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Critical Care Nurses' Knowledge and Practice Regarding Administration of Selected Positive Inotropics at Cairo University Hospitals

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Abstract
Background : Critical care nurses are responsible for administering Inotropics drugs that affects the patients cardiovascular functions. Nurses must know proper diluents of each drug and should be expert in calculating the dose of medication to prevent errors. Each nurse should be aware of indication, action, contraindications, adverse reactions interactions of drugs. Moreover, nurses monitor patients for any negative signs of a change in condition, administer medication, and develop a plan of action for patients care. **Aim of the study:** to assess critical care nurses 'nurses knowledge and practices regarding selected positive Inotropics. **Research Design**: A descriptive exploratory design was utilized in this study. **Research questions:** To achieve the aim of the present study, the following two research questions were formulated ;a)what the nurses know about the administration of selected positive Inotropics ?,b) what are the practices the nurses perform while administering the selected positive Inotropics?. **Setting:** The study was carried out at different Critical Care units at Cairo University Hospitals, in Egypt. **Sample:** A sample of convenience of 70 nurses from different critical care units with a minimum one year of experience were included in the present study. **Tools of data collection:** Two tools were used to collect data; the first tool has two parts ;part one is background data sheet that included gender, age, years of experience, educational level and area of work. part two was positive inotropics knowledge questionnaire that was designed by researcher to assess knowledge regarding indication, contraindication, and nursing measures taken with selected inotropics. **The second tool** was positive inotropic observational checklist that was designed to assess nurses practices while administering positive inotropics **Results:** The current study findings revealed that critical care nurses have got low knowledge and practice scores and no significant correlations were existed between years of experience , area of work and their level of knowledge and practice regarding selected positive inotropic medications.. **Conclusion:** it can be concluded that critical care nurses have inadequate knowledge and practice regarding selected positive Inotropics. **Recommendations :** Carrying out educational programs about nursing management of Inotropics and training on calculation of drug doses.
Keywords: Nurses ' knowledge , Nurses practice, Positive Inotropics administration

Introduction

Inotropic drugs start the failing heart by increasing cardiac output, relieving pulmonary congestion and improving blood pressure and tissue perfusion. It affects the strength of cardiac muscle contraction. Negative inotropic action decreases the force of contraction, positive isotropic action increases it. Common intropes used in ICU are Dopamine, Dobutamine, adrenaline , Noradrenaline, Isoprenaline and Milirinone.(Karen,2009).

Nursing staff providing care to patients receiving inotropic drugs on a medical or a surgical unit must have an adequate knowledge about its administration All inotropes can cause a marked increase in heart rate and encourage tachy arrhythmias They should preferably be given through a central venous line than peripheral infusion of some drug cause extravasations and can cause severe local tissue damage The drugs may be diluted in saline or dextrose before administration All drugs must be labeled accurately with name concentration diluents' and rate. (Santhipalan, 2006).

Nursing expertise for drug administration can vary according to experience educational level and the knowledge, regarding evidence based practice. Lack of knowledge regarding current practice guideline and care may result in poor patient outcome. confidence in performing safe and quality nursing care can also be affected by lack of knowledge(Santhipalan, 2006).

Nurses' lack of knowledge is considered to be one of the most significant factors contributing to medication administration errors.The frequency of medication errors made by nurses and the consequences of these errors affect not only the health of the patient but also the overall cost of health care. These medication errors and the reactions that result from them cause increased length of stay, cost, patient disability, and death. These include harm to the nurse involved, in regard to his or her personal and professional status, confidence, and practice. (Mayo & Duncan, 2004). To ensure safe and effective drug therapy for patients, nurses need to be familiar with the indications, customary dosage, and intended effects of prescribed drugs. Also, nurses need to assess each patient before administering a drug.

Just as important, nurses need the skills to be able to administer a drug efficiently, minimizing patient's anxiety and maximizing the drug's effectiveness.

Operational definition Positive inotropes in this study included Dopamine and Dobutamine, epinephrine and Nor Epinephrine that will be administered through intravenous infusion .These drugs are notably chosen from positive inotropics as it is highly dangerous and widely used in the studied critical care units.

2-Aim of the study

The aim of this study has two-folded purposes, first: to assess nurses' knowledge regarding positive inotropics, Second: to evaluate nurses' practice during administration of positive inotropics.

3-Research questions

To fulfill the aim of this study, the research questions were formulated:

3.1)What do nurses know about the selected positive inotropics?

3.2)What practices the nurses perform while administering the selected positive inotropics?

4-Subjects and Methods

4.1.Research Design:

A descriptive exploratory design was utilized in the current study.

4.2.Setting:

This study was conducted in different critical care units at Cairo University Hospitals in Egypt. It encompasses three critical care units who receives medical ,cardiac and neurological patients .These selected critical care units contains approximately 75 nurses with different educational categories.

4.3.Sample:

All nurses working at different critical care units had a minimum of 1 year work experience and provide direct nursing care to their patients and administering positive inotropics constituted the sample of this study. Criteria for inclusion were age 20 or over, minimum years of experience is 6 months, both sexes, and different educational categories. The exclusion criteria were subjects who were piloted and refused voluntarily to participate in the study. to participate will be the subjects of this study.

4.4.Tools: Two tools for data collections were utilized; it has included:

4.4.1 .Tool 1: - Interview questionnaire sheet: it was designed by the researchers and included two parts:

Part 1: Personal and background data sheet: covers data related to age, sex, educational level, and years of experience in nursing and in critical care units

Part 2 : positive inotropic knowledge questionnaire: to assess nurses' knowledge about administration of positive inotropics medications . it consisted of 19 questions in the form of multiple choice and true/false ones. They covered knowledge pertinent to dopamine ,dobutamine ,epinephrine and noeepinephrine . A total score for the questionnaire was 19 grades .The scoring system classified as follows; scores less than 85% was considered unsatisfactory and the scores equal or more than 85% considered satisfactory.

4.4.2. Tool 2:Inotropics adminsteration observational checklist: It was designed by the researcher through literature review to assess nurses' practices related to administration of positive inotropics . The designed tool consists of 23 steps distributed between four positive inotropics ;Dopamine , Dobutamine , Epinephrine and Nor Epinephrine . . It was carried out three times for each nurse during drug administration and the average mean of three observational checklists was obtained . The scoring system was distributed as follows; complete done step took two grades, incomplete one took one grade and incorrect / not done was took zero grade . A total score for the questionnaire was 23 grades .scores less than 85% was considered unsatisfactory and the scores equal or more than 85% considered satisfactory.

4.5.Tools validity and reliability:

The developed knowledge questionnaire and observational checklist tools were reviwed by three panel of experts in critical care nursing to ensure its validity . the reliability of the knowledge was confirmed by alpha Crobach of 75 %and the positve inotropic checklist was tested and retested and its items were significantly correlated with pearson correlation (r=0.81,p 0.00)t.

4.6.Pilot Study

A pilot study was carried out on 10 nurses to test feasibility, objectivity, and applicability of the study tools. .Based on the results of the pilot study, needed refinements and modifications were made.

5-Protection of Human Rights

An official permission to conduct the proposed study was obtained from the ethical committee and hospital directors . Participation in this study was voluntary; each potential subject was informed about the purpose, procedure, benefits, and nature of the study and that he/she had the right to withdraw from the study at any time without any rationale, then written consent obtained from them. Confidentiality and anonymity of each subject was assured through coding of all data.

6-Procedure

The current study was conducted on two phases: preparation and implementation phases.

6.1.Preparation phase:

It was concerned with constructing ,testing and piloting different data collection tools. In addition the managerial arrangements were made to conduct the current study .Nurses who agreed to participate in the study were interviewed individually by the researcher to explain the nature and purpose of the study and obtain a written consent was obtained.

6.2.Implementation phase:

Data were collected from August 2013 to January 2014. The researcher visited the selected Critical Care and Intensive Care Units on daily basis during morning shift. Each potential nurse was interviewed for 20- 30 minutes to fill out the personal and background data sheet and the knowledge questionnaire schedule . The researcher clarified any obscure questions. Later, each nurse was observed three times during administration of Inotropics medications in morning shift utilizing observational check list. The average mean of the three observations was calculated and obtained.

7-Results

Figure (1) presents Percentage distribution of the studied sample in relation to their gender. It is apparent from that figure that most of the participants are female (65.7%).

Table (1) showed percentage distribution of the studied sample regarding age , educational level ,Years of Experience, years of experience in ICU and area of work. It revealed that approximately half of studied subjects (54.3%) their age was ranged between 20-25 years with a mean age of 27.89 + 7.9 . Most of nurses participants carrying diploma degree (44.3%) and technical institute (41.4%) . Regarding years of experience in nursing field, 55.7% of the study subjects were having 1-5 years of experience, with mean years of experience of 8.61+ 7.29 while 64.3% of the study subjects were having 1-5 years of experience in ICU, with the mean of 6.97+ 7.16. ,. In relation to working areas , most of the participants (64.2%) were working in medical critical care..

Table (2) clarifies total and subtotal mean knowledge scores of the studied subjects in relation to selected positive inotropics medications. It showed that the total mean knowledge scores of the studied subjects were 10.72 $\pm$ 3.08 out of 19 items. In relation to Sub-items questions about inotropics , all the studied subject has got low scores. So the question scores pertinent to adrenaline are relatively higher than other inotropics (3.22 $\pm$1.17) out of five scores and knowledge about dobutamine showed the lowest mean (2.05 $\pm$ 1.03) out of 4.

Figure (2):presents percentage distribution of the respondents' knowledge answers in relation to selected positive inotropics medications. It revealed that near half of the studied sample answered questions incorrectly with the following percentage ; adrenaline(36 %), noradrenaline (44%),, dopamine(47.2%), and dobutamine (48.2%), respectively.

Table(3) present percentage distribution of correct and incorrect answers of questions regarding selected positive inotropic medications among the studied subjects. It revealed that 48.6% , 48.2% , and 44 % of the studied subjects answered questions incorrectly regarding Dopamine, Dobutamine , and Nor Adrenaline respectively. The items which has got the lowest score in this respect were Pharmacokinetic and indication of Noradrenaline (68.6%), Pharmacokinetic and indication of Dobutamine (65.7%), effect of Dobutamine on cardiogenic shock (64.43%) , dose of Dopamine (65.7%) , Pharmacokinetic and indication of Nor adrenaline (60%), Manner of Dopamine dilution (72.9%) and Dobutamine dilution (51.4%), clinical uses of Noradrenaline (58.6%.) . As regard responses to Adrenaline administration questions, doses of adrenaline (70%),and antidote in the case of extravasations (45.7%) have got the lowest scores.

Table(4) Shows Percentage distribution of the practice steps in relation to administration of selected positive inotropic medications. It is apparent from table 4 that all nurses participants didn't check blood pressure initially and frequently in adrenaline infusion and 56% didn't stay beside the patient during the initial titration of infusion . In addition , 41% of nurses didn't validate Adrenaline concentration and prescribed infusion rate. As regards Nor adrenaline and Doputamine infusions also all nurses didn't assess blood pressure initially and frequently every hour .More over they didn't assess the peripheral circulation, site of insertion and extravasations signs..In relation to Dopamine infusion administration , almost all nurses didn't assess the following parameters ; peripheral circulation((100%) ,central venous pressure (84.3%) and urinary output (61.4%).

Table (5) presents relationship between knowledge and practice sub items scores related to positive inotropics among the studied sample. It revealed that no correlation were exist between knowledge and practice scores regarding administration of selected positive inotropics except administration of dopamine where r=0.35; p=0.001.

Table (6) Clarifies the relationship of selected demographic variables with knowledge and practice scores related to selected positive inotropics among the studied sample . It showed that no correlation were exist between the

selected demographic variables with total knowledge and total practice scores among the studied sample.

Table (7) presents Comparison of total mean knowledge and practice scores regarding administration of inotropics among the studied subjects by their educational categories and work area. It revealed that there is high significant statistical difference among the means of the knowledge and practice scores of the studied subjects by their educational level where f =19.5, p= 0.001&f= 7.30;P=0.00 respectively. As the participants who carrying baccalaureate degree has got higher means in both knowledge and practice when compared to participants carrying technical and diploma degree. On the other hand, there is no significant statistical difference among the means of knowledge and practice scores of participants by their work areas where f=1.23;p=0.29 &f=1.03;p=0.6 respectively.

8-Discussion

Inotropic drugs are used to increase the force of myocardial contraction and cardiac output, which include sympathomimetics such as Dopamine, Dobutamine, Epinephrine, and Isoproterenol. these drugs are commonly given to patients with ventricular dysfunction and cardiogenic shock.(webester,2007). Nurses are responsible for preparing and administering the inotropic drugs that affects the patients cardiovascular functions. Nurses must know proper diluents of each drug and they should be expert in calculating the dose of medication to prevent errors. Each nurse should be aware of indication, action, contraindications, adverse reactions and interactions of drug.

The data that answered the first research question revealed that all the nurses participants had got low knowledge scores below the satisfactory level ($\geq$ 85%) with the mean 10.72 $\pm$ 3.08 out of 19 items which represent 52%. which was unsatisfactory level. As regard the percentage distribution of correct and incorrect answers of knowledge questions regarding administration of selected positive inotropic medications among the studied subjects. It revealed the items which has got the lowest score were Pharmacokinetic and indication of Noradrenaline , Pharmacokinetic and indication of Dobutamine, effect of Dobutamine on cardiogenic shock , dose of Dopamine, Pharmacokinetic and indication of Nor adrenaline , Manner of Dopamine and Dobutamine dilution , clinical uses of Noradrenaline. As regard responses to Adrenaline administration questions, doses of adrenaline ,and antidote in the case of extravasations have got the lowest scores.

The investigator interpreted the rationale of lack of knowledge pertinent to positive inotropic medication is that this topic is not incorporated in curriculum of pharmacology and nursing. The investigator point of view is supported by Stifter, et al (1991) findings who conducted a study to assess the effects of an educational program designed to improve nurses' knowledge of the use of emergency medications in the pediatric intensive-care unit (PICU) The clinical pharmacist and a clinical nurse educator developed a program for a six-bed PICU to assess and extend PICU nurse's knowledge of emergency medications with respect to calculations of bolus and continuous infusions, pharmacology, and proper dosage and administration route. The program consisted of a pretest, a pharmacology lecture, calculation problems, a hands-on practicum, and a posttest. Drugs covered were atropine sulfate, sodium bicarbonate, calcium gluconate, calcium chloride, dopamine hydrochloride, dobutamine hydrochloride, epinephrine hydrochloride, isoproterenol hydrochloride, lidocaine hydrochloride, sodium nitroprusside, and norepinephrine bitartrate. A retest was given 13 months after the pretest. The program was completed by 21 nurses over seven months. There was a significant difference between the mean pretest score, 69 .5%, and the mean posttest score, 87.3%, due to improvements in scores for the calculation questions.

In addition, This finding is agreed with Altun, et al (2010) who Conducted a study to determine if a structured workshop on best practice technique for the administration of injection for the nurses results in an improvement in knowledge on the subject. Lecture based practice technique of administration of injections helped to improve nurses knowledge and helped to overcome deficiencies in nurses training. Also this findings are congruent with Scarlet(2006) who stated that the infusion nurse specialist need to have knowledge and skills necessary to recognize and respond appropriately, when anaphylaxis occurs. Nurse's insufficient drug calculation skills contribute to 1.5 - 4.9% of error rate in infusion preparation task (Parshuram, et al 2008). Research has demonstrated that an educational programme can raise nurse's awareness- about medication errors. and other medication related safety issues (Elnour, et al 2008& Schreiber, et al (2007)).Research findings warn that more than half of life threatening errors are related to rapid infusion of high alert medications such as inotropics (Glandstone,1995). From an educational point of view lack of pharmacology teaching and a theory - practice gap lead nurses to make administration errors (Stifter, et al 1991 & Cohen,2007).

In relation to the data that answered the second research questions , it revealed that the nurses has got low practice scores pertinent to administration of positive inotropics notably checking blood pressure initially and frequently in Adrenaline, Nor adrenaline and Dobutamine infusion and didn't stay beside the patient during the initial titration of infusion . In addition , near half of the nurses didn't validate Adrenaline concentration and prescribed infusion rate. .More over they didn’t assess the peripheral circulation, site of insertion ,extravasations signs, urinary output and central venous pressure in Dopamine infusion administration . This finding is supported by Mohamed and Gaber

(2010) & Hsaio, et al (2010) aimed to assess nurses' views on the factors contributing to medication errors and suggestions of facilitating improvements to control medication administration errors in intensive care units and concluded that nurses' medication administration process (transcription, preparation,) is generally inadequate. Moreover, Benkirane et al (2009) conducted a multicentered study to assess the incidence of adverse drug events and medication errors in intensive care units and identified that improper dose accounted for the majority of potential and actual preventable (21.1%), wrong duration of treatment (19.2%), wrong rate of administration (13.5), errors due to drug omission (9.6%), wrong administration timing (1.9%).).

The studied sample of the present study didn't follow and comply with the evidence based guidelines while administering positive inotropics recommended by Ann Williams, (2001), Andrew, (2012) , Oshikoya, et al (2008) and Wolf (2006); that dosage calculation must be calculated and verified by two registered nurses and Obtain pre-infusion assessment; Heart rate (apical & radial), edema, assess peripheral pulses, B/P, respirations, temperature, lung sounds, pulse oximeter reading, skin color, abdominal girth (if applicable) and capillary refill. and document the baseline findings in the clinical note. The researchers added that when patient is receiving continuous infusion of Dopamine, Dobutamine or Milrinone, B/P, heart rate will be monitored by caregiver every AM .When dosage is changed, B/P and heart rate will be taken 15 minutes.

In the present study, The researchers examined the relationship between knowledge sub items and practice sub items scores regarding the selected positive inotropic medications. It revealed that no correlation were exist between participants' knowledge and practice regarding selected positive inotropics except Dopamine. This finding could be interpreted that lack of knowledge about Dopamine administration may have relevance to decreased practice scores .This finding is partially consistent with Hajebi, et al,(2010) who performed a study to determine the knowledge , attitude and practice of nurses towards pharmacovigilance in the taleqani medical teaching and treatment centre in Tehran before and after an adverse drug reaction education programme As the study revealed that the knowledge of nurses before the seminar was significantly less than the knowledge after the seminar (P= 0.0001), but there was no significant effect on the attitude (p=0.05). Based on the results of this study, the author recommended that it is necessary to conduct continuous adverse drug reaction educational programme until voluntary monitoring of adverse drug reaction become conventional and habitual among nursing staff.

The researcher investigated other factors that may have relevance to lack of knowledge and practice regarding selected positive inotropics such as educational level, years of experience (in nursing and ICU) and area of work. The study findings revealed that were significant statistical differences among nurses by their educational categories regarding knowledge and practice (f=19;p=0.000 & f=7.30 ; p=0.001 respectively). As the baccalaureate nurses has got higher knowledge and practice scores than diploma and technical institute nurses .

It has been postulated that years of experience is directly proportional to the level of knowledge and practice ,i.e.; the more the years of experience, the higher the level of knowledge and practice. In addition ,More education and experience are associated with improved patient safety .When administering medications, nurses are accountable for knowing why the medication is being used, what possible side effects are to be monitored Finding of this study didn't support this postulation and revealed that no significant correlation existed between years of experience and both knowledge and practice . This study finding is contradicted with Geri (2005) who stated that the more experience increases the cognitive resources available for interpretation of data resulting in increased knowledge. Finally the researcher investigated the correlation between participants' knowledge and practice and their work area It revealed that no correlation what so ever between work area and their level of knowledge and practice regarding administration of selected positive innotropics.

9-Conclusion

Based on the findings of the current study, it can be concluded that critical care nurses have inadequate knowledge and practice regarding selected positive inotropics and no correlation were existed between years of experience ,work area and their level of knowledge and practice.

10-Recommendation

- Repetition of the study on a larger population .
- Monitoring nursing interventions regarding administration of positive innotropics
- Carrying out educational programs about calculation of IV high alert medications doses.
-Incorporation of inotropics topic in nursing and pharmacology curricula .
-Training of nurses on metric system , IV drug dosage calculation and rate of its dilution.

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11-References

1-Andrew, p. (2012). Inotropic drugs and their uses in critical care. Nursing in Critical Care Volume 17, Issue 1, pages 19–27.
2-Altun, I., Cinar, D.N., Barin,C.0.(2010), Practice techniques for administration of injections: Impact of lecture based interactive workshops on training of nurses, Pakistan Journal of Medical Science,26 (1), 152-157.
3-Ann Williams,RN.(2001. Inotropic infusion therapy. ResourceNurse.com.
4-Anupriya P.S.(2010). A study to assess knowledge about selected cardiovascular drugs among cardiac nurses. Project Report Submitted in partial fulfillment of the requirements for the diploma in Cardiavascula:r and Thoracic Nursing. Sree Chitra Tirunal Institute for Medical Science '" .and Technology, Trivandrum..
5-Benkirane, Raja R, R-Abouqat, Haimeur, Cherkic Cherif EI Kettani, Salma S, Azzouzi, Abderrahim A.(2009). Incidence of Adverse Drug Events and Medication Errors in Intensive Care Units: A Prospective Multicenter Study. Journal of Patient Safety 1(5), 16-22.
6-Cohen, M.R. (2007). Medication Errors. (2nd edn). American Pharmaceutical Association, Washington, DC.
7-Elnour, A.A., Ellahham, H. N., Ismail, I. & Qassaset, A .. (2008) Raising the awareness of inpatient nursing staff about medication errors . Pharmacy World and Science, Springer link Journal, 30(9), 182-190.
8- Geri,w., & Susan,B.(2005).The effect of teaching method on long term knowledge retention.Journal of Nursing Education, Nov;44(11):13-16.
9- Hajebi, G., Mortazavi, A.S., Salamzadeh, J., Zian,A. (2010). A Survey of Knowledge, Attitude and Practice of Nurses towards Pharamacovigilance m Taleqani Hospital.Iranian, Journal of Pharmaceutical Research, 9 (2), 199-206.
10- Hsaio,J.Y., Chen, J.I., Wei, I.L., Fang,Y.Y.& Tang, F.I. (2009). Nurses' knowledge of high-alert medications: instrument development and validation, Journal of Advanced Nursing, 66(1), 177-190.
11- Karen J. Kirk, J. O. (2009). Drug Administration. In Nursing Procedures (p. 279). China: Lippincott Williams & Wilkins.
12-Mayo , A.M,& Duncan, D..(2004).Nurse perceptions of medication errors: what we need to know for patient safety. J Nurs Care Qual. 2004 Jul-Sep;19(3):209-17.
13- Mohamed, N., Gabr, H. (20 10). Quality improvement techniques to control medication errors in surgical intensive care units at emergency hospital, Journal of Medicine and Biomedical Sciences, 2078-2080.
14-Oshikoya, A.K., Senbanjo, I.O. & Soipe, A.(2008). Ability of medical students to calculate drug doses in children after their pediatric attachment, Journal of Pharmacy Practice, 6(4), 1886.
15- Parshuram, C., Eran.k., Seto, W., Veriee,Z Khattak,S. & Koren,G. (2004). Prospective observational study on the incidence of medication errors during simulated resuscitation in a paediatric emergency department, British Medical journal, 329(7478), 1321.
16--Santhipalan , T.(2006). Knowledge assessment of intensive care unit nursing staff about management of patients receiving inotropic drugs . ·Chitra Tirunal Institute For Medical Science And Technology.
17-Scarlet and Cora.(2006),Anaphylaxis, Journal of Infusion Nursing 29(1), 39-44.
18-. Schreiber, R., et al.(2007) , Drug-related problems in hospitals, Drug safety, 30(5): 379– 407.
19-Stifter, J., Hatoum, H.T. & Kraus , D.M.(1991). Program to improve nurses' knowledge of pediatric emergency medications American Journal of Hospital Pharmacy, 48(1),97-101.
20-Webster,M.(2007). Definition of cardiovascular drugs ..www. britannica com/ Ebchecked /Cardiovascular drugs.
21-Wolf,R.Z.(2006). Characteristics of medication errors made by students during the administrative phase: A descriptive study, Journal of Professional Nursing, 22(1),39-51..

Figure (1): Percentage Distribution of the Studied Sample in relation to their gender. (n=70).

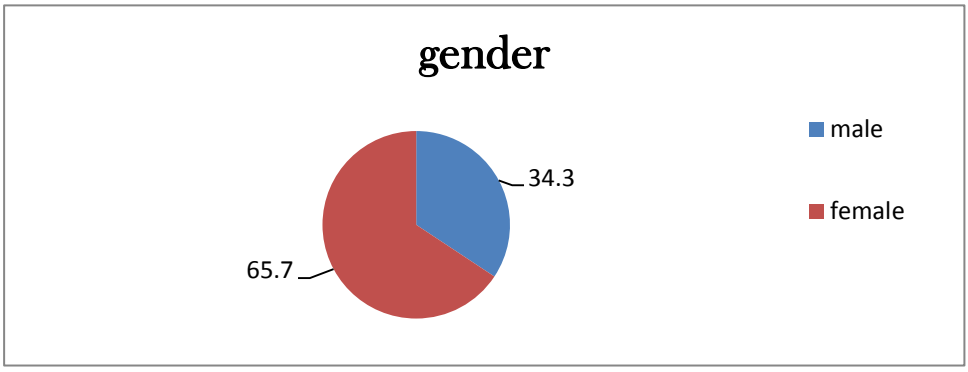

Table (1): Percentage Distribution of the Studied Sample regarding Age , educational level ,Years of Experience, years of experience in ICU and area of work (n=70) .

Variables	Study sample (n=68)	
	No	%
Age		
<20	3	4.3
20-25	38	54.3
26-35	17	24.2
>35	12	17.1
Mean± SD	**27.89**	**± 7.9**
Educational level		
bachelor	10	14.3
technical	29	41.4
diploma	31	44.3
Years of experience:		
1-5	38	55.7
6-10	10	14.3
11-20	16	22.9
>20	5	7.1
Mean± SD	**8.61**	**± 7.29**
Years of experience in ICU		
1-5	45	64.3
6-10	8	12.8
11-20	13	18.6
>20	3	4.3
Mean+ SD	**6.97**	**± 7.16**
working area		
Medical critical care	45	64.2
Neurological critical care	9	12.9
Emergency critical care	16	22.9

Table (2): Total and Subtotal Mean Knowledge Scores of the Studied Subjects in relation to selected positive inotropics medications (N=70):

Items	Total score	Mean± SD
Total Knowledge score.	19	10.72 +3.08
Knowledge subitems		
• Adrenaline	5	3.21 +1.15
• Noradrenaline	5	2.80 +1.26
• Dopamine	5	2.64 +1.16
• Dobutamine	4	2.07 +1.05

Figure (2): Percentage Distribution of the Respondents' Knowledge questions responses in relation to positive inotropics medications (N=70):

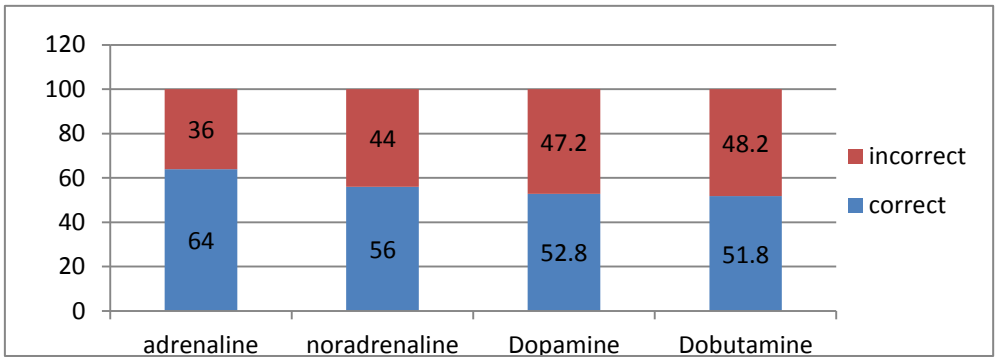

Table (3): Percentage Distribution of correct and incorrect / don't know answers of questions sub items regarding positive Inotropic medications among the studied subjects (n=70).

Items	correct		Incorrect / Don't know	
	No.	%	No.	%
Inotropic name				
Adrenaline				
Indication	49	70	21	30
Dose in a particular situation	21	30	49	70
Typical uses of adrenaline	61	87.1	9	12.9
Antidote in case of extravasation	38	54.3	32	45.7
Route of administration	55	78.6	15	21.4
Total	45	**64**	25	**36**
Noradrenaline				
Pharmacokinetic of noradrenaline	22	31.4	48	68.6
Famous name of noradrenaline	58	82.9	12	17.1
Pharmacodynamic of noradrenaline	28	40	42	60
Appropriate clinical use	29	41.4	41	58.6
Withdrawal of noradrenaline	59	84.3	11	15.7
Total	39	**56**	31	**44**
Dopamine				
Mechanism of action	51	72.9	19	27.1
Dose of dopamine	24	34.3	46	65.7
Unit prescription of dose	55	78.6	15	21.4
Manner of dopamine dilution in solution	19	27.1	51	72.9
Contraindication	36	**51.4**	34	**48.6**
Dobutamine				
Pharmacokinetic and indication	24	34.3	46	65.7
Effect of dobutamine on cardiogenic shock	25	35.7	45	64.3
Manner of Dobutamine dilution in solution	34	48.6	36	51.4
Mechanism of action	62	88.6	8	11.4
Total	36	**51.8**	34	**48.2**

Table (4): Average percentage distribution of the practice steps in relation to administration selected positive inotropics medications (n=70)

Steps	Correct	Incorrect
	N (%)	N (%)
Epinephrine infusion:		
Validate Adrenaline concentration and prescribed infusion rate	41 (58.7)	29 (41.3)
Obtain baseline vital signs.	66 (94.8)	4 (5.2)
Monitor BP frequently through arterial line BP& monitoring machine.	0 (0.00)	70 (100)
Stay beside the patient during the initial titration of infusion	31 (43.7)	39 (56.3)
Monitor patient's blood pressure every 5 minutes initially	0 (0.00)	70 (100)
Monitor for chest pain, dysrhythmias and hypertension	63 (89.7)	7 (10.3)
Never administer any other infusion in the same line	56 (80.1)	14 (19.9)
Total	**37 (52.4)**	**33 (47.6)**
Norepinephrine infusion:		
Obtain baseline vital signs.	66 (94.7)	4 (5.3)
Assess peripheral circulation prior to starting infusion.	1 (0.8)	69 (99.2)
Monitor and document vital signs and medication dose with each adjustment.	68 (97.3)	2 (2.7)
Monitor IV site closely	6 (8)	64 (92)
Monitor BP every 5 minutes initially, every 30 minutes and every hour.	0 (0.0)	70 (100)
Total	**28 (40.2)**	**52 (59.8)**
Dopamine infusion:		
Obtain base line vital signs.	68 (97.1)	2 (2.9)
Monitor carefully blood pressure and urine output.	24 (34.3)	56 (65.7)
Monitor central venous pressure during dopamine infusion	11 (15.7)	59 (84.3)
Observe infusion site hourly for signs of extravasation .	5 (7.1)	65 (92.9)
Monitor peripheral circulation and temperature of extremities for any changes.	0(0)	70(100)
Report tachycardia, hypertension and arrhythmia's immediately.	64 (91.1)	6 (8.9)
Check BP and urine output prior to each adjustment in infusion rate.	27 (38.6)	43 (61.4)
Total	**28 (40.6)**	**52 (59.4)**
Dobutamine infusion:		
Document vital signs hourly.	69 (99.1)	1 (0.9)
Monitor fluid balance (intake and output).	66 (94.1)	4 (5.9)
Observe IV site closely and avoid extravasation	4 (5.9)	66 (94.1)
Report tachycardia, hypertension and arrhythmia's immediately.	58 (82.7)	12 (17.3)
Total	**49 (70.5)**	**21 (29.5)**

Table (5): Relationship between sub items knowledge and sub items practice Scores Related to positive inotropics among the studied sample (n=70).

Variables	R value	P value
Adrenaline (knowledge & practice)	0.1	0.38
Noradrenaline (Knowledge & practice)	0.25	0.83
Dopamine (Knowledge & Practice)	0.375	0.001*
Dobutamine (Knowledge & Practice)	- 0.09	0.44

* P < 0.05 Significance value

Table (6): Relationship of selected demographic variables with knowledge and practice Related to positive inotropics among the studied sample (n=70).

Variables	knowledge		Practice	
	R value	p value	R value	p value
Age	0.175	0.146	- 0.04	0.71
Years of experience in nursing	0.05	0.63	0.13	0.27
ICU years of experience	0.14	0.22	0.09	0.43

Table (7):Comparison of total mean knowledge and practice scores regarding administration of inotropics by educational categories and work area

Variables	knowledge			Practice		
	X SD	F value	p	X SD	F value	p
Educational categories						
Diploma nursing school	10.06 ± 2.73	19.05	0.00	26.75 ± 2.92	7.30	0.001*
Technical nursing institute	9.86 ± 2.44			26.69 ± 4.71		
Baccalaureate nursing	15.20 ± 1.54			31..9 ± 4.45		
Work area						
Medical critical care unit	10.95 ± 3.23	1.23	0.29	27.7 ± 3.55	1.03	0.6
Neurological critical care	11.33 ± 1.5			28.77 ± 6.81		
Emergency critical care unit	9.68 ± 3.13			26.06 ± 4.55		

*** P < 0.05 Significance value**