infection control measures, such as appropriate hand hygiene and the correct application of basic precautions during invasive procedures are simple and of low-cost, but require staff accountability and behavioral change, in addition to improving staff education, reporting and surveillance systems. Therefore, adequate nursing staff is necessary because a higher patient- to nurse ratio increases the risk of nosocomial infection (Hugonnet *et al*, 2007; Bouallegue *et al*, 2013). Nurses are likely to be exposed to microorganisms during their daily practice due to their close and frequent direct contact with patients. This could be one of the main causes of transmitting infection to the patients (Maltezou *et al*, 2008).

Therefore, nurses should demonstrate the ability to effectively utilize principles of infection control, nurses should have professional and ethical responsibilities to make sure that their knowledge and skills regarding infection control are up-to-date and they practice safely and competently at all times (French, 2007; Royal College of Nursing, 2012). Thus, education about infection prevention and control was targeted as one of the main objectives of infection control program especially where nurses represent the largest group of health care workers within the healthcare system (WHO, 2008; Rasslan, 2011).

The current study dealt with four zoonotic infectious diseases encountered in Egypt, which are risky to health care Staff by blood transfusion or even by needle-stick. These are: malaria, babesiosis, toxoplasmosis and infantile visceral leishmaniasis.

Significance of the study: All the time nursing staff is the front line of health care team who face patients, so, early detection and rapid reporting which considered from Nursing Golden

Responsibilities and utmost important for taking the decision for isolation, treatment and disease spread prevention. In general, there is a lack of knowledge among the nursing staff and infection control nurses about blood parasites acquired by needled stick injury, although there is Three-quarters (74.9%) of the injured health care workers (HCWs) had appropriate immediate care (Hsieh et al, 2006).

Therefore, it was thought that a tailored educational program would help in improving nursing staff knowledge and attitude related to blood parasites acquired by needle-stick injury to improve the quality of nursing care, to acquaint the Egyptian Military Nursing Staff particularly those who share with the Peace Keeping Forces Mission to endemic areas with such fatal diseases. The four blood infectious parasitosis were selected due to their Egyptian epidemiology importance. These zoonotic blood parasites are malaria In there is less awareness and knowledge about these diseases. These diseases were encountered in Egypt; malaria (Saleh *et al*, 2016) and its *Anopheles* vectors (El-Bahnasawy *et al*, 2011), babesiosis (Saleh *et al*, 2015a) and its tick vector (Morsy, 2012), toxoplasmosis (Saleh *et al*, 2014) and leishmaniasis (El-Bahnasawy *et al*, 2013) and its Phlebotomis vector (Saleh *et al*, 2015b).

This study assessed the effect of a training program for Nursing Staff knowledge and attitude regarding blood parasites acquired by needle stick injury in Military Hospitals by 1- Assessing knowledge of Military Nursing Staff related blood parasites acquired by needle stick injury. 2- Assessing performance regarding applying safety measures in the handling and disposal of sharps instruments. 3- Assessing the attitude of Military Nursing Staff related to safety measures in the handling and disposal of sharps instruments. They were 80 nursing staff working in Military hospitals 30 from fever hospital and 50 from general hospital

Designing and implementing an educational training program, for military nurses on selected infectious blood parasites acquired by needle stick injury based on their need assessment.

## Results

The results are shown in figures (1 to 12).

## Discussion

Continuing education plays a significant role in equipping nurses to deal with the major changes currently making an impact on healthcare. They need competencies that ensure quality of care to help them perform their job (Fey and Miltner, 2000). Moreover, they stated that in this time of rapid scientific and technological change continuing education is assuming an increasingly important role in health care professions. Controlling and minimizing workplace hazards for healthcare personal (HCP) in hospitals present a unique challenge because the health and wellbeing of hospital patients must also be considered. The safety professionals must work to control occupational exposures in a way that does not interfere with safe patient care (Theresa *et al*, 2013).

Risk factors for staff nurses injure are related to a false movement during a procedure, re-assembling devices and handing devices to a colleague. The highest proportion of needle stick injuries is related to recapping of used needles especially during the cleaning process (IEA, 2011). In Egypt, approximately 40% of nurses had experience at least one injury in the past year. Most who had an injury did not report it (WHO, 2012).

Although there is evidence that knowledge among healthcare personnel about prevention measures in occupational exposure to blood and body fluids is adequate, transferring this knowledge into practice remains inadequate. Data on workers attitudes and risk perception about biological risk are poor. Several comments declare detecting "the perception" of biological risk, but actually detected only the knowledge about risk (Sreedharan *et al*, 2010).

Nurses who are employed in health care workplaces face a serious danger that may threaten their life; it is their exposure to blood and body fluids (BBF). Indeed, accidental exposure may lead to infections by blood borne pathogens, BBPs (Yao et al, 2010).

Lack of nurse knowledge about blood parasite infectious diseases, their way of transmission, symptoms and signs, ways of protection can negatively affect the nature

and spread of these diseases among military troops (Twum and Meredith, 2003).

Regular and continuous education plays a significant role in equipping nurses to deal with the major changes currently making an impact on healthcare. Educational programs can over light any health topic and bring it into focus in order to help nurses to face any needed action (Fey and Miltner, 2000).

In the present study, at the Fever Hospital the age ranged from (19-39), more than half of them were in the age category 21-30years (67%); while at the General Hospital the age ranged from (17-39), about (48%) of them were in the age category less than 20y. This difference in age was significant, which helped in assessing its relation with the level of knowledge, practice and attitude. The years of experience ranged from (3-15) at the Fever Hospital, but in both hospitals 56.7% had less than 5y. The great majority (96%) were females. This dominance was explained by Nikki and Campos (2010) that nursing is a feminine job with excellence; in addition to novices of men in that career only 5% of nurses were men. Moreover the first organization for men nursing that encourage men to join the nursing career was introduced in USA only in 1971 (Dubey *et al*, 2011). The majority (68%) were single. Jeff (2008) mentioned that nursing in military sector is time consuming with excess load of work making them having no time for marriage and make males afraid of being busy with their stressful career away from family duties. Nurses (80%) carried Nursing School diploma; with significant difference in educational levels. As to Rank the majority of them were sergeants at the two hospitals about (90%); there was variation in the level of education which shown its impact on the exam answer in the tests of program.

In order to design the educational program, the first step in planning any professional development was to assess the learning needs target group or individual to determine the structure of the program in terms of objectives, content, and activities, learning needs could be individual, organizational, or societal and must be clearly defined during the planning process (Lynor and Desilet, 2007). Thus, learning needs assessment was crucial in the educational process (Grant, 2002). Besides, learning needs analysis was a central component of continuing professional development but lack of psychometrically developed learning needs assessment tools and self-assessment questionnaires emerged as a key method (While *et al*, 2007). This was in contradictory with training need assessment done by Itrat *et al*. (2009) prior to the educational program as they conducted an interventional study and reported that the most studied topic and the program was tailored and specific and they relayed that on national interest of that particular topic.

The present study showed that (60%) of nurses at Fever Hospital and (70%) at General Hospital had attended course(s) of infection control. This was agreed with the Iranian study group had previous courses on isolation, standard precaution and the majority stated they needed to attend such courses. They relayed on proper infection control committee acts and commitment and raised awareness of HCWs towards importance of training (Askarian *et al*, 2007). However, in the present study none attended any training program on infectious blood parasites that was not dealt with nosocomial infectious blood parasites. Thus, the findings displayed that the all of their needs was related to definition of infectious blood parasites, and CCOHS (2005) reported that needle stick injuries are common hazard. Also, Singru and Banerjee (2008) found that needle-stick injuries and cuts were the common occupational accidents exposing HCWs to blood and body fluids (61.0.6%) to NSIs. Some hospitals reported that at least one third of nursing and laboratory staff suffered such injuries annually. Besides, Soknes, (2005) reported in 2001 reduced in NSIs exposure from (52%) to only (28%) due to good application of infection control.

In the present study, nurses (76.73) asked to know about infection control measures at Fever Hospital and (58%) at general hospital. No doubt, nurses lacked knowledge related to infection control measure did not attend such education subject. Vij *et al*. (2001) reported that highly educated nurses had higher knowledge regarding principles of infection control.

In the present study, all participants were eager to know blood parasites transmitted by blood or needle stick injury specifically those encountered in Egypt. Kovats *et al.* (2001) reported that the main cause of attending program by trainee was to improve their knowledge about diseases they may face. Also, Molyneux (2003) found that the majority of HCWs needed to attend cession on malaria, which was a problem in their country. But, majority of nurses needed to know their role in application of infection control (90%) at Fever Hospital and (68%) at General Hospital, which agreed with Frankel (2008) who reported the nurse leaders must demonstrate resilience in responding to change and supporting others to embrace this in a positive way. Effective leaders should be capable of reframing the thinking of those whom they are leading, enable them to see the changes were not only imperative but also achievable. Dyson *et al*. (2009) found that education for nursing staff it was not always systematically planned and developed and often relied on the interest area and assessment of the nurse educators.

Knowledge is valuable mainly to think in more profound ways, including recall or recognition of facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills an intellectual skill gained during a course of study which can be transferred to other situations (Sausa, 2006). Knowledge is acquired through formal and informal study in conjunction with experience in a specific domain of nursing practice (Considine *et al*, 2007). The present study results agreed with Carmela *et al*. (2012) who found nurses training and knowledge were able to reduce the risk of accidents by exposure to biological agents. Also, Lipscomb *et al.* (2009) reported that among health care workers, nurses appeared to be more exposed to biological risk, retrospective studies indicated that between 45% and 46.7% were exposed to work injuries, with prevalence of needle stick injuries (53-63.6%) mostly on hands 76.3%. Accidental exposures to blood and body fluids were also frequent among nurses of operating theater. In the United States showed low prevalence of training and high rate of underreporting of needle sticks and other exposure accidents were 48.9% (Gershon *et al*, 2007).

In the present study, all nurses had knowledge about occupational exposure and the important factor that enhances infection transmission. This agreed with Alwutaib *et al*. (2012) who found that acceptable knowledge level regarding modes of diseases transmission among nurses. However, Ahmed *et al*. (2008) reported that the minority of their nurses and laboratory technicians had unsatisfactory knowledge about mode of transmitting blood-borne diseases and their signs and symptoms.

In the present study, there were highly significant differences ($p < 0.001$), related to the most items of malaria at pre, post and follow up phase. There were high significant differences ($p < 0.001$) related to babesiosis at pre, post and follow up phase.

In the present study, there were highly significant differences ($p < 0.001$) related to infantile visceral leishmaniasis at pre, post and follow up phase fever. This agreed with assessment of knowledge done by Ausburn, (2004) after application of educational program about leishmania regarding types, prevention and treatment. The question-by-question analysis showed that all participants (with exception of zoonosis control agents) had poor knowledge of leishmaniasis symptoms, 40% of both groups confused VL with tegumentary leishmaniasis.

In the present study, the nurses had satisfactory knowledge level as regard toxoplas-

mosis with high statistically significant differences (P < 0.001), as compared with pre, post and follow up phase. This agreed with Kaye (2011) who found that it was important for nursing staff be aware of toxoplasmosis, recognize when it should be considered as a differential diagnosis, and understand how it is diagnosed and treated.

The present study showed the median scores of nursing staff knowledge about four diseases throughout the program three phases; Pre, Post and follow up phase, with high significant differences (p < 0.001), indicating improvement of knowledge levels. Fey and Miltner (2000) found that when the knowledge score of almost all participants improved after the program, compared to that before program implementation proved that they were highly interested in the program contents, added by media and teaching method. Tweed and Tweed (2008) reported that complication of the educational program resulted in improved levels of knowledge. The present study showed that all nurses at the fever hospital were good in total knowledge at post- test. Most of the participants at the General Hospital (98%) categorized good in total knowledge at post- test. Also, there was highly statistical difference (P <0.001) indicating significant improvement of knowledge score in post-test as compared to pre-test. This agreed with Cummingham (1998) who found that difference between pre and post-test of knowledge for all participants in educational program, which indicated that learning occurred among participants on the same line. Besides, the effectiveness of intervention, impact, program importance and group discussion increased knowledge level of nurses and improved the quality of health care services. Dyson *et al*. (2009) reported that ongoing education for nursing workforce was necessary and that education costs were high to the organization and attendance and must therefore be cost-effective, relevant and appropriate.

In this study, there was insignificant difference between nurses 'staff knowledge levels as regard knowledge and age groups, sex, education level, years of experience, working department and martial statuses at fever hospital. Tweed and Tweed (2008) found no differences in knowledge levels between staff members with different levels of experience, qualifications, and seniority, and no association between demographic data and test scores. Also, there was no relation between nursing rank and knowledge level, which might be due to the fact that rank was just an administrative issue depended upon number of years the nurses in the job and advancement to the next rank didn't need new knowledge or skills. Forder (2007) reported that level of knowledge depended upon nurses' capability to learn and self enhancement of career. In this study, nurses in age group more than 30y obtained the highest total mean % knowledge score (39.50±9.978) than other age groups.in relation to marital status and sex, widowed/ divorced nurses obtained the highest total mean % knowledge score (39.00±11.533). Also, nurses with work experience of 11-20y obtained highest total mean % knowledge score (38.07±11.605). The nurses have bachelor degree, and officer obtained the highest total mean % knowledge score (39.11±10.620). Thus, there were significant relations between nurses' characteristics (age, experiences, marital status, qualification, sex & rank) and their knowledge level. Thibault *et al.* (2003) found that younger ages were associated with higher satisfactory knowledge due to new graduation and refresh in last years. Powell *et al*. (2002) noticed that age affected knowledge level. Parhizi (2013) found that high significant relation between nursing staff level of knowledge and ages. Gilboy (2005) reported that only regular training programs significantly affected the level of knowledge. Andersson *et al*. (2006) linked between years of experience and level of knowledge and that each year increased knowledge by 5%. Fornaciari *et al.* (2009) reported that the more experience means more activities,

more patients' contact and more knowledge Nurses having bachelor degree of nursing obtained highest knowledge score. Generally, the education curriculum of bachelor degree included more valuable and update medical topics. Samuel *et al*. (2009) found that level of education was positively correlated to knowledge level. Sharma *et al*. (2010) said that nurses with diploma degree had lower knowledge level than those with bachelor degree and he explained that by different educational contents. However, Pinheiro (2010) highlight that the level of education alone didn't be a clear indicator for the level of knowledge and should be accompanied with training programs as well as the daily usual practice. Pages *et al.* (2010) clarified that the level of education was not related to knowledge level in developing countries where education depended upon retain not understanding and provided huge amount of information to the student not in an interesting manner.

In the present study, 93.3% of nurses had highest performance at pre- program and increased to (100%) at post program and follow up at Fever Hospital and at the General Hospital about (36%) had perform proper hand washing at pre-program and increased to (88%) at post program and follow up. Pittet (2001) reported that factors influencing adherence by healthcare professionals to hand washing included skin irritation, interference with the worker-patient relationship, patient needs perceived as a priority, insufficient time, and high workload and understaffing, lack of scientific information showing impact of improved hand hygiene on hospital infection rates and ignorance and/or disagreement with relevant guidelines and protocols. Currie *et al.* (2011) reported that perfect hand washing technique and commitment to hand wash criteria and guidelines as a good indicator of success of infection control committee, good program and supervision. Idang *et al*. (2014) stated that practice of hand washing was considered to be most effective means of preventing health care associated infections but poorly performed.

In the present study there were significant differences between pre; post and follow up related to all items of hand hygiene. The hand washing basin and good water supply were available (100%) but paper towel not available as reported by all studied group. Siegel et al. (2007) listed hindrances to non-compliance to hand washing to include, Ineffective and inadequate provision of water, lack of appropriate facilities and materials in health care setting. NHS surveillance (2010) reported that hand wash facility was available and enough but with defect bio-waste management and facilities. Consequently, hospital authority should provide standard guidelines on hand washing in all wards for nurses to refresh their memory with good supervision. The importance of hand hygiene must be done in different situations concerned with patients (before and after attendance; before performing invasive procedures; after contact with blood, body secretions; etc…). During the intervention phase; nurses learned the hand washing importance as protective measure. A nurse was also in need of closing to supervision and observation to be considered hand washing as a part of her behavior before, after and during any procedure.

In the present study, there were significant differences between pre, post and follow up related to all items concerning personal protective equipment (PPE). The gowns and gloves were available (100%) but nurses said goggles and face shields neither available nor enough 100% that indicated provision of goggles and face shields and also poor knowledge and attitude towards importance of goggles and face shields. Kabbash *et al*. (2007) stated that protocols for prevention, PPE measures and post exposure prophylaxis were mostly not available or not accessible in the studied units of hemodialysis in Egypt. Singru and Banerjee (2008) reported shortage in provision of masks and gown that cause muco-cutaneous

exposure to blood.

As to gowns at fever hospital the participants (80%) at pre-program increased to (100%) and at general hospital (92%) was HCP wear gown during procedures at the pre-program and increased to (96%) at post program. The rates of gown usage agreed with Curtis (2008) where 76% of healthcare providers and staff used gowns in patient care. Also, Vaz *et al*. (2010) reflected positive role of infection control team in orientating newly joined staff about wearing of PPE to reduce risk of exposing skin or mucous membranes to infectious materials.

The present study, showed that needles and syringes were used only for one patient (100%) at the two hospitals, but the worst (70%) at fever hospital and (76%) at general hospital pre- program were disinfection of the rubber septum on a medication vial with alcohol prior to piercing, due to inadequate knowledge about safety injection, absence of guidelines and lack of supervision. Alamgir *et al.* (2007) mentioned that although regulations and hospital policies discouraged recapping of conventional needles and encouraged point of use disposal containers, examination of injury description reported that recapping occurred when using conventional needle. Also, Abdel Hamed *et al*. (2010) reported single use of syringe by HCWs in all hospital wards due to ethics and obligation regarding syringe usage and precautions. Abdel-Razik and Abdel-Rahman (2011) found that in relation to wastes and sharp disposal, nurses used sharp container for needles and sharp devices, used red bags for infamous and pathologic waste and black bags for general wastes. They added that most needle-stick injuries occurred during syringe recapping or bending after use. The present study found that the proper practice and compliance to guidelines regarding handling and disposal of sharps, had waste bags are securely fasted when ¾ full at fever hospital about (12%) at pre-program increased to (84%) at post program and follow up. At the general hospital (63%) pre-program increased to (100%) at post program and follow up.

The present study, reported that (63%) nurses waste bags were securely fasted when ¾ full at pre-program increased (100%) at post program and follow up at fever hospital and (72%) at pre- program increased (94%) at post program and follow up at general hospital due to inadequate knowledge, training, and lack of supervision on wastes handling, inadequate resources. Ferreire and Teixeira (2010) reported higher risk perception and adherence to procedures concerning waste disposal and sharps and needles handling and disposal. The present study, displayed significant differences between pre, post and follow up related to all items related to waste management.

The present study, demonstrated actual performance of the military nursing exposure control plan immediate action, at fever hospital (13.3%) had immediate action (injured person) at pre- program increased to (93.3%) at post program and follow up and at general hospital (6%) reported the incident immediately to the department at pre- program increased (92.3%) at post program and follow up. This agreed with data provided by the Central Register of Occupational Diseases in Poland indicated that among 314 new cases of occupational diseases in healthcare workers, HBV and HCV represented 42.6% of all cases (Wilczynska *et al*, 2005).

The present study displayed high significant differences ($p < 0.001$), between pre, post and follow up related to all items related to exposure control plan immediate action after injury.

This study showed the median scores of military nursing staff performance about (hand hygiene, personal protective equipment, injection safety, handling and disposal of sharps, waste management and exposure control plan) throughout the three phases of the program pre, post and follow up phase. This agreed with Petrit *et al*. (2014) mentioned that nurses should have adequate knowledge before initial training period at

hospital, which prerequisite for compliance, moreover, specialized training must be received before a health care student undertakes any patient procedure involving contamination or infection.

The present study showed the percentage distribution of the military nursing staff total performance score regarding infection control measures related infectious blood parasites acquired by needle-stick injury during the program, at pre- program was (46.7%) while at post program, and follow up and increased (100%). There were high significant differences (p-value< 0.001), indicating significant improvement of their performance to infection control measures related blood parasites acquired by needle-stick injury. Miguela *et al.* (2007) found that course content and teacher performance met the trainees' needs and all trainees acquired the necessary knowledge and skills.

The present study revealed no correlation between knowledge and performance in pre-program (p <0.001), but positive correlation between nurses' knowledge and performance in the post and follow up. Ibrahim *et al.* (2011) attributed lack of compliance to infection control standards to knowledge lack about standard infection control; poor design of the hospital unit; high work load; lack of sustainable resources and arrangements; time of contacts (daytime or night shift), and lack of training and constructive supervision, and added that efforts are needed to correct unacceptable nursing staff performance, especially where certain mismatching was noticed between what nursing staff know and what they actually done. However, significant positive correlation was found between knowledge and practice (Hamid *et al*, 2010; Gijare, 2012). This reflected that nursing staff performance was based on their knowledge. This agreed with Ndikom and Onibokum (2007) who found positive correlation between knowledge and practice of standard precautions

Visser *et al.* (2006) defined attitude as a psychological tendency expressed by evaluating a particular entity with some degree of favor or disfavor. So, evaluation of attitude towards certain topic can help to know the readiness of the target people to know what is new in that topic (Nabi *et al,* 2007). The present study showed change in the attitude of nurses throughout the training program, which achieved a highly significant improvement in nurse's attitude in all aspects.

Attitude in pre-program evaluation was noticed in re-cover the age of the needle mean attitude score % was (1.77±.430), care to a patient have blood parasitic diseases" mean attitude score % was (1.50±.682), and use of preventive precautions" mean attitude score % was (1.67±.547) at the fever hospital. The mean attitude score % increased at post program and follow up (P <0.001). At general hospital attitude in pre-program evaluation was noticed in re-cover age of the needle (1.34±.479), care to a patients' blood parasitic diseases (1.72±.497), and use of preventive precautions (1.6±.67) at the fever hospital and this mean attitude score % was increased at post program and follow up (P <0.001). Wood (2000) found that the highest attitude score was for taking all recommended vaccines and Isolation of infected cases. Lapinski and Franklin (2001) mentioned that isolation of infected cases and valid vaccination certificate took the highest score.

In the present study, as to handling and disposal of sharps instruments nurses at the Fever Hospital (90%) had negative attitude at pre- test. at post-program, up most (97%) had positive attitude. However, at follow up phase, 77% had positive attitude, but, those at the General Hospital (92%) had negative attitude at pre- test and up 98% had positive attitude at post program. However, at follow up phase, 88% had positive attitude. Also, there was high significant difference (p <0.001) indicating significant attitude improvement. This agreed with Rabaud *et al.* (2000) who reported proper positive attitude toward safety health among nurses especially toward vaccination.

In the present study, there was no correlat-

ion between knowledge and attitude of nurses throughout program phases, without significant differences ($P > 0.05$) between pre, post and follow-up. This agreed with Fazio and Michael (2003) who found that change of attitude directly was related to individual characteristics (especially intelligence and self-esteem), and message source characteristics specially expertise. Cialdini and Goldstein (2004) also noticed that the highly educated people could change their attitude with effective message more than less educated.

Power (2000) outlined main criteria of effective tutor; preparation, a positive optimistic outlook, passion, opens mindedness, and reliability. Undoubtedly, success of any training program depends directly upon the recipients' satisfaction of all sides of the program as tutor, materials, and place, as a key indicator (Dow *et al*, 2006).

In the present study, criteria of tutor showed an excellent competence with the scientific curriculum, repeating and stressing on important topics and encourage learning through being friendly and patient with trainees (100%). About (50%) gave very good evaluated the tutor professional and well organized and good examples. Azer (2003) mentioned that if the tutor was not efficient in the scientific content that made the trust of trainees hesitated in making the outcome of training unsatisfactory. Prideaux (2004) mentioned that if the tutor didn't prepare for the session and read the content even if he used to teach this literature this will make him not good enough. Guskey (2002) concluded that if the educator didn't give attention to the needs of the trainees this will widen the gap between both of them. Satisfaction with training and development was a major factor in decisions regarding peoples careers (Violino, 2001). Also, Thibault (2003) said that when the educator is not respondents to the questions and expectations of the trainees this will make them disjoin him and value of the literature decrease markedly.

The present study, the training materials/ teaching helped the participants as distribution of notes containing the scientific material was excellent. Teaching materials helped in information destination and maintenance to the audience, it was better to give handouts or notes that help the trainees to remember the information. About (80%) were considered scientific materials as an excellent teaching means, about (34%) of nurses evaluated visual and hearing as very good Randall (2007) noted that the proper training material should be suitable to the contents, and the audience, should cover all topics must be attractive, and trainees, should get handouts and brief notes about the subject. Amuwo and Jenkins (2006) said that the training materials specifically the electronic one should be clear, easy understood clear font, easy to be used by the educator or the trainees.

In the present study, 52.2%of the nurses considered the specified Lecture duration allowed group discussion was excellent and about (41%) found that the time specified for replying to trainees questions was excellent. While about (31%) found that, generally how could you find lecture Duration were good. Gills (2001) recommended that the duration shouldn't be very short not to make the trainees take it lightly or too long not to make them bored. Smith and Poland (2003) noticed that the trainees in the first half an hour to one hour has the maximum level of concentration with better understanding, the concentration starts to decline markedly with high impact on the abilities to understand and concentrate.

The place of the training either made the person comfortable and willing to go to training every day or very boring and making him wish to finish any way. So In the present study, 51.3% of nurses found that the item: training room was very good equipped and clean, and (37.5%) found that the item; supplying the training room with computer devices was fair, while (56.3%) found that generally the training room was very good. Giachello *et al.* (2001) recom-

mended that the place for training should be well ventilated, well lightened, comfortable furniture, and equipped with materials cope with the content of training. The training place should also be near or very available to the trainees (Jamal, 2004). Furnham and Christoforou (2007) noticed that the interior design of the place of training was very important to reach the message for example the U-shaped tables are very good in discussion and problem solving in addition it makes interaction between the groups more easy.

In the present study, 85% of the nurses agreed that all the trainees were informed with the intended learning outcomes and they would be evaluate after their fulfillment,(85%) was found strongly agree that the lectures were useful & related to the program title. All the participants agreed that the tutor was broad minded and have a good scientific background. Chen and Silverthorne (2008) reported that it was very important to meet the expectations of your trainees in order to reach the goals of the program. In addition if the program and expectations of the audience didn't meet this means great gap between the objectives and outcome. Borna and White (2003) said that if the program succeeded to reach the expectations this an indicator of performance. In the present study, 71.3% said that all topics were important. Kracher and Marble (2008) noticed that if the program tutor, contents, material were good this made all topics important to the audience.

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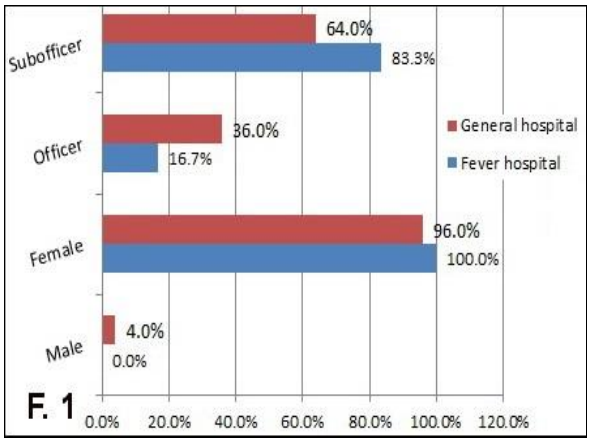
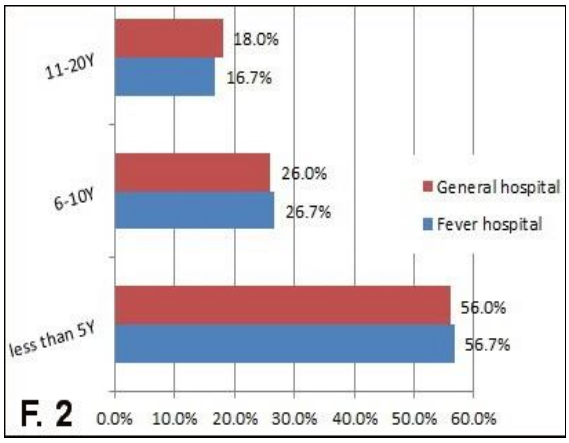
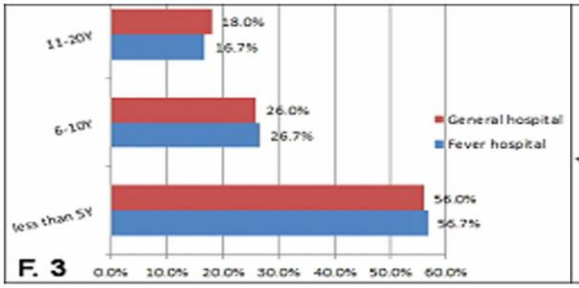
## Explanation of figures

Fig.1: Socio-demographic characteristics as regard sex and rank.
Fig. 2: Socio-demographic characteristics as regard years of experience
Fig. 3: Socio-demographic characteristics as regard Qualification
Fig. 4: Training status of Nursing Staff on an educational program about infectious diseases
Fig.5: Comparison between Nursing staff Knowledge Score as regard Topics via program (N=80)
Fig. 6: Actual total performance of Nursing Staff regarding infection control measures related blood parasites acquired by needle-stick injury
Fig. 7: Comparison between Nursing staff attitude to handling and disposal of sharps instrument via program at Fever hospital (n=30)
Fig. 8: Comparison between Nursing staff attitude to handling and disposal of sharps instrument via program at General hospital (n=50)
Fig. 9: Evaluation of Tutor (N=80) Fig.
10: Evaluation of training materials/teaching aids regarding as visual / hearing
Fig. 11: Evaluation of Place of Training (N=80)
Fig. 12: Evaluation of topics of Training programs (n=80)\\\





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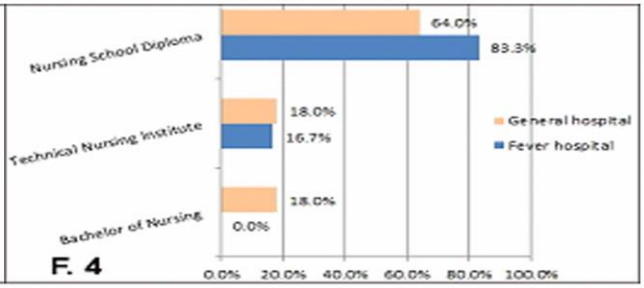
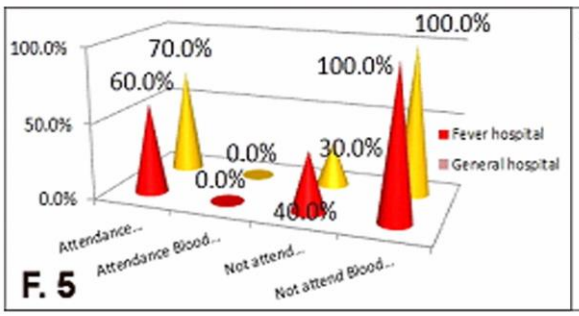


F. 4



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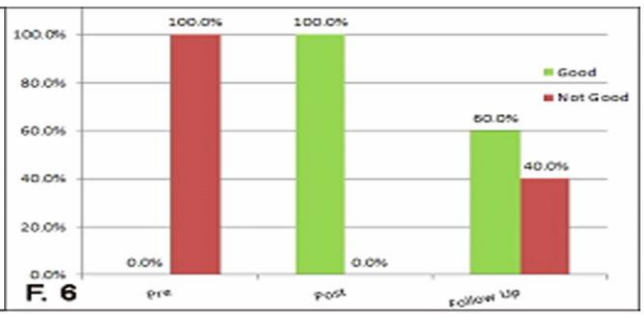
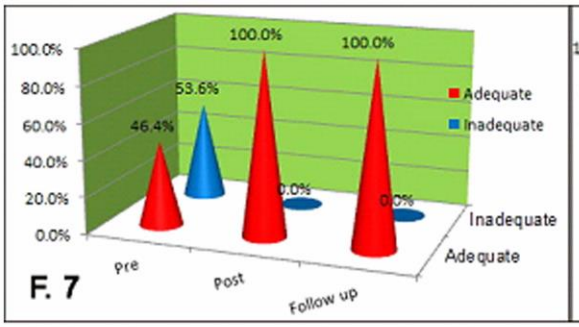
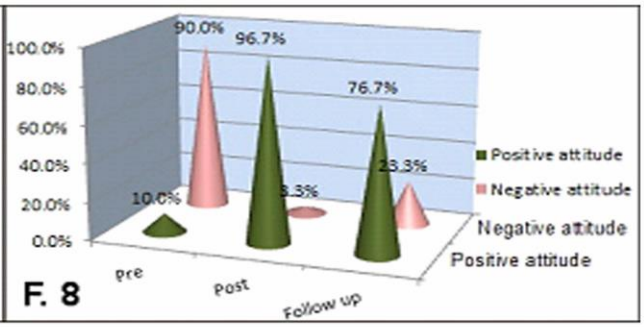


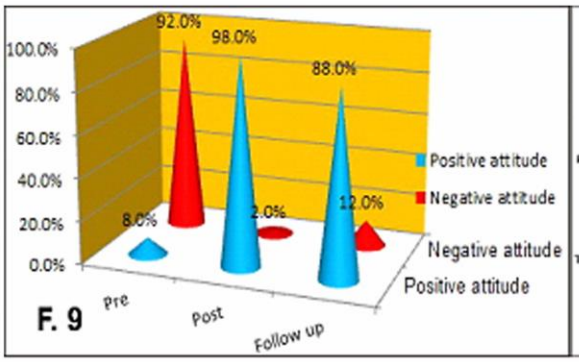
F. 6



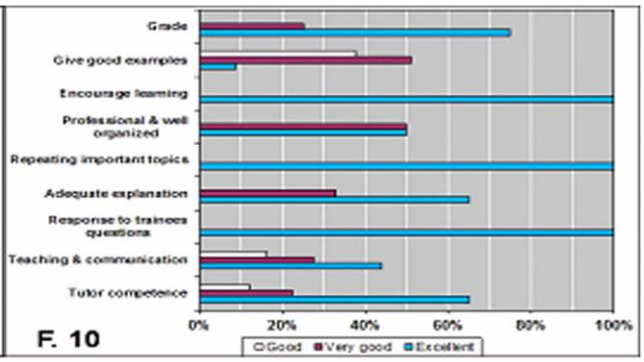
F. 7



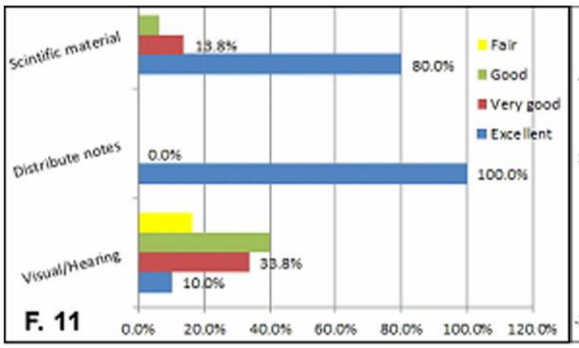
F. 8



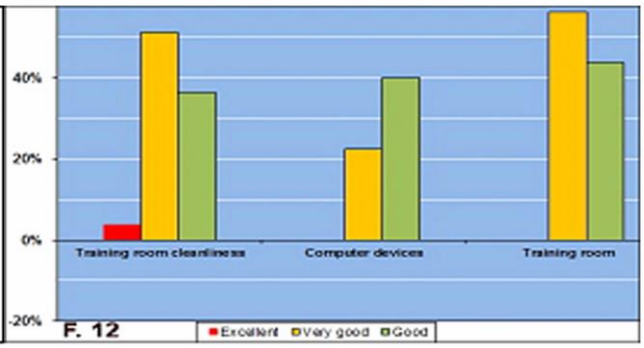
F. 9



F. 10



F. 11



F. 12