



Evaluation of Nurses Practice Regarding Electrocardiogram Procedure

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Abstract

Electrocardiogram (ECG) is a graphic recording of electrical currents of the heart. It is simple and important test used to diagnose cardiac disease. Nurses are responsible for monitor and interpret ECG. **Aim:** Aim of this study was to evaluate nurses' practice regarding electrocardiogram. **Design:** A descriptive exploratory was used. **Setting:** This study was conducted in the coronary and high-risk pregnancy units at Beni-Suef University Hospital. **Sample:** all nurses (n = 60) working at both units. **Tools:** An observational checklist to assess nurses' practice regarding electrocardiogram. **Results:** Results of this study showed that their aged ranged between (25- 30) with a mean age was 26.60 ± 3.614 years. Year of experience ranged between five to ten years with a mean of (6.75 ± 3.513) , ninety percent were females, eighty-six point seven percent were married. As well thirty-eight point three percent were having technical nursing education. The majority of the studied nurses had unsatisfactory practice regarding electrocardiogram. **Conclusion:** the majority of the nurses were having an unsatisfactory practice regarding electrocardiogram procedure. **Recommendation:** The importance of implementing an educational training program to raise the efficiency of nurses' performance regarding ECG.

Keywords: Electrocardiogram; Nurses; Practice.

1. Introduction

Electrocardiogram (ECG) is a graphic recording of electrical currents of the heart [1]. It is non-invasive and simple cardiac procedure. It provides valuable information to diagnosis heart disease [2]. ECG is used to assess cardiac function such as rate and rhythm, diagnosis of cardiac rhythm disorder and cardiac diseases e.g. dysrhythmias and myocardial infarction, evaluate effects of medications (cardiac medication) and detect effects of electrolyte disturbances such as hypokalemia [3].

Prior to recording ECG, the nurse should be explaining the procedure to the patient and check the efficiency of equipment [4]. As regards nursing role during ECG, the nurse asks the patient to lie still and avoiding movement. Place leads and make sure ECG is plugged in [5]. When the ECG machine finishes recording ECG, the nurse removes the electrodes and clean the patient's skin, perform hand hygiene, document the test's date and time and patient's name [6]. Finally, the nurse interpreting the ECG include the following; determine the rate, rhythm, evaluate the P wave, determine the duration of the PR interval and QRS complex, evaluate the T waves and determine the duration of the QT interval [7].

The nurses working in patient care areas where electrocardiographic monitoring occurs is often the healthcare professional responsible for the continuous monitoring of the patient's cardiac rhythm, interpretation of cardiac rhythm disturbances and has the opportunity to provide early intervention that can prevent an adverse clinical situation and improves patient safety [8].

2. Significance of the Study

ECG plays a critical role in decreasing death in patients with coronary artery disease because it enables the practitioner to detect early danger signs. *Asprey and Dehn* [9]. Critical-care nursing is that sub-specialty of nursing sciences that deals, particularly, with human responses to life-threatening issues [10]. Nurses working in critical care units are responsible for monitoring and interpreting ECGs, patients usually are monitored continuously at the bedside or through intermittent monitoring a 12- lead ECG [11].

3. Aim of the Study

The aim of the current study is to evaluate nurses' practice regarding electrocardiogram procedure in critical care settings (coronary care and high-risk pregnancy units).

4. Research Question

What is the level of nurses' practices regards electrocardiogram procedure?

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5. Subjects and Methods

The study will be portrayed under four designs: -

- 1) Technical design.
- 2) Operational design.
- 3) Administrative design.
- 4) Statistical design.

1. Technical Design

The technical design includes research design, setting, subjects and tools of data collection which used in this study.

A. Research Design

A descriptive exploratory design was used in this study.

B. Setting

The study was conducted in the coronary care and high-risk pregnancy units at Beni-Suef University Hospital.

C. Subject

A convenient sample included 30 nurses working in coronary care unit and 30 nurses working in high-risk pregnancy unit at Beni-Suef University Hospitals and agreed to participate in this study.

D. Tools for Data Collection

Observational checklist of nurses' practice regards their role toward electrocardiogram procedure: It was adapted from Eckman [6] and modified by the researchers. It's consists of the following parts:

❖ Part one:

It concerned with demographic characteristics of the nurses such as age, marital status, education level, and years of experience.

❖ Part two:

It was used to evaluate nurses' practice regarding electrocardiogram. It comprises four phases covering the following:

- Nurses role pre-procedure eight steps
- Nurses role during procedure nine steps.
- Nurses role post-procedure four steps.
- Interpreting the ECG eight steps.

Scoring system:

Each item was scored as follows:

- Done correctly was assigned a score of (2)
- Done incorrectly was assigned a score of (1)
- Not done was assigned a score of (0)

Total practice score was 58 classified into:

- $\geq 80\%$ satisfactory practice level--- score ≥ 46 .
- $< 80\%$ unsatisfactory practice level--- score < 46 .

2. Operational Design

The operational design included a preparatory phase, ethical consideration, validity and reliability, pilot study and fieldwork.

A. Preparatory Phase

It was included reviewing of related literature and theoretical knowledge of the various aspect of the study using books, articles, internet, periodicals, and magazines to develop tools for data collection. Permission for data collection of the study in Beni-Suef University hospital was obtained from the hospital administrative personnel.

B. Ethical Consideration

- The researcher was clarifying the objective and aim of the study to the nurses included in the study.
- The researcher was assured maintaining anonymity and confidentiality of the subject's data for the purpose of this research only.
- Nurses were informed that their allowed to participate or withdraw from the study at any time without any rational.

C. Tools Validity and Reliability

❖ Content validity:

The tools were revised and checked for content validity by seven experts who composed of three professors, one assistant professor, and three lecturers specialized in medical-surgical nursing and critical care nursing.

❖ Reliability:

Testing reliability of proposed tool was done by cronbach's alpha test.

D. Pilot Study

It was carried out on 10% of the total study 6 nurses. It was done to test clarity and efficiency of the tool. No modification was done, so the nurses who participate in the pilot study were included in the sample.

E. Fieldwork

Data were collected from the beginning November 2017 to the end of February 2018. Each nurse was observed by the researcher while they were doing the ECG procedure; the time allowed is 15 minutes. The researcher was attended to the setting 3 days per week in the morning and afternoon shift.

3. Administrative Design

To carry out the study, permission for data collection was obtained from the director of Beni-Suef university hospital.

4. Statistical Design

An IBM compatible personal computer was used to store and analyze data and to produce graphics presentation for some important results. Statistical package for the social science (SPSS) version 22 was used for statistical analysis of data. Data were summarized using:

- a. The arithmetic means as an average, describing the central tendency of observation for each variable studied.
- b. The standard deviation as a measure of dispersion of results around the mean.
- c. The frequency and percentage of observations for each variable studied.

6. Results

Table (1): illustrates that half of the studied nurses' (50.0%) their age ranged between 25- 30 with a mean age 26.60±3.614 years, the majority (90%) of nurses were females, most of the nurses (86.7%) were married. Regarding educational qualification; 38.3% of the studied nurses' had a technical nursing education. As regarding the nurses' year of experience; 66.7% of the studied nurses' were from 5-10 years of experience with mean years of experience was (6.75±3.513) years.

Table (2): demonstrates that most of the studied nurses did not perform hand washing, explain the procedure to the patient and cleanse the sites for electrode placement (75%, 85%, and 88.3% respectively).

Table (3): shows that most (86.7%) of the studied nurses did not ask the patient to relax and breathe normally during the procedure.

Table (4): demonstrates that most (76.7%) of the studied nurses did not perform hand washing and clean the patient's skin.

Table (5): demonstrates that lowest percentage of the studied nurses determines heart rate and rhythm identify P wave, PR interval, QRS complex, T wave, QT interval and report abnormality

Fig. (1) Illustrate that the highest percentages (78.3%) of nurses were having an unsatisfactory practice level.

Table-1. Percentage distribution of the study nurses according to their demographic characteristics

Variable	No	%
Age in years		
18-<25	16	26.7
25-<30	30	50
30-35	14	23.3
Mean ±SD	26.60±3.614	
Gender		
Male	6	10
Female	54	90
Marital status		
single	8	13.3
Married	52	86.7
Educational qualification		
Diploma	22	36.7
Technical nursing education	23	38.3
Bachelor of nursing	15	25
Years of experience		

1-<5	18	30
5-< 10	40	66.7
≥10	2	3.3
Mean ±SD	6.75±3.513	

Table-2. Percentage distribution of studied nurses' practice pre electrocardiogram procedure

Item		No	%
Verify the doctor's order.	Not done	3	5.0
	Done incorrectly	14	23.3
	Done correctly	43	71.7
Prepare of equipment.	Not done	0	0.0
	Done incorrectly	46	76.7
	Done correctly	14	23.3
Perform hand washing	Not done	45	75.0
	Done incorrectly	5	8.3
	Done correctly	10	16.7
Confirm the patient's identity	Not done	20	33.3
	Done incorrectly	22	36.7
	Done correctly	18	30.0
Explain the procedure to the patient.	Not done	51	85.0
	Done incorrectly	1	1.7
	Done correctly	8	13.3
Position the patient in supine position	Not done	0	0.0
	Done incorrectly	9	15.0
	Done correctly	51	85.0
Expose his arms and legs.	Not done	0	0.0
	Done incorrectly	4	6.7
	Done correctly	56	93.3
Cleanse the sites for electrode placement	Not done	53	88.3
	Done incorrectly	5	8.4
	Done correctly	2	3.3

Table-3. Percentage distribution of studied nurses' practice during electrocardiogram procedure

Item		No	%
Place the limb lead electrodes.	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Place the four limb leads, one on each limb	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Expose the patient's chest	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Place chest leads following appropriate directions:	Not done	0	0.0
	Done incorrectly	8	13.3
	Done correctly	52	86.7
Connect the lead wires to the electrodes.	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Check to see that the paper speed selector is set to the Standard 25 mm/second.	Not done	1	1.7
	Done incorrectly	3	5.0
	Done correctly	56	93.3
Ask the patient to relax and breathe normally.	Not done	52	86.7
	Done incorrectly	0	0.0
	Done correctly	8	13.3
Begin the recording by pressing the AUTO or START button	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Observe the tracing quality	Not done	12	20.0
	Done incorrectly	15	25.0
	Done correctly	33	55.0

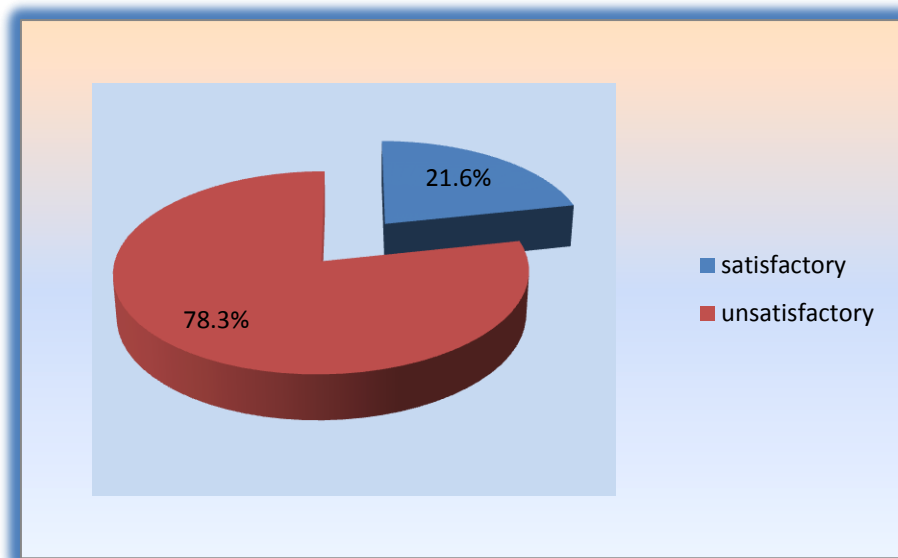
Table-4. Percentage distribution of studied nurses' practice post electrocardiogram procedure.

Item		No	%
Post procedure remove the electrodes	Not done	0	0.0
	Done incorrectly	0	0.0
	Done correctly	60	100
Clean the patient's skin.	Not done	46	76.7
	Done incorrectly	0	0.0
	Done correctly	14	23.3
Perform hand washing.	Not done	46	76.7
	Done incorrectly	4	6.6
	Done correctly	10	16.7
Document.	Not done	14	23.3
	Done incorrectly	30	50.0
	Done correctly	16	26.7

Table-5. Percentage distribution of studied nurses' practice regarding interpretation of electrocardiogram procedure

Item		No	%
Determine heart rate.	Not done	37	61.7
	Done incorrectly	15	25
	Done correctly	8	13.3
Determine heart rhythm.	Not done	40	66.7
	Done incorrectly	15	25
	Done correctly	5	8.3
Identify P wave.	Not done	37	61.7
	Done incorrectly	21	35
	Done correctly	2	3.3
Identify PR interval	Not done	50	83.3
	Done incorrectly	9	15
	Done correctly	1	1.7
Identify QRS complex.	Not done	41	68.4
	Done incorrectly	17	28.3
	Complete correct	2	3.3
Identify T waves	Not done	54	90
	Done incorrectly	4	6.7
	Done correctly	2	3.3
Identify QT interval	Not done	55	91.7
	Done incorrectly	3	5
	Done correctly	2	3.3
Report any abnormality.	Not done	46	76.7
	Done incorrectly	5	8.3
	Done correctly	9	15

Figure-1. Distribution of the studied nurses according to their total practice score levels



7. Discussion

Nurses comprise the greatest group of health care providers and are the ones responsible for the quality of care provided to the patients, their perspectives on the effectiveness of their care are very important [12, 13]. However, nurses possess a wide variety of holistic skills and there is evidence of nursing interventions that are proving to be valuable in ECG in critical care settings. So, the current study was conducted to evaluate nurses' practice regarding electrocardiogram procedure in critical care settings as coronary care and high-risk pregnancy units.

This study showed that half of the nurses in the age group (25- 30 years), this might be due to a new graduate nurses are appointed in the critical care units. In the same line with Malk, *et al.* [14], who found the same result.

Regarding the gender, the study revealed that the majority of the studied nurses were females. This might be due to nursing education for males start recently. This result agreed with Ibrahim, *et al.* [15] who reported that the majority of his study sample were females.

Related to nurses' educational qualification, the results of the current study revealed that more than third of the nurses' had technical nursing education, which might explain the nature of the work in critical care and high-risk units which necessitates young nurses to tolerate this work. This result agreed with Ali, *et al.* [16] who stated that most nurses had a technical nursing education.

As regards to marital status, the present study indicated that most of them were married. This result agreed with Malk, *et al.* [17] who stated that most of the nurses, in his study, were married.

And according to years of experience, the present study found that more than two third of the studied nurses' were having from five to ten years of experience. This finding agreed with Marzouk, *et al.* [18] who stated that more than two third of them had years of experience more than five years.

Regarding nurses' practice at pre electrocardiography, the study revealed that about most of the studied nurses neglected hand washing this may be due to nurses ignored this skill. This result confirmed by El-Metwally, *et al.* [19] who found that most nurses had an inadequate practice of hand washing at pre-program phase. In the same line with Abd-Elkareem, *et al.* [20], who found that there was only one nurse have a level good in the procedure of hand washing before using the procedure manual.

Regarding explaining the procedure to the patient the present study revealed that there few numbers of nurses did this issue. This finding supported by Perry, *et al.* [21] who reported that explaining the procedure to the patient at pre-procedure helps in reducing patient anxiety regarding the procedure and obtains an accurate test result.

As regarding cleansing the sites for electrode placement, the study showed that there few numbers of nurses did this step. This result agreed with Hassan and Hassan [22] who stated that there is an improper technique in ensuring the skin clean and dry at pretests.

Regarding nurses practice during electrocardiogram procedure, the study showed that most of the studied nurse didn't ask the patient to relax and breathe normally. This finding agreed with Hassan and Hassan [22] who found the same result.

In relation to nurses' practice regarding the interpretation of electrocardiogram procedure, the current study revealed that low percentage of them did the following (determines heart rate and rhythm identify P wave, PR interval, QRS complex, T wave, QT interval and report abnormality). This finding agreed with Sheilini and Devi [23] stated that majority of the studied nurses had poor skill in interpreting ECG during pretest.

Finally, this study revealed that majority of the study nurse had an unsatisfactory level of practice regarding electrocardiogram procedure this might be due to overlapping of work and poor skills supported by Malk, *et al.* [14].

8. Conclusion

Based on the findings of the current study, it can be concluded that majority of the nurses were having an unsatisfactory practice regarding electrocardiogram.

Recommendation

Based on results of the present study the following recommendations can be suggested:

1. In-service training programs about ECG for refresh and update the nurses' knowledge and practice regarding ECG.
2. Establishing booklet guideline for nurses regarding ECG.
3. Further researchers recommended for implementing the educational training program to raise the efficiency of nurses' performance regarding ECG.

References

- [1] Hinkle, J. L. and Cheever, K. H., 2014. *Brunner and Suddarth's Textbook of Medical Surgical Nursing*. 12th ed. China: Wolters Kluwer Health/ Lippincott Williams and Wilkins. p. 677.
- [2] Fernandez, R. G., Varona, M. R., and Colina, G. M., 2013. "Detection of p wave in electrocardiogram. Central institute of digital research, Havana, Cuba Computing in Cardiology." vol. 40, pp. 515-518.
- [3] Jacob, A., Rekha, R., and Tarachand, J. S., 2015. *Clinical nursing procedures: The art of nursing practice*. 3rd ed. New Delhi: Jaypee Brothers Medical Publishers. p. 350.
- [4] Davies, A. and Scott, A., 2015. *Starting to read ecgs, a comperhensive guide to theory and practice*. 1st ed. London: Springer-Verlag. p. 20.
- [5] Nettina, S. M., 2014. *Lippincott manual of nursing practice*. 10th ed. China: Wolters Kluwer health \ Lippincott Williams and wilkins. p. 334.

- [6] Eckman, M., 2013. *Lippincott's Nursing procedures*. 6th ed. China: Lippincott Williams and Wilkins. p. 250.
- [7] Lynn, P., 2015. *Taylor's handbook of clinical nursing skills*. 2nd ed. China: Wolters Kluwer. p. 321.
- [8] Sole, M. L., Klein, D. G., and Moseley, M. J., 2013. *Introduction to critical care nursing*. 6th ed. China: Saunders, an imprint of Elsevier Inc. p. 94.
- [9] Asprey, D. P. and Dehn, R. W., 2013. *Essential clinical procedures*. 3rd ed. Philadelphia: Saunders, an imprint of Elsevier Inc. p. 86.
- [10] Qalawa, S. H. and Hassan, H., 2017. "Implications of nurse's moral distress experience in clinical practice and their health status in obstetrics and critical care settings." *Clinical Practice*, vol. 6, pp. 15-25.
- [11] Linton, A. D., 2016. *Introduction to Medical Surgical Nursing*. 6th ed. Canada: Soundaries, an Imprint Elsevier Inc. pp. 726-732.
- [12] Hassan, H., 2016. "Infertility profile, psychological ramifications and reproductive tract infection among infertile women, in northern Upper Egypt." *Journal of Nursing Education and Practice*, vol. 6, pp. 92-108.
- [13] Sheha, E., Hassan, H., and Gamel, W., 2018. "Association between pre-pregnant overweight and obesity and periodontal disease during pregnancy: a cross sectional study." *International Journal of Studies in Nursing*, vol. 3, pp. 1-21.
- [14] Malk, R. N., Abd-Alla, K. F., Rezk, M. M., and Mohammed, S. S., 2017. "Effect of an education program on nurses' performance regarding electrocardiography." Doctoral thesis. Faculty of Nursing Benha University. pp. 73-77.
- [15] Ibrahim, R. A., Abd-Allah, K. F., Arafa, O. S., and Mohammed, S. S., 2016. "Effect of nursing care standards on nurses' performance regarding caring for patients with cardiac arrhythmias." Doctoral thesis in medical-surgical nursing, Faculty of Nursing, Benha University. p. 99.
- [16] Ali, A. S., Mohamed, M. A., Hassan, M. S., and Sobeh, H. S., 2012. "Effect of self-learning modules on nurses' performance regarding electrocardiography." Thesis submitted for partial fulfillment of doctorate degree. Faculty of nursing. Ain Shams university. p. 104.
- [17] Malk, R. N., Khalil, F. M., Mahammed, W. Y., and Taha, A. S., 2013. "Assessment of nurses' knowledge and practice in cardiac dysrhythmia among critical ill patients at Benha University Hospital." Master thesis Faculty of Nursing Benha University. p. 62.
- [18] Marzouk, S. F., Abd-Allah, K. F., Abd-Elkader, M., and Shehata, H., 2013. "Effect of self learning on performance of nurses caring for patients with pacemaker." Doctoral thesis in medical-surgical nursing, Faculty of Nursing, Ain Shams University. p. 121.
- [19] El-Metwally, S. E., Abdelaziz, M. M., Shawky, A., and Sheta, H. A., 2012. "Effect of an educational program on the performance of nurses working with coronary artery bypass grafting patients." Thesis submitted for partial fulfillment of doctorate degree. Medical surgical nursing. Faculty of nursing. Benha university. p. 125.
- [20] Abd-Elkareem, H. S., Adam, S. M., and Hassan, R. M., 2012. "Effect of nursing procedures manual on nursing performance in the intensive care unit." *The New Egyptian Journal of Medicine*, vol. 46, p. 225.
- [21] Perry, A. G., Potter, P. A., and Ostendorf, W. R., 2016. *Nursing Intervention and Clinical Skills*. 6th ed. Canada: Elsevier, Inc. p. 1124.
- [22] Hassan, S. M. and Hassan, H. S., 2013. "Effectiveness of Nursing Education program on nurses' practices toward arrhythmia in Kirkuk's teaching hospitals." *Kufa Journal for nursing Sciences*, vol. 3, p. 228.
- [23] Sheilini, M. and Devi, E. S., 2014. "Effectiveness of educational intervention on ECG monitoring and interpretation among nursing students." *IOSR Journal of Dental and Medical Sciences*, vol. 13, pp. 2-3.