

Effect of applying a vascular Nursing Staff Development Competency Program on Nurses Practices and Knowledge

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Abstract

Background: The specialist nurses in vascular surgery department have a great role in the application of all the core generic knowledge and competencies and special skills required for caring of vascular surgical patients through improves patient outcomes by empowering nurses to implement an evidence-based practice model of care. This model encourages nurses to learn comprehensive vascular care through education and training regarding best practice care for patients with complex vascular needs. **Aims of the study:** This study aimed to determine the effect of applying a nursing staff development program on vascular surgery nursing practices practices and knowledge **Design:** The present study follows a quasi experimental research design **Setting:** This study was conducted at the vascular surgery department, Main University hospital, Alexandria. **Subjects:** The study Subjects were 30 nurses. **Tool:** Vascular Staff Nurse Portfolio of Competency assessment check list. **Results:** Good knowledge was detected among 40% of nurses immediately after implementing the nursing staff development program, and then decreased to 26.7%, after two months post program implementation, after being zero percent before applying the program. **Recommendations:** Performing annual in-service training programs, concerning for all nurses working with patients with a vascular disorders, is mandatory, and Continuing nursing supervision, education and evaluation is advocated to identify areas of knowledge lack or malpractice.

Keywords: Competency, vascular Nursing, Practices, vascular surgical

Introduction

The current trend in surgical training is a move toward a structured competency based curriculum requiring objective and ongoing documentation of proficiency both in residency training and in practice (*Freidman and Mallappallil, 2010*). Toward this end,

national organizations including the American College of Surgeons, ABS, RRC-S, American Surgical Association, for Program Directors in Surgery, and Association for Surgical Education have established a national consortium called the Surgical Council on Resident Education (SCORE) to reform general surgical residency education. The thrust of SCORE's endeavor is to develop a

national curriculum that will include a spectrum of educational offerings delivered in a modular system. The curriculum includes didactic content, simulated experiences, clinical and surgical experiences, that could be developed for vascular surgery to reflect the goals of stakeholders (*Peter and Helen, 2012*).

Nurse specialist must have knowledge about medical management of vascular disorders, noninvasive and invasive diagnostic testing, open surgical procedures, endovascular interventions, and management of critically ill patients. The core curriculum should be designed so that it can be used by all training program (*Hudac, et al., 2013*). The core curriculum must facilitate learning by ensuring that the core content of the training program. The aspects of perioperative care that specialists in vascular surgery should demonstrate particular ability to perform the preoperative assessment of patients with ischaemic the nurse should have a working knowledge of clinical cardiac risk indices (e.g. Goldman, Detsky, and Eagle) and their application to the vascular surgical patient (*Saunders and Mary, 2012*).

The specialist should have a working knowledge of the value of specific tests of cardiac function (e.g. echocardiography, dipyridamole thallium scanning, exercise ECG, dobutamine stress echocardiography, MUGA scanning). The specialist should be aware of the possible role of pre-operative angiography and the possible benefits of coronary artery bypass grafting in appropriate patients (*Gonce et al., 2012*). Vascular nurse should

understand specific surgical risk factors for each different type of vascular surgery (e.g. carotid endarterectomy, aortic aneurysm surgery and peripheral vascular surgery). Vascular nurse should be aware of the need for, and methods available for, improving the patients peri-operative risk in the preoperative period (*Rosendalle and Kowalski, 2013*). In particular they should be up to date on the debate surrounding specific treatments aimed at optimizing the patient status regular monitoring of vital signs and inspection of the entire wound wound surface, preferably during each dressing change. Local signs of wound infection with invasion include, rapidly extending cellulitis of healthy tissue surrounding the injury, rapid eschar separation, and tissue necrosis. (*Kneale et al., 2011*)

Infection control practitioners play an integral part in any center's prevention program. wound infections should be rigorously monitored in order to generate accurate epidemiological data about infection rates. Routine surveillance should also be carried out for other types of nosocomial infections commonly diagnosed in patients, including catheter-related infections, pneumonia, and urinary tract infections. In all cases, published standard definitions should be used in identifying these types of infection complications (*Sheldon and Baraff, 2012*).

Aim of the study

This study aimed to determine the effect of applying a nursing staff development program on vascular surgery nursing practices and knowledge

Research hypothesis

Nurses who are exposed to the nursing staff development program will improve their level practices and knowledge more than their level practices and knowledge in previous training.

Materials and method

Materials

Research design:

Quasi-experimental design pre and post interventional study was used.

Settings:

This study will be conducted the vascular surgery unit, Alexandria Main University Hospital, Egypt.

Subjects:

- A convenience sample of 30 nurses and worked at the above mentioned settings.

Epi info 7 was used to estimate the sample size using the following parameters:

- Population size: 70
- Confidence level: 95%
- Margin of error: 5%
- Prevalence rate: 50%
- Minimum sample size: 30 nurse.

Tool: One tool used to collect data in this study

Vascular Staff Nurse Portfolio of Competency assessment checklist

A structured checklist was developed by the researcher based on reviewing related literatures, it was used to assess nursing competencies regarding related activities required for dealing with patients with

vascular disorders (*Rosenthal and Michel, 2012*). It comprised of three parts:

Part I: Socio demographic and clinical data: It was used to identify nurses' personal and socio-demographic characteristics including age, educational level, marital status, years of experience and previous training.

Part II: Nurses' knowledge assessment schedule: It was used to obtain base line data about vascular department nurses' knowledge.

Part III: Nurses' practice assessment checklist: It was used to obtain base line data about vascular department nurses' practice.

Method:

1. An official permission to carry out the study were obtained from the responsible authorities at the Unit, The Main University Hospital, Alexandria
2. Tool of the study was developed by the researcher and tested for content validity by five experts from professor of medical surgical nursing, nursing education. Required corrections were done.
3. Reliability of tools were Assured by means of Cronbach's coefficient alpha which had a value of .98
4. A pilot testing was conducted with five nurses using tool 1, to test the feasibility
5. Data collection. After securing the administrative approval, data collection was started, and continued for a period of 2 months.

Data collection covered a period of 2 months started from first of august 2020 till first of October.

6. Steps of the study:

All nurses were attended training, in consecutive sessions, ranging from 30-45 minutes at the break hours, at the unit. Psychomotor competencies of subjects was supervised throughout daily nursing practice for around 30 minutes per procedure, C.D was given to the nurses including videos about some clinical procedures as personal protective equipment ,hand hygiene, assisting in central line insertion, the videos was given to the nurses, focus was done on the neglected part in the clinical performance (*Edmond B and Wenzel P, 2010*).

7. Ethical considerations:

- Written consent of the nurses was obtained, after explanation of the aim .
- Anonymity, confidentiality were maintained

8. Statistical analysis:

- The raw data were coded and entered into SPSS system files (SPSS package version 18). Analysis and interpretation of data were conducted .
- Descriptive statistics were presented as frequency, distribution, mean, and standard deviation were used to describe different characteristics.
- Univariate analyses including: Chi-Square test and Friedman test were used to test the significance of results of qualitative variables.
- Linear correlation was conducted

to show correlation between scores of knowledge and practices regarding infection control among the studied nurses before applying nursing development program using Spearman Rho correlation coefficient.

Results:

Table (1) describes the sociodemographic characteristics of the studied nurses working at the unit. Age of the nurses ranged between 31- less than 50 years, with a mean age of 32.5 ± 6.2 years. Half of the studied nurses (50%) were aged between 30 years to less than 40 years, only 16.7% of nurses were between 40 to less than 50 years of age.

Regarding the education level of the studied nurses, nearly half (46.7%) of the nurses were diploma graduates, followed by bachelor degree holders (36.7%), while the least percentage were nurses graduated from The Nursing Technical Institute (16.7%). The studied nurses were either employed as practical nurses (60%), or nursing supervisors (40%) the majority (73.3%), of the studied nurses had 10 years of experience or more. Nurses with nursing experience ranging between 1 year to less than 5 years, represented (13.3%), followed by those whose experience was ranging between 5 years to less than 10 years (10%). Almost all nurses (93.3%), reported that they studied a course about infection control before their graduation, the duration of those courses was 2 hours (50%), more than 2 hours (26.8%), or less than 2 hours (21.4%). None of the studied nurses have attended in service training programs .

Table (2) shows the general knowledge among the studied nurses

before and after applying the nursing staff development program. Almost all of the knowledge scores significantly improved after applying the program. Knowledge scores were significantly improved immediately after the program and two months post program for almost all items.

Table (3) shows general vascular surgery practice of studied nurses before and after applying the nursing staff development program. All of the knowledge items were significantly improved after applying the program. Holistic nursing assessment of the patient with peripheral arterial disease. Use of hand held Doppler and interpretation of signals. Performing ABPI. Discharge planning, Limb amputation, Angiogram/Angioplasty Tissue Viability and Wound Care since all P s values were <0.0001 .

Table (4): Correlations between knowledge score and socio-demographic characteristics among the studied nurses, before, immediately and two months after applying the nursing staff development program. None of the sociodemographic characteristics were correlated with knowledge score, before, immediately and two months after applying the nursing staff development program.

Table (5): Correlations between practice score and socio-demographic characteristics among the studied nurses, before, immediately and two months after applying the nursing staff development program. Significant correlation were observed between practice score and the socio-demographic characteristics of the studied nurses regarding age, educational level and years of experience before applying the nursing staff development

program and two months after applying the nursing staff development program.

Discussion

The complexity of medical and nursing care for vascular disorders patients has become more specialized, requiring nurses to deliver care with greater understanding of specialty-specific disease processes. Although this paradigm shift has occurred, continuing nursing programs needed to prepare nurses workforce as generalists. Therefore the responsibility falls onto the shoulders of the employer to prepare the nurse to care for specialty-specific populations soon after accepting a position on a specialty-specific unit through providing education and support to newly hired nurses for a vascular medical-surgical unit. Benner's Novice to Expert concept provided the stimulus to recognize the need for in-depth specialty knowledge and skill development for medical-surgical nurses to provide optimum patient care. Despite all advances in diagnosis, management of vascular surgery patients seems to continue to exist as a health institution problem as well as nursing problem (*Garnes S and Simmons P, 2012*). Furthermore, the increased awareness of the problem of infection in hospitals, knowledge about how infection is transmitted, as well as the wise application of the advances in hospital technology and adequate treatment for infections are the goals of infection control. It was hoped that by attainment of these goals, the problem of infection in the hospital will be adequately or largely minimized (*Mantik, et al., 2012*). Infection control issues can be adequately and efficiently addressed or

not in order to rescue the patient morbidity (*Sands et al., 2010*).

These former study findings could be attributed to the fact that the majority of the nursing manpower in Egypt was either diploma or technical institutes graduates. Faculty of Nursing graduates are usually directed to care for patients in special care units requiring expertise and high technological care (*Smeltzer and Bare, 2011*). This is in line with 27. Marvin (2016) who studied the quality of ambulatory nursing practice for patients, and reported that nearly half of the nursing staff were diploma and a minority of nurses were bachelor graduates (*Marvin et al., 2016*).

Regarding years of experience, the present study findings revealed that the majority of the studied nurses had more than ten years of experience. El-kady et al (2015) reported that experiences more than ten years have positive effects on nurses' performance. In relation to previous training the study results reported that none of the studied nurses have attended in service training programs. This result was supported by Sheldon and Monahan (2016), who reported that only 4 % of his studied nurses had formal training about infection control standards and more than half of nurses had internet access (*Monahan et al., 2016*). This also was in accordance with Gastout et al. (2013), who reported that the majority of the studied nurses had not attended any sort of training program (*Gastout and Buston, 2013*).

The current study findings revealed that nurses' knowledge related to dealing with vascular disorders before applying the nursing staff development program

was very poor. It has been reported in a similar study, that most of the studied nurses were not upgrading their knowledge after their graduation either by formal or non-formal aspects (*Ali et al., 2013*). Emphasized that the unavailability of supplies and equipment is considered among the factors hindering the implementation of universal infection control precautions. These findings were contradicted by Shokeir (2013), who reported that many of their studied nurses did not appreciate the importance of these protective barriers and complained of its unavailability (*Shokeir ME, 2013*).

In the present study it was observed that a statistically significance difference was observed before, immediately and two months after the nursing staff development program related to the majority of practices items.

Comer (2013), added that inadequate practices level of nurses has been reported as a cause of such errors. The current study showed that, there was no positive correlation between nurse's age, level of education and years of experience in relation to their performance (*Comer and Bailey, 2012*).

Concerning wound dressing. Although advances in wound care have reduced mortality rates, infection remains one of the most challenging concerns for the team. Wound infection can be managed by rapid wound debridement, following infection control standard precaution and the use of effective topical and systemic antimicrobial therapy to enhance rapid wound healing (*Abdel All, 2013*). Finally, the findings of the present study were consistent with the results of

Rasslan et al (2015), who found that the used vascular training program was successful in improving the applied knowledge and practical behaviors of nurses providing care (*Rasslan, 2015*). Also, the results were similar to Abo Shadi (2014), who reported that in order to have qualified professionals to take over infection prevention and control activities it would be important to have more comprehensive training programs. He found that an educational program was effective in improving the nurses' knowledge and attitude toward patients (*Abo Shadi Ibrahim, 2016*).

Gonce (2014), strongly recommended that following aseptic technique in wound dressing enhances epithelialization and promotes wound with the assessment of the current knowledge and skills, that is to say assessing the learning needs and setting the educational objectives as well as assessment of basic knowledge regarding all aspect of patients' care. Insufficient or misinterpretation of these practices will result in poor or inadequate care This enhancement of nurses' practices may be due to the fact that the educational program stressed on the practical training to change nurses' practices using adequate sessions and demonstration which is needed for attainment of the desired level of practices (*Gonce et al., 2014*).

Conclusion

Formal training programs should be multidisciplinary interventions in the era of quality control to help healthcare workers realize the importance of basic vascular staff nurses skills that are required in reducing morbidity and

mortality and improving the quality of patient's care.

Recommendations

1. Training programs, concerning vascular disorder patients for all nurses working at vascular surgery units, is mandatory.
2. The developed program need to be introduced and modified on a 6 monthly base, at the same study setting and adopted in other similar settings with required modifications
3. .Continuing nursing supervision, education and evaluation is advocated to identify areas of knowledge lack or malpractice.
4. The infection control committee should be more involved carrying out surveillance and following.

Table (1): Socio-demographic characteristics of the studied nurses

Socio-demographic characteristics	Studied nurses (n=30)	
	No.	%
Age (years)		
20-	10	33.3
30-	15	50.0
40-<50	5	16.7
Min-Max	21.0-45.0	
Mean SD	32.5±6.2	
Educational level		
Diploma	14	46.7
Nursing institute	5	16.7
Bachelor	11	36.7
Job position title		
Practical nurse	18	60.0
Nurse supervisor	12	40.0
Duration of experience (years)		
1-	5	16.6
5-	3	10.0
10 or more	22	73.3
Studied under graduate courses about infection control		
Yes	28	93.3
No	2	6.7
Duration of the attended infection control course (s) [n=28]		
Less than 2 hours	6	21.4
2 hours	14	50.0
More than 2 hours	8	28.6
In-service training program attendance	30	zero

Table (2): Knowledge of nurses at the Unit before and after applying the nursing staff development program

Knowledge items	Level of performance	Studied nurses (n=30)						Chi-Square test (P-value)
		Before program		Immediately after		2 months Post program		
		No.	%	No.	%	No.	%	
Anatomy and Physiology	Correct	26	86.7	17	56.7	30	100.	X ² =19.291 P<0.0001*
	Incorrect	4	13.3	13	43.3	10	0.0	
Vascular Risk Factor Control	Correct	15	50.0	0	0.0	21	70.0	X ² =32.5 P<0.0001*
	Incorrect	15	50.0	30	100.0	9	30.0	
Pain and Symptom Control	Correct	5	16.7	24	80.0	11	36.7.	X ² =50.708 P<0.0001*
	Incomplete	5	16.7	5	16.7	16	53.3	
	Incorrect	20	66.7	1	3.3	3	10.0	
Nutrition	Correct	5	16.7	1	3.3	11	56.7	X ² =61.381 P<0.0001*
	Incomplete	5	16.7	5	16.7	17	35.6	
	Incorrect	20	66.7	24	80	2	6.7	

Total score=10	mean	4.6	4.7	5.86
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*Significant at $P \leq 0.05$

Significant at $P \leq 0.05$ -NA-: Not applicable

Table (3): General vascular nurses practices of the studied nurses before and after applying the nursing staff development program.

practices items	Level of performance	Studied nurses (n=30)						Chi-Square test (P-value)
		Before program		Immediately after		2 months Post program		
		No.	%	No.	%	No.	%	
Holistic nursing assessment of the patient with peripheral arterial disease	correct	5	16.7	18	60.0	5	16.7	$X^2=21.297$ $P < 0.0001^*$
	Incomplete	10	33.3	5	16.7	16	53.3	
	In correct	15	50.0	7	23.3	9	30.0	
Use of hand held Doppler and interpretation of signals	correct	10	33.3	20	66.7	10	33.3	$X^2=14.559$ $P=0.006^*$
	Incomplete	10	33.3	8	26.7	16	53.3	
	In correct	10	33.3	2	6.7	4	13.3	
Performing ABPI	correct	15	50.0	25	83.3	9	30.0	$X^2=31.485$ $P < 0.0001^*$
	incomplete	5	16.7	2	6.7	18	60.0	
	incorrect	10	33.3	3	10.0	3	10.0	
Discharge planning	Correct	10	33.3	25	83.3	16	53.3	$X^2=21.937$ $P < 0.0001^*$
	Incomplete	10	33.3	4	13.3	12	40.0	
	In correct	10	33.3	1	3.1	2	6.7	
Limb amputation	Correct	22	73.3	10	33.3	22	73.3	$X^2=13.333$ $P=0.001^*$
	Incorrect	8	26.7	20	66.7	8	26.7	
Angiogram/Angioplasty	Correct	2	6.7	10	33.3	7	23.3	$X^2=6.538$ $P=0.038^*$
	Incorrect	28	93.3	20	66.7	23	76.7	
Tissue Viability and Wound Care	Correct	10	33.3	10	33.3	13	43.3	$X^2=0.861$ $P=0.65$
	Incorrect	20	66.7	20	66.7	17	56.7	
Total score=14	mean	4.70		9.1		12.2		

*Significant at $P \leq 0.05$

-Chi-Square test of Likelihood Ratio

* Significant at 0.05 level

-NA-: Not applicable

Table (4): Correlations between knowledge score and socio-demographic characteristics among the studied nurses, before, immediately and two months after applying the nursing staff development program.

Socio-demographic characteristics	Knowledge score					
	Before program		Immediately after		After 2 months	
	r	P	r	P	r	P
Age (years)	-0.139	0.230	-0.053	0.616	0.172	0.36
Educational level	-0.210	0.249	-0.119	0.496	0.163	0.49
Duration of experience (years)	-0.118	0.570	0.097	0.705	-0.197	0.288

r: Spearman Rho correlation coefficient

Table (5): Correlations between practice score and socio-demographic characteristics among the studied nurses, before, immediately and two months after applying the nursing staff development program.

Practice score	Before program					
	Age		Educational level		Duration of experience	
	R	P	R	P	r	P
Holistic nursing assessment of the patient with peripheral arterial disease	0.14	0.67	0.035	0.928	1.0	0.0
Use of hand held Doppler and interpretation of signals	0.086	0.769	-0.054	0.866	-0.336	0.376
Performing ABPI	0.224	0.527	0.385	0.239	-0.052	0.855
Discharge planning	0.192	0.383	-0.308	0.365	-0.336	0.360
Limb amputation	-0.365	0.269	0.211	0.545	-0.037	0.912
Angiogram/Angioplasty	-0.343	0.147	0.258	0.418	0.170	0.650
Tissue Viability and Wound Care	0.380	0.221	-0.381	0.222	0.323	0.396
Practice score	Immediately after					
	Age		Educational level		Duration of experience	
	R	P	R	P	r	P
Holistic nursing assessment of the patient with peripheral arterial disease	-0.316	0.407	0.288	0.451	-0.998	0.089
Use of hand held Doppler and interpretation of signals	-0.106	0.757	-0.158	0.642	-0.196	0.585
Performing ABPI	0.459	0.156	-0.098	0.774	0.387	0.239
Discharge planning	-0.788	0.003*	0.180	0.596	-0.817	0.002*
Limb amputation	-0.106	0.757	-0.158	0.642	-0.186	0.585
Angiogram/Angioplasty	-0.770	0.003*	-0.770	0.003*	-0.777	0.002*
Tissue Viability and Wound Care	0.0238	0.933	0.031	0.923	-0.067	0.837
Practice score	After 2 months					
	Age		Educational level		Duration of experience	
	r	P	R	P	r	P
Holistic nursing assessment of the patient with peripheral arterial disease	-0.316	0.407	0.289	0.450	-0.598	0.089
Use of hand held Doppler and interpretation of signals	0.156	0.647	0.346	0.288	0.008	0.982
Performing ABPI	-0.262	0.426	-0.018	0.912	-0.114	0.738
Discharge planning	0.027	0.938	0.248	0.463	-0.121	0.723
Limb amputation	-0.770	0.003*	0.537	0.088	-0.403	0.219
Angiogram/Angioplasty	0.569	0.053	-0.770	0.003*	0.759	0.002*
Tissue Viability and Wound Care	-0.174	0.589	0.293	0.356	0.866	0.002*

r: Spearman Rho correlation coefficient

*significant at $P \leq 0.05$

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