

An Evaluative Study of Practices Related to Administration of Vasoactive Drugs by Nurses

Kamli Prakash¹, Renuka Chauhan², Rajni Rajjappa³

¹(Medical Surgical Nursing, Himalayan College of Nursing/ Himalayan University, India)

^{2,3}(Medical Surgical Nursing, College of Nursing, CMC Hospital, India)

Abstract: Medication administration is an important function and responsibility of professional nurses, an evaluative study was done to Evaluate the Practices Related to Administration of Vasoactive Drugs by Nurses, in Selected Adult Care Areas of a Hospital, Ludhiana, Punjab. Sixty nurses were observed while administering vasoactive drugs by using an evaluative proforma based on Donabedian's -structure, process, outcome framework. Results showed that overall practices were lower than the expected standard and therefore needed improvement to reach upto expected standards. There were deficits in practices of nurses related to criteria of structure standard i.e. knowledge of vasoactive drugs, accessibility to protocols and human resources both in special units and general wards, process standard i.e. assessment, nursing diagnosis and intervention, documentation and reporting, and outcome standard i.e. observation of principles of universal precaution, patients / relative satisfaction in special units as well as in general wards..

Keywords: Evaluation, Practices, Vasoactive drugs, Structure, Process, Outcome

I. Introduction

A nurse as a professional assumes responsibility and accountability for all nursing care delivered. Responsibility refers to execution of duties associated with a nurse's particular role. (ANA, 1991).¹ When administering a medication, nurse is responsible for assessing the client's needs for drug, giving it safely and correctly and evaluating the response to it. Accountability is being answerable for one's own action. A nurse is accountable to self, the client, the profession the employing institution and society (Potter & Perry 1995).² Medicines are prescribed by the doctor and dispensed by the pharmacist, but responsibility for correct administration rests with the nurse. Each Registered Nurse is accountable for his or her practice. This practice includes preparing, checking, and administering medications, updating knowledge of medications, monitoring the effectiveness of treatment, reporting adverse reactions and teaching patients about their drug. (O'Shea E. 1999)³

Evaluation and quality assurance are inseparable. As defined by Donabedian quality care is "the conformity between actual care and preset criteria. The degree of conformity gives an indication which part of care is predominantly good and which part needs improvement." Thus quality health care is translated into an evaluation process (Giebing, 1994).⁴ Three different aspects of health care can be evaluated; the structure in which the care is given, the process of giving that care, and the outcome of that care. To be comprehensive, an evaluation program must include all three aspects of health care (Donabedian, 1969, Donabedian, 1977, Brook, 1980).⁵⁻⁷

The ANA defined Standards as statements relating to the scope of nursing practice including both Standard of care; and such aspects of the nurse's role as assessment, planning, and evaluation; and standards of professional performance such as aspects of the nurse's role in quality assurance and research.(ANA, 1991)¹.The purpose of standards of clinical nursing practice is to describe the responsibilities for which nurses are accountable. The standards –reflect the values and priorities of the nursing profession, provide direction for professional nursing practice, provide a framework for the evaluation of nursing practice and define the profession's accountability to the public and the client outcomes for which nurses are responsible (ANA 1998).⁸

Vasocative drugs exert an effect on the caliber of blood vessels. Vasoactive drugs are administered in altered hemodynamic states, the nursing diagnosis related with altered hemodynamic states are altered cardiac output, impaired tissue perfusion and fluid volume deficit. Since these are emergency situations, the nurse must understand the hemodynamic imbalances and the drugs needed to correct them. The major vasoactive drugs needed to correct them include-dopamine, dobutamine, epinephrine, nor epinephrine isoprenaline. (Whipple 1992)⁹

Need of the Study: In today's complex and competitive health care environment, quality monitoring and evaluation is no longer the responsibility of a single person or department. Consumers and outside agencies now mandate ongoing monitoring and improvement in the quality of patient care service.(Schroeder, 1984)¹⁰ Quality in nursing is "The process for the attainment of the highest degree of excellence in the delivery of patient or client care"(Lang, 1980)¹¹

Statement of the Problem: An Evaluative Study of Practices Related to Administration of Vasoactive Drugs by Nurses, in Selected Adult Care Areas of a Hospital, Ludhiana, Punjab.

Purpose: The study aims to evaluate the practices related to administration of vasoactive drugs by nurses with a view to develop guidelines on, Intravenous Administration of Vasoactive Drugs, and recommend their use as written standards.

Objectives:

1. To assess the practices related to administration of vasoactive drugs by nurses in selected adult care areas of a hospital.
2. To analyze practices related to administration of vasoactive drugs with variables such as – professional qualification, professional experience, training institution, in-service education, area of work, duty shift, and type of vasoactive drug administered by nurses.
3. To compare over all practices of nurses related to administration of vasoactive drugs, between special units and general wards.
4. To identify deficits in practices related to administration of vasoactive drugs by nurses in selected adult care areas.
5. To develop guidelines on, Intravenous Administration of Vasoactive Drugs, and recommend their use as written standards.

Hypothesis

H₁: Score of practices related to administration of vasoactive drugs by nurses in special units will be significantly higher than those of general wards as measured by a structured evaluation proforma at $p < 0.05$ level

Conceptual Framework: The conceptual model of the present evaluative study was based on American Nurses' Association Model of Quality Assurance (1975)¹¹ with Donabedian's (1966)¹² structure–process–outcome format.

II. Methodology

Research Approach: Non experimental approach was adopted for the present evaluative study

Research Design: The evaluative research design was adopted to evaluate the practices related to administration of vasoactive drugs by nurses for which American Nurses Association (ANA) Quality Assurance Model with Donabedian's Structure-Process-Outcome framework was adopted.

Population: The target population of this study consisted of all registered nurses working in selected adult care areas.

Sample and Sampling Technique: The sample of the study consisted of 60 nurses administering intravenous vasoactive drugs in general wards i.e neurology and cardiology wards, male medical ward. Special units i.e. intensive care unit, intensive cardiac care unit, and neurosurgery intensive care unit. Judgmental sampling technique was used to select the subjects for the sample which included all nurses who were administering intravenous vasoactive drugs in all three shifts- morning, evening and night.

Development and Description of the Research Tool: The tool in the form of Evaluation proforma was structured to evaluate the practices related to administration of vasoactive drugs.

Parts of the Tool:

The tool was divided into three parts-

Part I- Personal data - Comprised of items for obtaining personal information i.e. professional qualification, professional experience, training institutions, in-service education, area of work, duty shift, vasoactive drug administered.

Part II- Evaluation proforma for evaluation of practices related to administration of vasoactive drugs by nurses based on ANA Quality Assurance Model with Donabedian's -structure, process, outcome framework.

It had three sections: Section A- Structure Standard. Section B- Process Standard. Section C- Outcome Standard.

Research tool consisted of total 64 criteria (items). Criterion meeting the expected standard was given one (1) score each and criterion which was not meeting the expected standard was each given a score zero (0). So the number of criteria was equal to the maximum score. Maximum score = 64. Minimum score = 0

Criterion Measure:

A. Structure standard= Maximum score =33

Expected standard met= >90% (>30)

Need improvement = < 90% (<30)

B. Process standard = Maximum score=26

Expected standard met =100% (26)

Need improvement =< 100% (<26)

C. Outcome standard = Maximum score = 5

Expected standard met =100% (5)

Need improvement <100% (<5)

Part III: Development of Guidelines:- The guidelines on intravenous administration of vasoactive drugs was developed which included- **Introduction**, definition of Nursing, importance of Quality and Standards, purpose and Objectives of Guidelines, standards, guidelines, structure, process, outcome, evaluation Proforma.

Content Validity of Evaluation proforma & Guidelines: Content validity of the tool was determined by experts' opinion and suggestions on relevance of items

Reliability of the Tool: The inter rator (inter observer) reliability of the evaluation proforma was calculated which was 0.97

Ethical consideration: An informed verbal consent was obtained from each study subject. It was ensured that treatment of patient was not interfered. Confidentiality and anonymity was ensured.

Data Collection Procedure: Prior to data collection a written permission was obtained from the Nursing Superintendent. Another observer was trained to observe along with the investigator practices related to administration of vasoactive drugs. The list of nurses working in concerned wards was obtained. Rapport was built with the ward in- charges and staff nurses. A notice was put-up by the investigator in the nurses' station requesting staff nurses to call her whenever any doctor prescribed any of the vasoactive drugs for any patient in the ward. The investigator and inter rator observer did not participate in the administration of vasoactive drugs but observed each subject from the assessment to the evaluations step of process standard and went with subjects to bedside of the patients and checked the documentation in the bed side charts. The evaluation proforma for assessment of practices related to administration of vasoactive drugs was filled on the basis of investigator's observation, auditing of bed side documents and asking questions to nurses /patients/relatives.

III. Results

Sample Characteristics- Maximum nurses (36.7%) were having > 4 years of professional experience, Majority of nurses (73.3%) were trained at CMC hospital Ludhiana.50% of nurses had attended in-service education. Majority of nurses (48.3 %) were on morning duty and 33.3 % on evening shift and 13.3 % on night shift during data collection. Majority of the nurses 28.8% were working in ICCU followed by 23 % in ICU, 20% in male medical ward and 16.66 % in neurosurgery ICU and 11.66 % in neurology ward. Maximum number of nurses (60%) administered nor-adrenaline, 23.3 % GTN and 16.7 % dopamine.

Objective 1 To Assess the practices related to administration of vasoactive drugs by nurses in selected adult care areas of hospital.

Table:1

Mean, Mean percentage score of practices according to level of structure standard.

N=60

Structure Standard	Max Score	Score			
		Expected standard =90%		Need improvement < 90%	
		Mean	Mean %	Mean	Mean %
S1 Knowledge of vasoactive drugs	12	-	-	8.4	70.25
S2 Access to written protocols	4	-	-	0.52	13
S3 Availability articles for procedures	9	9	100	-	-
S4 Availability articles for universal precautions	4	4	100	-	-
S5. Human resources	4	-	-	2.65	66.25

Maximum structure standard score = 33, Minimum structure standard score = 0

Table:1- Shows that mean percentage score was (100%) in availability of articles for procedure as well as for universal precautions. The criteria needed improvement were knowledge of vasoactive drugs (70.25%) human resources (66.25%) and access to written protocols (13%)

Table:2
Mean, Mean percentage score of practices related to administration of vasoactive drugs by nurses according to process standard

N=60

Process Standard	Max Score	Score			
		Expected standard =100%		Need improvement < 100%	
		Mean	Mean %	Mean	Mean %
P1 Assessment	10	-	-	7.20	72
P2 Nursing Diagnoses	1	-	-	0.38	38
P3 Interventions	10	-	-	5.58	55.8
P4 After care	1	1	100	-	-
P5 Recording and Reporting	2	-	-	1.77	88.5
P6 Evaluation	2	2	100	-	-

Maximum Process standard score = 26, Minimum process standard score = 0

Table :2- Shows that mean percentage score of practices were meeting the expected standard (100%) in ‘after care’ and ‘evaluation’. The criteria did not meet the expected standard were-‘recording & reporting’ (88.5%) ‘assessment’(72%), ‘intervention’(55.8%) and ‘nursing diagnosis’ (38%)

Table: 3
Percentage Distribution of Practices Related to Administration of Vasoactive Drugs by Nurses According to Outcome Criteria

N=60

Outcome Criteria	Score	Score of Practices			
		Expected standard =100%		Need improvement < 100%	
		n	%	n	%
Statement	Score				
O1 Effectiveness	1	46	76.66	14	23.33
Achievement of desired effects	1	30	50	30	50
Patients/relative satisfaction	1	57	95	3	5
Absence of complication	1	60	100	0	0
O2 Efficiency	1	4	6.66	56	93.33
Nurses satisfaction with performance	1				
Observes principles of safety (universal precautions)	1				

Maximum score = 5, Minimum score = 0

Table:3- shows distribution effectiveness and efficiency criteria for practices related to administration of vasoactive drugs by nurses. Achievement of desired effect (improvement in BP& general condition) was shown reported by 76.66% of patients where as 23.33% of patient did not show/ report the same. Satisfaction with nursing care was found among 50% clients. Patients who had no procedure related complications were 95%. All nurses were satisfied with their performance (100%), only 6.66% of nurses observed principles of universal precautions where as 93.33% did not.

Objective 2 To analyze practices related to administration of vasoactive drugs by nurses with variables such as –area of work, duty shift, vasoactive drug administered.

Table:4
Mean, mean percentage score of practices related to administration of vasoactive drugs by nurses according to area of work.

N=60

Area of work	n	Practice Score				
		Mean	Mean %	SD	df	f
Neurology Ward	7	42	65.62	2.16		
Male Medical Ward	12	41.42	64.71	2.84		
Intensive Care unit	14	45.86	71.65	3.63	59	20.736

Neurosurgery ICU	10	46.60	72.81	2.50		
Intensive cardiac care unit	17	50	78	2.21		

Maximum practice score=64 *** highly significant at p < 0.001

Minimum practice score=0

Table:4 Shows that mean score of practices was highest (50) among ICCU nurses followed by (46.60) neurosurgery ICU nurses, (45.86) ICU staff nurses, (42) neurology nurses and lowest (41.42) among male medical ward nurses.

Statistically 'f' ratio (in application of ANOVA) revealed that the difference in the mean score of nurses' practice according to area of work was highly significant at p < 0.001 level.

Hence it is concluded that there was statistically significant effect of area of work on nurses' practice score related to administration of vasoactive drugs. This **finding** supports the **hypotheses** – Nurses' practice score of administration of vasoactive drugs in special units will be significantly higher than the general wards as measured by a checklist at p<0.05 level.

Table:5

Mean, mean percentage score of practices related to administration of vasoactive drugs by nurses according to vasoactive drug administered.

N=60

Vasoactive drug administered	n	Practice Score				
		Mean	Mean %	SD	df	'f'
Dopamine	10	44	68.75	4.22		**
Nor adrenaline	36	44.47	69.48	3.54	59	
GTN	14	50.57	79	1.91		

Maximum practice score=64 *** highly significant at p < 0.001 Minimum practice score=0

Table 5 shows that mean score of practices was highest (50.57) among nurses administered GTN followed by (44.47) administered nor-adrenaline and lowest (44) administered dopamine. Statistically 'f' ratio (in application of ANOVA) revealed that the difference in mean score of nurses' practices according to vasoactive drug administered was highly significant at p < 0.001 level.

Objective–3 To compare practices related to administration of vasoactive drugs by nurses between special units and general wards.

H₁ score of practices related to administration of vasoactive drugs by nurses in special units will be significantly higher than those in general wards as measured by self structured evaluation proforma at p<0.05 level.

H₀

There will be no significant difference in score of practices related to administration of vasoactive drugs by nurses in special units and general wards as measured by a self structured evaluation proforma at p>0.05 level.

Table: 6

Comparison of Mean Scores of Practices Related to Administration of Vasoactive drugs by Nurses between Special Units and General Wards According to Structure, Process and Outcome Standard.

N=60

Standard	Max Score	Score of Practices					
		Special Units n=41		General Wards n=19		df	"t"
		Mean	S.D	Mean	S.D		
Structure	33	25.90	1.36	21.79	1.95	58	8.303***
Process	26	18.49	1.90	16.74	1.24	58	3.664***
Outcome	5	3.37	0.83	3.11	0.74	58	1.171 NS

*** Highly significant at p < 0.001, NS Non Significant

Table: 6 depicts that mean score of nurses' practices according to structure standard was higher in special units (25.90) as compared to those in general wards (21.79) .Statistically 't' test revealed that the difference in mean score was highly significant at p<0.001 level.

Mean score of practices according to process standard was higher in special units (18.49) as compared to general wards (16.74). Statistically 't' test revealed that the difference was highly significant at $p < 0.001$ level. Mean score of practices according to outcome standard was slightly higher in special units (3.37) as compared to general wards (3.11) however this difference between mean scores was found to be statistically non significant at $p > 0.05$ level.

Objective 4 To identify deficits in practices related to administration of vasoactive drugs by nurses in selected adult care areas

**Table-7
Mean Percentage Score of Practices Related To Administration of Vasoactive Drugs by Nurses According To Deficits in Structure Standard**

Structure Criteria	Score of Practices				
	Score	Mean	Mean %	Deficits%	Rank order
S1 Knowledge of vasoactive drugs	12	8.43	70.25	19.75	3
S2 Access to written protocols	4	0.53	13.25	76.75	1
S3 Availability of articles for procedures	9	9.00	100	0	-
S4 Availability of articles for universal precautions	4	4.00	100	0	-
S5. Human resources	4	2.65	66.25	23.75	2

Maximum score=33, Minimum Score=0, Expected Standard=> 90%, Need Improvement=<90%

Table: 7 shows that maximum deficits was found in meeting of structure standard in S2 criteria i.e. access to written protocols (76.75%) followed by S5 human resources (23.75%). S1 knowledge of vasoactive drugs ranked 3 (19.75%).

**Table:8
Mean Percentage Score of Practices Related to Administration of Vasoactive Drugs According to Deficits in Process Standard**

N=60

Process Criteria	Score of Practices				
	Score	Mean	Mean %	Deficits %	Rank order
P1 Assessment	10	7.20	72	28	3
P2 Nursing diagnosis	1	0.38	38	62	1
P3 Intervention	10	5.58	55.8	44.2	2
P4 Aftercare of articles	1	1.00	100	0	-
P5 Documentation and reporting	2	1.77	88.5	11.5	4
P6 Evaluation	2	2.00	100	0	-

Maximum score =12

Expected Standard =100%

Minimum score =0

Need improvement=<100%

Table: 8 shows that maximum deficits was found in meeting of process standard in P2 criteria i.e. nursing diagnosis (62%), followed by intervention ranked 2, (44%), assessment ranked 3, (28%), documentation and reporting (11.5%) ranked 4. After care of articles and evaluation criteria met the expected standard showing no deficits.

Table:9
Mean Percentage Score of Practices Related to Administration of Drugs by Nurses According to Deficits in Outcome Standard

N=60

Outcome Criteria Statement	Score of Practices				
	Scores	Mean	Mean %	Deficits %	Rank order
O1 Effectiveness Achievement of desired effect	1	0.77	77	23	3
Patients / relative satisfaction	1	0.50	50	50	2
Absence of complications	1	0.95	95	5	4
O2 Efficiency Nurses satisfaction with performance	1	1.00	100	0	-
Observes principles of universal precaution	1	0.066	6.6	93.4	1

Maximum score =5

Expected Standard =100%

Minimum score =0

Need improvement=<100%

Table: 9 Depicts that maximum deficit (ranked 1) was found in meeting the efficiency criteria of outcome standard i.e. observes the principles of universal precaution (93.4%). Among effectiveness criteria patient/ relative satisfaction ranked 2nd (50%), followed by achievement of desired effect (23%) ranked 3rd, absence of complication (5%) ranked 3. All the nurses were satisfied with their performance showing 100% evidence.

IV. Discussion:

The findings of present study revealed that over all mean percentage score of practices related to structure standard was 74.5%, process standard (68.96%) and outcome standard (65.6%). All the three standards were lower than the expected levels (90% for structure and 100% for process and outcome standard). It indicates that improvement is needed in all three standards.

The percentage distribution of score of practices related to administration of vasoactive drugs by nurses according to structure standard criteria revealed that only 16.66% of nurses met the expected standard of knowledge regarding vasoactive drugs and 83.33% did not. This finding is supported by Bayraktar N. & Erdil F (2000)¹² who reported that, none of the nurses scored the maximum score of 100, and very few nurses scored above 50%, and also study conducted by King R.L (2003)¹³ revealed that nurses identified “drug administration” as an area of nursing which required knowledge of pharmacology. Three of the respondents stated that pharmacology knowledge was needed in the whole assessment of the patient from admission to discharge including regular observation of pulse, blood pressure, temperature, oxygen saturation, respiration rate, and blood glucose monitoring. Similarly Bullock and Manias (2002)¹⁴ concluded that nurses who had strong knowledge base in pharmacology would be better prepared to fulfill their roles in the management of patients’ drug therapy and medication education.

V. Conclusion

- Overall practices related to administration of vasoactive drugs by nurses according to structure, process and outcome standards were lower than the expected standard and therefore need improvement to reach upto expected standards.
- There were deficits in practices of nurses related to criteria of structure standard i.e. knowledge of vasoactive drugs, accessibility to protocols and human resources both in special units and general wards, related to process standard i.e. assessment, nursing diagnosis and intervention, documentation and reporting, and related to outcome standard i.e. observation of principles of universal precaution, patients / relative satisfaction in special units as well as in general wards..

Limitation

1. A small purposive sample of only 60 nurses would limit the generalizability of the results.
2. The study was limited to evaluate the administration of only vasoactive drugs by nurses.
3. It was difficult to evaluate the satisfaction of patients and relatives as many of the patients were critically ill.
4. It was difficult to evaluate the desired effect of the vasoactive drugs because there were various pathological conditions affecting the patients condition
5. The study is limited to adult care areas only

Implications

The findings of the study have several implications which have been discussed in four areas: nursing practice, nursing administration, nursing education and nursing research.

Nursing Practice

1. As revealed by the findings of the study that expected standard was not met in nurses' practices related to administration of vasoactive drugs. Most of the practices have shown deficit such as in knowledge, assessment, intervention and documentation and reporting
2. Nurses should be aware of legal responsibilities and accountability of drug administration. With implementation of consumer protection act and increasing awareness among clients of their rights.
3. Nurses can bring about significant decrease in the rate of nosocomial infection by adhering to the principles of universal precautions while administering drugs and otherwise also.
4. As the structure criteria- S2 access to written policies and protocol showed lack of evidence in both general as well as special units. It needs immediate attention of nursing administration that they should not only develop but make available guidelines/ protocols on hand washing, universal precaution, IV infusion and medications and implement also.
5. Nurses should take responsibility for upgrading their own knowledge on regular basis by attending to in-service education arranged by the authorities, reading current journals, and research studies on drug administration.

Nursing administration

1. Evaluation of nursing practices as well as performance appraisal must be carried out on regular basis, enabling the administrators and nurses to be aware of level of excellence and deficits. Findings should be reported and discussed in departmental and professional meetings.
2. All nursing professional should be made aware of professional and as well as institutional values. Nurses should be encouraged to present papers of new drugs, new technologies and evaluative study done in their areas.
3. Development of written standards on nursing procedures should be undertaken by the nursing administration.
4. Nursing administration should report to higher authorities regarding shortage of man power and adhere to Indian nursing council norms for assigning nurse to patient ratio.

Nursing education and research

1. In the era of growing competition in the health care sector it is imperative to be quality conscious and it should begin from the nurses' training period.
2. Besides theoretical knowledge practical application need to be emphasized. Student should be encouraged to make use of computers and research methodology for developing problem solving skills research studies on standard development outcome indicators, evidence based practice should be conducted by students and professionals.

Recommendations

1. Structured guidelines on intravenous administration of vasoactive drugs developed by the investigator should be used as standards not only for the practice but also for in-service education and follow up study could be conducted to evaluate the changes in structure, process, and outcome standard.
2. Similar study can be conducted on administration of other medicines administered in critical care areas such as: anti hypertensive, anti-arrhythmic, and thrombolytic drugs.

Reference:

- [1]. American Nurses Association (ANA) Standards of Clinical Nursing Practice. Washington. DC: ANA. 1991.
- [2]. Potter PA. & Perry AG. Basic nursing essential for practice. Fifth Edition. St Louis; Mosby 1999;7-10.
- [3]. O'shea E. Factors contributing to medication errors: a literature review. *Journal of Clinical Nursing* 1999; 8: 496-504.
- [4]. Geibing H. Nursing quality management in the Netherlands. *International Nursing Review* 1994; 41 (1): 18.
- [5]. Donabedian A. A guide to medical care administration Vol. II Medical care appraisal –Quality and utilization. New York. American Public Health Association. 1969.
- [6]. Brook RH., Davis AR., Kamberg C. Selected reflections on quality of medical of medical care evaluation in the 1980s. *Nursing Research* 1980; 29 (12): 127.
- [7]. Davis M. Management module M5: quality in care: What is quality... open learning programmes. *Nursing Times* 1992; 88 (39): 1-8.
- [8]. American Nurses Association (ANA) Standards of Clinical Nursing Practice. Washington. DC: ANA1998.
- [9]. Whipple JK, Bringa MA, Schimel BA, Jiricka MK, Lurch MC, Quebbeman EJ. Selected vasoactive drugs, a readily available chart reference. *Critical Care Nurse* 1992; 12 (3): 23-29.
- [10]. Lang N. Quality Assurance in nursing: a selected bibliography. DHEWpub. HRA80-30.US Dept. of Health, Education and welfare.

- [11]. American Nurses' Association Congress for Nursing Practice. A plan for implementation of the standards for nursing practice. Kansas City, Mo:ANA1975.
- [12]. Donabedian A. Evaluating the quality of medical care. *Milbank Memorial Fund Q.* 1966;44:166-206.
- [13]. Bayraktar N. & Erdil F. Blood Transfusion knowledge and practice among nurses in Turkey. *Journal of Intravenous Nursing* 2000;23 (5): 310-317.
- [14]. King RL. Nurses' perception of their pharmacology educational needs. *Journal of Advanced Nursing* 2003; 45 (4): 392-400.
- [15]. Bullock S. & Manias E. The educational preparation of undergraduate nursing students in pharmacology: Clinical nurses' perceptions and experiences of lecture and students. *International Journal of Nursing Studies* 2002; 39: 757-769.