

# BEST PRACTICE TECHNIQUES FOR ADMINISTRATION OF INJECTIONS: IMPACT OF LECTURE BASED INTERACTIVE WORKSHOPS ON TRAINING OF NURSES

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## ABSTRACT

**Objectives:** To determine if a structured workshop on best practice technique for the administration of injections for nurses results in an improvement in knowledge on the subject.

**Methodology:** Nurses attended an interactive lecture-based workshop on best practice technique for the administration of injections. Participants had to accept an invitation to the presentation prior to the training event. They completed a multiple choice question (MCQ) test, derived from topics covered in the presentation, prior to the lecture. The MCQ test was repeated after the lecture to assess retention and application of knowledge.

**Results:** Thirty-eight nurses participated in the workshop. There was a significant improvement in mean test scores after the lecture when compared with pre-lecture scores (Mean=16.5, SD=3.7 vs. Mean=7.8, SD=1.9,  $p < 0.001$ ).

**Conclusions:** Lecture based workshop on best practice techniques of administration of injections helps improve nurses knowledge. It also helps in overcoming deficiencies in nurses training.

**KEY WORDS:** Administration of injections, Test, Knowledge, Nurses. Interactive workshop.

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## INTRODUCTION

The administration of injections has become a common nursing intervention in clinical practice and an activity perceived as fundamental

to patient care. Injections are among the most frequent used pharmacological administrative procedures, with an estimated 12 billion administered throughout the world on an annual basis. Of these, 5% or less are for immunization and more than 95% of injections are given for curative purposes.<sup>1</sup> The safe and accurate administration of injections is one of the most important responsibilities of nurses.<sup>2,3</sup>

Historically, complications from injections were frequent and were largely attributed to inadequate knowledge of the procedure and improper technique.<sup>4-10</sup> The dangers and consequences of inappropriate administration of injection application have been highlighted previously. Despite advances in knowledge about injection, preventable complications still occur.<sup>2,10-13</sup> To avoid complications nurses must know

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the anatomy, and advantages and disadvantages of injection sites, be able to accurately identify anatomic landmarks and site boundaries, know the particulars of injection technique, and administer the injection using careful technique. A breach of duty is negligent, may harm the patient and may have an adverse effect on the nurse's professional standing and career.<sup>1-3, 8, 11-15</sup>

Awareness of the structures which are at risk from injections in the region was poor in nurses.<sup>4,7, 15-18</sup> Most of these injection complications are related to the tissue damage at the injection site and are preventable. Most if not all complications can be avoided by careful technique with accurate needle placement, sterile precautions, and a thorough understanding of the relevant anatomy.<sup>1-3,13,14</sup> Many studies correlated the nurse's knowledge to the rate of complications.<sup>4,7,15,17,18</sup>

The nurses should perform regular updates regarding the most prevalent injection administration in the clinical setting. There is a pressing need to educate nurses on best practice technique for the administration of injections, especially given the reduction in clinical experience. A multifaceted approach to tackle current deficiencies in knowledge on best practice technique for the administration of injections should include the provision of validated educational opportunities. Therefore, the aims of this study were to determine if a structured workshop on best practice technique for the administration of injections for nurses results in an improvement in knowledge on the subject and to evaluate the perceived helpfulness of such a workshop.

## METHODOLOGY

*Study Design:* This pre-post test experimental descriptive study was conducted in a Government Hospital in the Kocaeli city center in Turkey on May 2009.

*Participants:* Nurses working in hospital participated in a teaching workshop organized as part of in service Training Programme.

*Interventions:* Participants attended an interactive lecture-based workshop on best practice

technique for the administration of injections. Participants had accepted an invitation to the presentation prior to the training event. A pre-lecture Multiple Choice Question (MCQ) test (Appendix A) was completed by nurses to test their existing knowledge. The MCQ's were derived from topics covered in the presentation. Following the lecture the MCQ test was repeated to assess retention and application of knowledge delivered from the interactive lecture. Participants were unaware that they would be tested with an MCQ prior to the lecture or that the MCQ would be repeated at end of the workshop.

*Statistical Analysis:* Statistical analysis was performed using the SPSS (SPSS for Windows, version 12.0). The Chi-square test was used to determine if data were normally distributed. The Student paired t-test was used to determine if the differences between the pre-lecture and post-lecture test results were significant. Differences were considered significant at  $p < 0.05$ .

## RESULTS

Thirty- eight nurses participated in the workshop. There was a statistically significant improvement in test scores after the lecture when compared with pre-lecture scores (Table-I, Fig-1).

## DISCUSSION

This study was undertaken to determine best practice technique for the administration of

Table-I: Pre-lecture and post-lecture scores

	<i>Pre-lecture test</i> (n = 36)	<i>Post-lecture test</i> (n = 36)
Mean (Standard deviation)	7.8 (3.7)	16.5 (1.9)
95% confidence interval	5.6-9.0	15.8-17.1
Chi Square	31.4	11.6
df	14	7
Asymp.sig	0.005	0.111

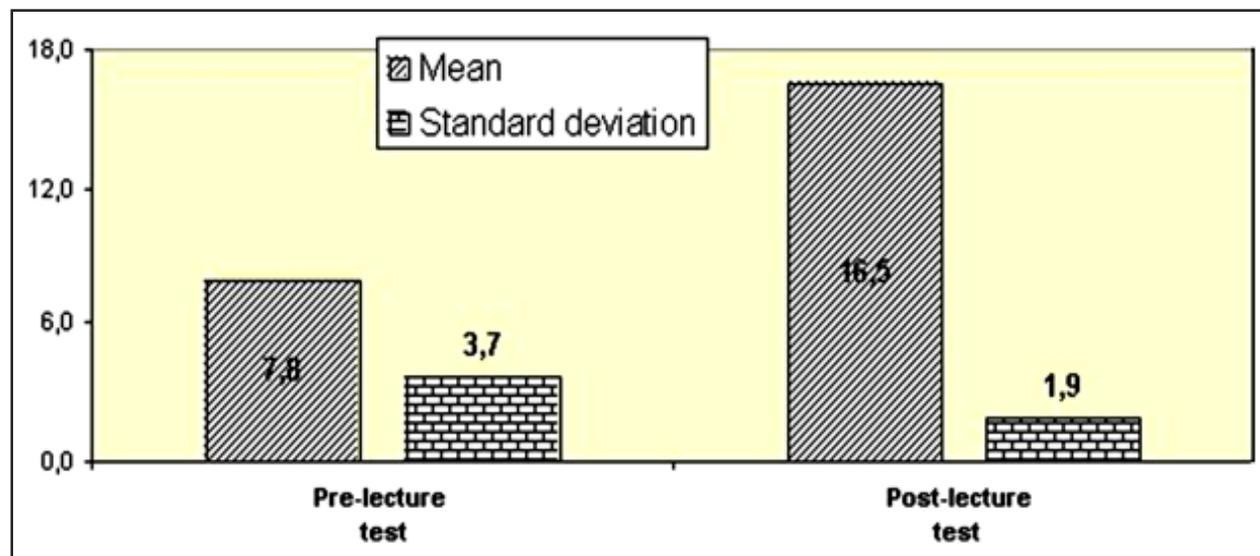


Figure-1: Pre-lecture and post-lecture test score

injections for knowledge and skills of nurses and to assess the effect of training given on this subject.

Participants in this study were at nursing training grades and, having qualified four years previously, would be expected to have a reasonable understanding of best practice technique for the administration of injections. Yet the mean pre-lecture test score (Mean =7.8, S.D=.3.7) was low, and all questions were based on the content of the presentation. This indicates that it is not enough to merely direct nurses to the appropriate sources of information. A more didactic form of teaching with explanation of the underlying concepts is required to improve knowledge and application of best practice technique for the administration of injections, as indicated by the significant improvement in post-lecture test scores (Mean=16.5, SD=1.9). Studies on this theme are similar to the results found.<sup>15, 19, 20</sup>

Overall nurses acknowledged the importance and relevance of the subject and felt the workshop was worthwhile. Amongst the limitations of this study was the small number of nurses in this study, although they represented 45% of the nurses invited to attend this session. This sample is, therefore, representative of nurses within a Regional Nursing Training Programme.

This study tested immediate recall of knowledge and it remains to be seen whether the knowledge gained as a result of the event will be retained by the nurses and whether their application of best practice technique for the administration of injections habits will be altered as a result. It would be useful to examine nurses' knowledge base and application of best practice technique for the administration of injections habits sometime after such an event to determine the need for continued and repeated training into this important subject. In addition, the improvement in the MCQ score could be at least partially attributed to an 'order effect'. It is possible that improvement in post-lecture scores could have happened without the structured workshop, simply because the nurses had the opportunity to think about the questions again and give a more considered answer. This could have been avoided if participants subjected to the MCQ test were randomised to no intervention and to structured learning groups.

## CONCLUSION

Many studies have shown that using interactive sessions with lectures and multiple choice questions improved nurses' knowledge on the topic. The findings of this study suggest that greater emphasis needs to be placed on nurses' education of administration of injections.

## Appendix A

For each given question select the single best answer from the choices provided (AeE)

1. Which one of the following statements about nursing practice standards for medication administration is true?

- A Right medication, dose, patient, and route
- B Right medication, dose, time, and route
- C Right medication, patient, time, and route
- D Right medication, dose, patient, time, and route
- E Right medication, dose, patient, time

2. Which of the following is advocated as the safest site for an IM injection?

- A Vastus lateralis
- B Ventrogluteal site
- C Deltoid muscles.
- D Dorsogluteal muscles.
- E Deltoid and dorsogluteal muscles.

3. Which of the followings is not as safe as being the site of choice for an IM injection?

- B. Vastus lateralis
- C Deltoid muscles.
- D Dorsogluteal muscles
- E. Vastus lateralis and deltoid muscles.

4. Which of the following maximum dosage of injection is appropriate for deltoid muscles?

- A 6 mL
- B 5 mL
- C 4 mL
- D 3 mL
- E 2 mL

5. Which of the followings has the greatest blood flow of any muscle routinely used for IM injections?

- A Ventrogluteal site
- B Vastus lateralis
- C Deltoid muscles
- D. Dorsogluteal muscles.
- E. Vastus lateralis and dorsogluteal muscles.

6. Should be given into the densest part of the muscle at an angle of degrees for IM injections

- A 50 degrees
- B 60 degrees
- C 80 degrees
- D 70 degrees
- E 90 degrees

7. Which of the following statements on using alcohol swab, cleanse injection site is true?

- A Cleanse the site in a circular motion for 15 seconds and allow to dry for 15 seconds prior to administration
- B Cleanse the site in a circular motion for 30 seconds and allow to dry for 30 seconds prior to administration
- C Cleanse the site in a circular motion for 5 seconds and allow to dry for 5 seconds prior to administration
- D Cleanse the site in a circular motion for 20 seconds and allow to dry for 20 seconds prior to administration
- E Cleanse the site in a circular motion for 12 seconds and allow to dry for 10 seconds prior to administration

8. Which one of the following statements about the massage of the site of post injection is true?

- A Massaging the site can cause tissue redness

B Massaging the site can not cause tissue irritation

C Massaging the site can cause tissue irritation

D Massaging the site can cause tissue swelling

E Massaging the site can cause tissue pain

9. Which one of the following statements about using the Z-track technique is true?

- A Use the Z-track technique for vastus lateralis injections
- B. Use the Z-track technique for ventrogluteal site injections

C. Use the Z-track technique for deltoid muscles injections

D. Use the Z-track technique for dorsogluteal muscles injections

E Use the Z-track technique for all IM injections

10. IM injections result in the following potential complications:

A Abscesses, cellulites, tissue necrosis, granulomas, muscle fibrosis, haematomas and injury to blood vessels, bones and peripheral nerves

B Abscesses, cellulites, tissue necrosis, granulomas, contractures, haematomas and injury to blood vessels, bones and peripheral nerves

C Abscesses, cellulites, tissue necrosis, granulomas, muscle fibrosis, contractures, haematomas and injury to blood vessels, bones and peripheral nerves

D Abscesses, tissue necrosis, granulomas, muscle fibrosis, contractures, haematomas and injury to blood vessels, bones and peripheral nerves

E Abscesses, cellulites, granulomas, muscle fibrosis, contractures, haematomas and injury to blood vessels, bones and peripheral nerves

11. Which of the following statements about subcutaneous heparin injections is true?

A Subcutaneous heparin injections should be administered 5 cm beyond the umbilicus

B Subcutaneous heparin injections should be administered 4 cm beyond the umbilicus

C Subcutaneous heparin injections should be administered 3 cm beyond the umbilicus

D Subcutaneous heparin injections should be administered 2 cm beyond the umbilicus

E Subcutaneous heparin injections should be administered 1 cm beyond the umbilicus

12. Which of the following statements about recommended duration of subcutaneous heparin injections is true?

A The recommended duration of subcutaneous heparin injections is over 10 seconds

B The recommended duration of subcutaneous heparin injections is 10 seconds

C The recommended duration of subcutaneous heparin injections is 8 seconds

D The recommended duration of subcutaneous heparin injections is 5 seconds

E The recommended duration of subcutaneous heparin injections is 3 seconds

13. Which of the following statements is critical element of an intra dermal injection?

A Correct dose: the injection of a small amount of medication (0.01-0.1 mL)

B Maintain asepsis

C Correct syringe and needle size for type of injection

- D Do not aspirate before injecting
- E All of the above

14. Which one of the following statements about nurses' responsibilities in intravenous catheter application is true?

A Starting, and stopping the liquid flow, and the diagnosing and preventing complications caused by intravenous catheters

B Starting, observing, and the diagnosing and preventing complications caused by intravenous catheters

C Starting, observing, and stopping the liquid flow, and the diagnosing and preventing complications caused by intravenous catheters

D Observing, and stopping the liquid flow, and the diagnosing and preventing complications caused by intravenous catheters

E. Starting, observing, and stopping the liquid flow, and preventing complications caused by intravenous catheters

15. Routinely, Central venous access devices (PICCs) are used for administration of:

A Total parenteral nutrition (TPN), hypertonic solutions, chemotherapeutic agents, blood products, fluid administration, antibiotic therapy, and retrieval of blood specimens

B Total parenteral nutrition (TPN), hypertonic solutions, chemotherapeutic agents, blood products, fluid administration, and retrieval of blood specimens

C Total parenteral nutrition (TPN), hypertonic solutions, chemotherapeutic agents, fluid administration, antibiotic therapy, and retrieval of blood specimens

D Total parenteral nutrition (TPN), chemotherapeutic agents, blood products, fluid administration, antibiotic therapy, and retrieval of blood specimens

E Total parenteral nutrition (TPN), hypertonic solutions, blood products, fluid administration, antibiotic therapy, and retrieval of blood specimens

16. Complications associated with indwelling central venous catheters include the followings:

A Site infection, catheter occlusion, dislodgment and Twiddler's syndrome, catheter migration, catheter pinch-off syndrome, damaged catheter, superior vena cava syndrome, and skin erosion.

B Site infection, dislodgment and Twiddler's syndrome, catheter migration, catheter pinch-off syndrome, vessel thrombosis, damaged catheter, superior vena cava syndrome, and skin erosion

C Site infection, catheter occlusion, dislodgment and Twiddler's syndrome, catheter migration, catheter pinch-off syndrome, vessel thrombosis, damaged catheter, and skin erosion

D Site infection, catheter occlusion, dislodgment and Twiddler's syndrome, catheter migration, catheter pinch-off syndrome, vessel thrombosis, damaged catheter, superior vena cava syndrome, and skin erosion

E Site infection, catheter occlusion, dislodgment and Twiddler's syndrome, catheter migration, vessel thrombosis, damaged catheter, superior vena cava syndrome, and skin erosion

17. Factors that influence Central venous access devices (PICC) functioning may include:

A The characteristics of the device, product material, medications and solutions infused through the PICC

B The characteristics of the device, product material, and the health status of the patient

C The characteristics of the device, medications and solutions infused through the PICC, and the health status of the patient

D The characteristics of the device, product material, medications and solutions infused through the PICC, and the health status of the patient

E Product material, medications and solutions infused through the PICC, and the health status of the patient

18. Which of the following statements about the first symptom of phlebitis may be true?

A Discomfort at the insertion site or along the cannulated vein.

B Erythema at the insertion site

C Warmth at the insertion site

D Limb edema

E A palpable cord along the venous pathway, and low grade fever

19. Which of the following statements about risk factors of phlebitis may be true?

A Material, and length of the catheter; pH and osmolality of the infusate; and rate of flow, administered drugs, and duration of catheterization

B Material, diameter, and length of the catheter; pH and osmolality of the infusate; and rate of flow, administered drugs, and duration of catheterization

C Material, diameter, and length of the catheter; and rate of flow, administered drugs, and duration of catheterization

D Material, diameter, and length of the catheter; pH and osmolality of the infusate; and rate of flow, and duration of catheterization

E Material, diameter, and length of the catheter; pH and osmolality of the infusate; and rate of flow, administered drugs

20. Which of the following statements about prevent infiltration and extravasation may be true?

A Selection of an appropriate size catheter, use of appropriate fluids, stabilization of the catheter, and use of proper administration techniques

B Selection of an appropriate site for catheter insertion, selection of an appropriate size catheter, use of appropriate fluids, stabilization of the catheter, and use of proper administration techniques

C Selection of an appropriate site for catheter insertion, use of appropriate fluids, stabilization of the catheter, and use of proper administration techniques

D Selection of an appropriate site for catheter insertion, selection of an appropriate size catheter, stabilization of the catheter, and use of proper administration techniques

E Selection of an appropriate site for catheter insertion, selection of an appropriate size catheter, use of appropriate fluids, and stabilization of the catheter

**Answers:** 1-D, 2-B, 3-D, 4-E, 5-C, 6-E, 7-B, 8-C, 9-E, 10-C, 11-A, 12-A, 13-E, 14-C, 15-A, 16-D, 17-D, 18-A, 19-B 20-B,

Providing nurses with information about administration of injections is essential since it can promote nurse adherence to good practice, self assessment and self reporting of injections symptoms, and involvement in safety. The information gained in this study will be valuable as a basis for further research and help guide improvements in the implementation of administration of injections with the ultimate goal of enhancing safe and quality patient care.

The study examined nursing knowledge, clinical performance of sensory and motor blockade assessment, the identification of actual or potential complications, and clinical decision-making skills. The results of the study would help educational planning for injections management competencies. In addition it would be reasonable to assume, therefore, that a similar method could be adopted to teach nursing students about administration of injections as well.

## REFERENCES

- Nicoll LH, Hesby A. Intramuscular injection: an integrative research review and guideline for evidence-based practice. *Appl Nurs Res* 2002; 15(3):149-62.
- Cocoman A, Murray J. Intramuscular injections: a review of best practice for mental health nurses. *J Psychiatr Ment Health Nurs* 2008; 15(5):424-34.
- Dougherty L. IV therapy: recognizing the differences between infiltration and extravasation. *Br J Nurs* 2008; 17(14):896,898-901.
- Karadeniz G, Kutlu N, Tatlisumak E, Ozbakkaloglu B. Nurses' knowledge regarding patients with intravenous catheters and phlebitis interventions. *J Vasc Nurs* 2003; 21(2):44-49.
- Hadaway L. Infusion without infecting. *Nursing* 2003; 33(10):58-63.
- Greenway K. Using the ventrogluteal site for intramuscular injection. *Nurs Stand* 2004; 18(25):39-42.
- Lanbeck P, Oadenholt I, Paulsen O. Perception of risk factors for infusion phlebitis among Swedish nurses: a questionnaire study. *J Infus Nurs* 2004; 27(1):25-30.
- Small SP. Preventing sciatic nerve injury from intramuscular injections: literature review. *J Advanced Nursing* 2004; 47(3):287-296.
- Tarnow K, King N. Intradermal injections: traditional bevel up versus bevel down. *Applied Nursing Research* 2004; 17(4):275-282.
- Thigpen JL. Peripheral intravenous extravasation: nursing procedure for initial treatment. *Neonatal Netw* 2007; 26(6):379-84.
- McGarvey MA, Hooper AC. The deltoid intramuscular injection site in the adult. Current practice among general practitioners and practice nurses. *Ir Med J* 2005; 98(4):105-7.
- Hawes MLA. Proactive approach to combating venous depletion in the hospital setting. *J Infusion Nursing* 2007; 30(1):33-44.
- Wynaden D, Landsborough I, Chapman R, McGowan S, Lapsley J, Finn M. Establishing best practice guidelines for administration of intramuscular injections in the adult: a systematic review of the literature. *Contemp Nurse* 2005; 20(2):267-77.
- Wynaden D, Landsborough J, McGowan S, Baigmohamad Z, Finn M, Pennebaker D. Best practice guidelines for the administration of intramuscular injections in the mental health setting. *Intern J Mental Health Nursing* 2006; 15 (3):195-200.
- Ozyaziciođlu N, Arıkan D. The effect of nurse training on the improvement of intravenous applications. *Nurse Educ Today* 2008; 28(2):179-85.
- Beyea SC, Nicoll LH. Administration of medications via the intramuscular route: an integrative review of the literature and research-based protocol for the procedure. *Appl Nurs Res* 1995; 8(1):23-33.
- Csomós A, Orbán E, Konczné Réti R, Vass E, Darvas K. Intensive care nurses' knowledge about the evidence-based guidelines of preventing central venous catheter related infection. *Orv Hetil* 2008; 149(20):929-34.
- Lanbeck P, Odenholt I, Paulsen O. Perception of Risk Factors for Infusion Phlebitis Among Swedish Nurses. *J Infusion Nursing* 2004; 1 (27):1:25-30.
- Hardern R, Sutcliffe J, Catto A, Pope R. Doctors, nurses, and training in the administration of intravenous drugs. *Br J Clin Pract* 1994; 48(5):246-7.
- Lopez V, Molassiotis A, Chan WK, Ng F, Wong E. An intervention study to evaluate nursing management of peripheral intravascular devices. *J Infus Nurs* 2004; 27(5):322-31. Ventrogluteal site