

Evaluating Knowledge of Emergency Department Nurses in Recognition and Treatment of Emergency Cardiovascular Events

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Abstract

Based on the international literature there is a moderate knowledge of nursing staff on the cardiovascular system, incorrect assessment of the dangerousness of the situation and consequently delay on specialized assistance call. There were similar results from studies which were conducted in the Greek territory. The aim of the study was the investigation of Emergency Department Nurses knowledge in recognition of urgent cardiovascular events and the evaluating of a first used knowledge questionnaire. The study population consisted of 81 professional nurses working in the Emergency Room (ER). For the data collection was used a specially designed 30 items multiple choice questionnaire. The statistical analysis was performed using the statistical package SPSS 16.0 and non-parametric tests. During the evaluation of the questionnaire the Alpha of Cronbach was found a = 0.72. 80.2% of the sample were women, and the mean age was 34.1 (SD = 7.6). 28.8% had secondary, 62.5% undergraduate and 8.8% postgraduate education. The majority was single (56.3%). The median score of correct answers was 17.2 (range 1-30), there wasn't any statistical significant difference between sex and marital status, but only education level when comparing secondary with undergraduate/postgraduate educated nurses ($p = 0.031$). The majority of the sample (61.7%) had moderate performance answering correctly 11 to 20 questions, 9.9% low (0-10 questions) and 24.8% high (21-30 questions). There was a statistically significant difference between ages, years of work and years of working in ER, with a moderate positive correlation (respectively $\rho = 0.258$, $p = 0.021$, $\rho = 0.298$, $p = 0.007$ and $\rho = 0.283$, $p = 0.001$). The study is consistent with the existing literature, which shows that Emergency Department nurses have moderate knowledge in the recognition and treatment of cardiovascular events.

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Important finding lays on the positive correlation of college education and professional experience with a better questionnaire performance, indicating improving of knowledge. Continuing education for nurses, motivation and facilities for educational programs contains our basic proposals. Also the establishment of Research and Continuing Education Offices in all Nursing structures will provide specialized knowledge.

Keywords: ER, cardiovascular, nurse's knowledge, emergency department

1 Introduction

The continued professional education is a set of self-education activities or standardized education that aims to gain new knowledge beyond those acquired during basic training. The beginning, essentially, for continuing education, is the completion of basic education. The continued education has been found to be directly related to the improvement of service quality and the reduction of work-related stress. Additionally, trained professional nurses have demonstrated high productivity, reduced occupational accidents and mistakes, better working environment, job satisfaction and better patient outcomes (Panagiotopoulou, 2008).

In recent decades many studies, mostly medical, have focused on finding ways of prevention of cardiovascular diseases, such as the use calculation tables in total cardiac risk (Pipilis et al., 2007). Similarly, computer science has been employed both for the acquisition of knowledge by health workers through simulation software (Lazakidou, 2005, pp. 28-39) and to advise the medical - nursing staff for faster and accurate diagnosis of various diseases including cardiovascular (Apostolakis, 2007, pp. 111-119). Although there have been many legislative and scientific efforts, the incidence of patients with cardiovascular problems remains high.

Nurses are the first healthcare professionals who come into contact with patients either in sorting events (Triage) (Karabinis & Koukoulitsios, 2006 website) which essentially recognizes and classifies incidents both in terms of condition and mostly in terms of gravity, or in immediate response to the Emergency Department. Their education should be a priority for hospitals.

2 Material and Methods

The study population consisted of 81 nurses who worked in Emergency Departments in four major hospitals in Athens. For data collection was created a specially structured questionnaire for the purpose of research which was self-supplemented anonymously and consisted of the following three parts:

A) Demographics data: gender, age, marital status, work experience, professional experience in ICT, education (education category).

B) Conviction Questions, where the target population was asked to indicate the degree of agreement or disagreement with them.

C) Knowledge and skills of nurses in the subject of cardiovascular events. Specifically, out of all the questions, 11 were related directives of 2005, the European Resuscitation Council (European Resuscitation Council - ERC), for Basic Cardiopulmonary Resuscitation and the use of Automatic External Defibrillator (Handley et al., 2005), while the other 19 were urgent cardiological knowledge basis issues of international and Greek literature.

The validity of the content (Content Validity) of the measuring tool of this study was examined by sampling adequacy of the contents in the field researched. The procedure followed in this questionnaire was a two-step process: the stage of development (Development Stage) and the stage of judgment or quantification (Quantification Stage) (Sahinis - Kardasi, 2003 pp. 155-161).

The reliability of the measuring instrument of the present study was assessed by investigating the internal consistency (Internal Consistency Reliability), thus minimizing the measurement error and proving whether the gauge meter performed well. The rate used to assess the internal consistency coefficient was the Alpha of Cronbach. During the pilot test of the questionnaire which included 25 nurses IRD found high internal consistency with Alpha of Cronbach (Alpha = 0,77). The final sample processing and in all 30 questions, coefficient of Cronbach was 0,72 (Alpha = 0,72) (n = 60).

In the target population of 120 questionnaires distributed 81 were valid (68% response rate). 30 questionnaires were not answered at all or not returned and 9 were serious omissions in demographics and considered unfit for processing were discarded.

Statistical analysis was performed with the Statistical Package for the Social Sciences SPSS 16.0. including the descriptive part and the statistical analysis. To clarify which statistical tests should be used in this study a check was made for normality variables of age, years of work, years of working in ICT and score of the questions. We see that all the p-value is less than 5% ($p < 0.05$) (Table 1), therefore, none of the variables follow the normal distribution. Because of these results in the present study non parametric tests will be used.

3 Results

The study population of 81 nurses emergency department (ED), of which 19,8% (n = 16) were male and 80,2% (n = 65) were female, while the age of the respondents ranged from 21 up to 50 years with an average age 34.1 years (SD = 7,6 years). Regarding marital status 56.3% were single, 36.3% married, 6.3% divorced and 1.3% widowed. The educational level of 28.8% of those sampled was secondary education, 62.5% Tertiary, while 8.8% were holders of a Master - PhD. The experience of nurses was on average 9.9 years. The minimum working time was "0 years", where zero means working less than one year and a maximum of 27 years. The average number of years working in the ED is 5.6 years, while the minimum working time was 0 years and maximum 24 years.

The four cases were respondents to declare our belief gave the following results: 1st Case "The knowledge that I have to deal with cardiovascular events in ED is sufficient. 40.7% of the study population did not consider that the knowledge to tackle cardiovascular events in ED can be sufficient while 59.3% considered it adequate. Case 2 was "When we need to apply the knowledge that I have to treat cardiovascular events in an appropriate way." About 16% of people who participated in the study did not consider when you need

to apply the knowledge they have to treat cardiovascular events in done in an appropriate way, while 84% considered that it does correctly and in the right way. Case third "My training in applying Cardiopulmonary Resuscitation (KARPA) and the use of Automatic External Defibrillator (AED) is sufficient." The 46.9% of the study population considered the compilation of the application Cardiopulmonary Resuscitation (KARPA) and the use of Automatic External Defibrillator (AED) was sufficient while 53.1% believed that there is sufficient knowledge of the proper application of CPR and AED. Case 4 "Do regular seminars happen in your hospitals, regarding dealing with cardiovascular events in ED?" The 87.7% of the population said that in the hospital there are no regular seminars, in dealing with cardiovascular events in ICT, while 12.3% thought that the seminars are enough to properly address the events.

The percentage of the responses from the sample population of 30 questions is depicted in Table 2. The analysis found that the average of correct answers was 17.2 (range 0-30). The lowest score is 4 correct answers while the highest is 27 correct answers. Nobody answered correctly all the questions. Regarding gender and marital status there was found no statistically significant difference in correct responses ($p > 0.05$).

Regarding the education level medians conditions are similar to those who have Higher Education and PhD/Master, namely 18, while it is lower with a score of 16 for those with secondary education. Observing the low score of people with secondary education compared to higher education and postgraduate studies we considered it necessary to make a separate analysis, in which it was found a statistically significant difference with those having higher education and postgraduate studies to excel those with secondary education ($p = 0.031$). Specifically, the score of correct answers of those with secondary education is a median of 2 points lower than those with higher education.

In the following comparisons, we examined whether the beliefs of the population over four cases affect performance in the questionnaire.

In the first case it was compared if the median score of correct answers varied according to the beliefs expressed in knowledge that have to deal with cardiovascular events in ED. The statistical analysis, showed no statistically significant difference between participants believed that their knowledge is not adequate for what we believe is adequate (median 18 and 17 respectively, $p = 0.616$). In the second case it was compared if the median score of correct answers varied according to the beliefs expressed regarding the appropriate way of implementing their knowledge to treat cardiovascular events. The statistical analysis, showed that there is no statistically significant difference between participants who believed that when you need to apply the knowledge they do in an appropriate way, compared to those who believed that when you need to apply the knowledge they do in an appropriate way (median 17.5 and 17 respectively, $p = 0.689$). In the third case it was compared if the median score of correct answers varied according to the beliefs expressed about the adequacy of their knowledge in basic Cardiopulmonary Resuscitation (CPR) and the use of Automatic External Defibrillator (AED). The statistical analysis, showed a statistically significant difference in correct responses between those who believed that their training in the application of KARPA and the use of PII is adequate in relation to people who considered their training in the application of KARPA and the use of AEA is not sufficient (median 19 and 15 respectively, $p < 0.001$). And finally in the fourth case it was compared if the median score of correct answers varied according to the beliefs expressed in terms of holding seminars, the Nursing Agency where they work, regarding responding to cardiovascular incidents in ED. The statistical analysis, showed that there is no statistically significant difference in correct responses between those who say that

the hospitals where they work are no regular seminars and those who reported that they worked in hospitals where there are regular seminars (median 18 and 17 respectively, $p = 0.801$).

Categorizing the level of knowledge 6.9% had a low level of knowledge (0-10 correct answers), 61.7% had a moderate level (11-20 correct answers) and 28.4% a high level (21-30 correct answers).

The statistical analysis of the score of the responses in relation to age showed us that there is a statistically significant difference ($p = 0.021$) and positive correlation. It was found that increasing age by one year causes an increase in score of correct answers at 25.8% in this knowledge measuring instrument of nurses. The statistical analysis in relation to our working years showed a statistically significant difference ($p = 0.007$) and a positive correlation. It was found that an increase in years of work in a year causes an increase in score of correct answers by 29.8% in this measuring instrument. The statistical analysis in relation to the years of work on in ICT showed a statistically significant difference ($p = 0.01$) and a positive correlation. It was found that an increase in years of work in the ED in a year causes an increase in score of correct answers at 28.3% in this measuring instrument.

4 Discussion

The majority of the sample consists of women (80.2%), similar results were found in other studies addressing nursing staff. These rates were expected since the nursing profession is an area of activity of the female population (Efkarpidis et al., 2008; Zaharopoulos et al., 2007; Papageorgiou et al., 2007). The average age of the study population was 34.1 years. Possible interpretation of the finding of this study is that gravity work in the ED requires younger workers with increased physical strength. In similar studies it has been found that the average age of the workers was slightly higher median age (36-39 years) (Efkarpidis et al., 2008; Papageorgiou et al., 2007).

Regarding the educational level of the results of this study showed that 28.8% were secondary. In contrast other studies have shown that the proportion of workers with secondary education who worked in other areas of general hospitals ranged to 45% (Zaharopoulos et al., 2007; Papageorgiou et al., 2007). This difference may be justified by the need to provide specialized, qualitative and immediate response of the arriving events in a special section. Something that is not required so much in the majority of nursing departments.

In general the average length of service was found to be 9.9 years, a finding that is not inconsistent with other studies (Efkarpidis et al., 2008; Zaharopoulos et al., 2007; Papageorgiou et al., 2007). Rather it is observed that the average working in ED is only 5.6 years, a finding that may reflect the need for staff movement by importance of the section and to prevent professional burnout.

The results of this study showed that a high percentage of Nurses namely 58.8% did not know what cardiac arrest is. Similarly to the study of Trifoni et al., (2005) showed that a high percentage of students, namely 56% did not know what a cardiac arrest is. One possible explanation for the similarity can be seen in that firstly there is a lack of continuing education of nurses, another that undergraduate students are unable to understand the sense of the term of cardiac arrest due to educational deficiencies. But both

our interpretations suggest that the basic and continuing education must be a qualitative continuity in the career of nurses.

Also, a high percentage of nurses knew both clinical signs of cardiac arrest and Algorithm of Basic CPR (77.5% and 60.6% respectively). This may be the result of empirical knowledge from the frequent occurrence of cardiovascular. In a previous study in nursing staff was found that only 32.4% knew Algorithm in CPR (Zaharopoulos et al., 2007), while for undergraduate nursing students it was 33.3% (Trifoni et al., 2005). This difference may be attributed both to the lower degree of familiarity which Nurses of the general sections and students on the CPR have, since they do not often face cardiac arrest cases, when it is of little importance in these skills, another is that in that the algorithm in Basic CPR have after the new guidelines of 2005 have been simplified and are easily remembered and applied.

With regard to the beliefs of nurses about the adequacy of their knowledge and applying these in clinical practice an optimistic attitude is observed, and almost 60% said that holds the knowledge and also the highest percentage (84%) say they can cope adequately in practice cardiovascular cases entering in ED. The findings of this study contradict the findings concerning the correctness of their positions as only 28.4% answered correctly more than 20 questions. One possible interpretation of these contradictory findings is that there is an overestimation of knowledge, which may be due to wrong judgment on the cognitive level. This Incorrect judgment can result from the lack of continuing education. This lack is confirmed by the majority view (87.7%) of respondents who consider that there are no regular seminars for new data to address cardiovascular events in their hospitals.

Another factor that should be taken into account when exploring the knowledge of nurses in addressing urgent cardiovascular events is the lack of satisfactory undergraduate education, which may be another factor influencing the wrong judgment. The results of the study of Bakalis, Bowman & Porock (2004) which investigated the knowledge of English and Greek Nursing students to the anatomy and physiology of the cardiovascular system confirm this view, because the British students were found to have a higher level of knowledge with a statistically significant difference compared to the Greeks.

In this study we observed that the majority of the sample had moderate knowledge by answering 11 to 20 questions in total of 30 queries. It is widely accepted that the mediocrity of the knowledge can negatively influence their judgment in assessing the facts, which is confirmed by Daffurn's et al. study (1994), where the nurses' knowledge is studied in specific cardiovascular diseases. Specifically, the researchers concluded that 17% - 73% of nurses according to the incident led to incorrect specialized assistance calls in the areas of the incidents.

To similar results to this study led investigations of Newens et al. (1996), concerning the knowledge of nurses in recognizing symptoms of cardiovascular events and revealed modest performance with average 9,6 (SD 1,9) in a total of 15 questions. And the Harper's study (2007), concerning the knowledge of nurses in recognition of ischemic stroke showed that the average percentage of correct answers was 53% (range 30-90%).

Certainly the mediocrity may not be the norm because it is a subjective criterion, while there are studies which show the exact opposite, that nurses have the knowledge to recognize and deal to the adequacy of cardiovascular events in the ED. Other factors to be considered when assessing the knowledge of nurses in ED are not only the recognition of pathophysiological characteristics of cardiovascular events but also cultural characteristics of patients. In a study of Arslanian-Engoren (2009) held in the US, it was

observed that the main errors in the estimation of cardiovascular events came from the different way that patients showed their health status, namely, Hispanics and Asian tribes were more expressive compared to whites, where this expressing the nurses perceive as excessive. In addition, in another specialized research in Australia (Kremser & Lyneham, 2007) nurses in ED were able to correctly identify electrocardiographic and symptomatically incidents needing thrombolysis and referred these patients to thrombolytic therapy successfully. The variation of results from country to country or even from continent to continent can be explained by different levels of nurses' education either at undergraduate or postgraduate level.

Particularly important in an emergency department is the timely recognition ECG rhythms that can lead to death within minutes and must be urgently addressed. In this study we observed that the identification of urgent ECG arrhythmias it was possible for the 65.4% of participants. Similar results were reached by the research of Bertoglio et al. (2008), which investigated the knowledge of nurses on the interpretation of ECG rhythms. Specifically only 58% of the study population who worked in departments that there was no possibility of monitoring with monitors, it was able to recognize basic cardiac rhythms, whereas, in sections where it was possible to monitor patients with monitors this figure amounted to 75%.

Good knowledge in recognition of fatal cardiac arrhythmias have been observed in the present study which may be explained by the specificity of the emergency department and specialized infrastructure such as that of continuous recorders of vital signs (monitors). Constant contact and experience gained from the use and monitoring of parameters recorded by these special implementation equipments (monitors, ECGs, etc.) leads to improved knowledge, which entails timely and effective treatment of cardiovascular events.

On the educational level, it was found that secondary school graduates had statistically worse performance than those with higher education and postgraduate studies. Similar results were also reached by the research of Zaharopoulos et al. (2007), where the Nurses of Higher education had given more correct answers than those with secondary education. These findings can be considered reasonable because the curriculum in higher education is higher than in the secondary. In addition, limiting continuous education, as well as exclusion of graduates from secondary education graduate programs consist all factors that contribute decisively to reducing the already acquired knowledge. In addition, another possible interpretation is that both the acquired theoretical knowledge (declarative knowledge) and knowledge of the application of the protocols or procedures (procedural knowledge), i.e. the knowledge of how things should be done, it has the tendency to decrease if not applied periodically.

Many times, the knowledge should not be evaluated only by the accuracy of the answers because both of changes over time and secondly, nurses are reluctant to implement in practice if unsure. Apart from the above factors, it is imperative to take into account other factors such as the personality of nurses, the degree of satisfaction with the work experience, the degree of support from the professional environment to the acquisition and application of knowledge or even stress levels experienced during the performance of duty.

Regardless of interpretation, however, the continuous nurses' education is widely accepted as an absolute prerequisite for the treatment of acute cardiovascular events and is the key factor for providing high quality care. According to the results of this study, the increase in years of work in one year induces an increase in the score of correct answers

by 29.8% in value of the score. Therefore, the experience of each employee seems to be a factor associated with maximizing efficiency in everyday clinical practice and improve knowledge. This study also observed that increasing age caused an increase of correct answers of the score by 25.8% in value of the score per year. Therefore, with increasing a person's age, the higher score of correct answers we expect to have. One possible interpretation of this finding is that the older the age of the workers, the more are the years of service and by extension the greater both the acquisition of the knowledge and secondly the application of these in everyday clinical practice.

Similarly, the increase in years of work in the ED in one year causes an increase in score of correct answers by 28.3% in the price of the table. So with increasing years working in the ED of an individual score higher correct answers we expect to have. With the preceding considerations can be interpreted this result.

Other factors that did not research the present study is the level of nurses' awareness to participation in continuing education programs, a sense of personal responsibility for the proper exercise of the profession, as well as the offering of incentives for participation in continuing education programs by the employer. These factors may be the future purposes of research and study.

It is worth noting that the amount of research data concerning the knowledge of nurses in acute cardiovascular events is limited in both the Greek and international literature. Specifically, studies of foreign literature refer on how to deal with diseases of the cardiovascular in ED while Greek literature was limited to basic CPR and use of Automatic External Defibrillators. It is also important to mention the limitations presented in this study, which are summarized in the following:

- The instrument was first used. Further use will highlight the validity of the discipline that investigates.
- The sample was small given that there is a small population of Nurses in ED. It is proposed to use a larger sample in future studies to confirm the usefulness of the instrument.

5 Conclusion

Nurses are the first healthcare professionals who come into contact with patients either in sorting events (Triage) (Karabinis et al, 2006), which essentially recognizes and classifies incidents both in terms of condition and mostly in terms of gravity, or in immediate response to the Emergency Department. Their education should be a priority for hospitals. The presented study is consistent with the existing literature, which shows that Emergency Department nurses have moderate knowledge in the recognition and treatment of cardiovascular events. Continuing education for nurses, motivation and facilities for educational programs contains our basic proposals. Also the establishment of Research and Continuing Education Offices in all Nursing structures are necessary to provide specialized knowledge.

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Appendix

Panel 1: Regularity Checks

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AGE	,138	79	,001	,959	79	,012
WORKING YEARS	,133	79	,001	,913	79	,000
WORKING YEARS IN ICT	,210	79	,000	,788	79	,000
Score	,116	79	,011	,961	79	,016

a. Lilliefors Significance Correction

Panel 2: Percentage (%) distribution of answers per question

QUESTIONS	RIGHT	WRONG
What's a cardiac arrest?	41,3	58,8
What are the main clinical signs of cardiac arrest?	77,5	22,5
What is the algorithm in Basic CPR have?	69,6	30,4
How is the control to the victim's reaction?	73,8	26,3
What is the mode of existence of diagnosis or no normal breathing?	86,4	13,6
What is the time required for the control of physiological respiration existence or not?	33,8	66,2
What is the method for finding the appropriate point to chest compressions?	25	75
What is the indicated compression ratio of breaths?	58	42
Until when do we continue the recovery?	55,6	44,4
What is the recovery position or safety position?	63,3	36,7
What is a primary arrhythmia therapy defibrillation?	62,5	37,5
Identify the following electrocardiographic rhythms.	65,4	34,6
What are the energy levels recommended in shock biphasic defibrillators?	32,5	67,5
What are the single phase defibrillators compared with the bi-phase?	31,9	68,1
When we have evidence to shock what actions followed?	65,3	34,7
What drug is given every 3-5 minutes during the arrest?	86,8	13,2
What medications are used to pulseless electrical activity?	17,8	82,2
What do we have if the patient develops D - dimer negative?	92,1	7,9
What does a positive test isoenzymes of troponin T and I?	47,4	52,6
When detected elevated blood isozymes of troponins?	61	39
Which biochemical marker of creatine kinase increases in myocardial infarction?	92,1	7,9
What are normal levels of troponin in the blood?	98,6	1,4
What transaminase increases in myocardial infarction?	66,7	33,3
What are the anginal symptoms in a patient who has undergone a heart transplant?	33,8	66,2
What is the difference between myocardial infarction and angina?	40,3	59,7
What is commonly referred to as fever appearance before precordial pain?	82,1	17,9
What are the possible clinical situations in unconscious patients with frequent episodes of atrial fibrillation?	27,6	72,4
What do the changes in the P wave of the electrocardiogram mean?	82,6	17,4
What do we have if the patient develops D - dimer positive?	77	23
What do the changes in the waves of the electrocardiogram QRS mean?	62,5	37,5