Emergency Nurse Competence in Electrocardiographic Interpretation in Spain: A Cross-Sectional Study

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Contribution to Emergency Nursing Practice

- Refresher courses in electrocardiography should be run at least every 5 years.
- Recognizing the most relevant pathologies in the electrocardiogram (ECG) is the key to hastening patient care.
- Nurses are the first step in patient care. To provide patients with the best care possible, nurses need to be highly competent in recognizing alarming symptoms.

Abstract

Introduction: Electrocardiographic interpretation skills are key to provide a fast attention to patients with thoracic pain. The aim of the study was to determine the current level of competence in electrocardiographic interpretation of nurses in emergency departments.

Methods: Cross-sectional, multicenter study via an ad hoc questionnaire. Subjects were nurses from three Spanish emergency departments with at least a year experience in this area. A two-part questionnaire was created consisting of a professional profile, and 12 questions (2 theoretical questions and 10 questions on practical cases with electrocardiographic register [readout]). A pilot test was carried out to evaluate the validity of the questionnaire, the content validity index. The reliability of the questionnaire was also tested on a subsample through intraclass correlation coefficient with a value of 0.869 (CI 95% 0.712-0.941). Descriptive and bivariate analyses were conducted using an independent *t*-test or one-way ANOVA as appropriate. A statistical significance of $P < .05$ was assumed.

Results: Fifty-seven usable questionnaires were obtained (47.2% response rate). Women comprised 84.2% of the sample and the mean age of the sample was 40.5 (SD = 9.3) years. Slightly more than 91% had taken electrocardiographic interpretation training courses, the main modality for which was face-to-face (84.2%). The average score on our questionnaire was 8.6 (SD=1.1) points. No significant differences between nursing experience and hospitals were observed. Nurses who had received training within the previous five years scored significantly higher than those who had not ($P = .031$).

Discussion: The electrocardiographic knowledge of emergency nurses is high. Level of knowledge was not influenced by experience or hospital but was influenced by training when provided in the previous 5 years. Therefore, refreshing courses should be taken at least every 5 years.

Key words: Electrocardiography; Knowledge; Nursing; Emergencies; Critical care nursing

Introduction

Cardiovascular disease (CVD) is the leading cause of mortality in Western countries, resulting in 30% of all deaths.[1] Thoracic pain is one of the most frequent reasons for medical consultation and assistance in emergency services. In Europe, in 2012, there were 608 hospital discharges per 100,000 inhabitants for patients with CVD.[2] Thoracic pain is responsible for 5% to 20% of hospital emergencies,[3] and, in the United States, 6 million medical visits are registered annually.[4] Acute nontraumatic thoracic pain is manifested in numerous ways: from minor discomfort, a heavy feeling or tightness, to intense pain with or without radiating pain to other parts of the body. Moreover, pain can be modified by patient conditions such

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TABLE 1
Content of the questions on the questionnaire

Question 1	Waves and ECG intervals
Question 2	P wave
ECG 1	Atrial flutter
ECG 2	Ventricular fibrillation
ECG 3	Atrial fibrillation
ECG 4	Pathological Q wave
ECG 5	Atrioventricular third-degree bundle branch block
ECG 6	Ventricular tachycardia
ECG 7	Acute myocardial infarction
ECG 8	Normal ECG
ECG 9	Ventricular extrasystole
ECG 10	Atrial tachycardia

as age and comorbidities (eg, diabetes), as well as by ethnic and cultural aspects.[5] For this reason, CVD is considered a clinically complex condition with numerous etiologic possibilities in which cardiac-originated causes may be due to emergent processes, nonvital emergencies (emergencies without vital risk for the patient), or banal emergencies (emergencies where the process is of low complexity that can be treated in primary care).[3] One of the most serious pathologies that usually presents with thoracic pain and requires fast diagnosis and treatment is acute myocardial infarction (AMI), one of the most dramatic expressions of acute coronary syndrome (ACS).[6] The incidence of AMI worldwide has increased over the last few decades. The number of AMI cases in Spain is estimated at 68,500 cases per year.[7]

A rapid and objective evaluation is required to identify potentially severe causes, such as AMI or other serious arrhythmias, as these are time-dependent. It is important, therefore, that nurses—who are usually the first health professionals to assist these patients—are able to recognize these causes early.[8]

Patients admitted to emergency departments are triaged to the level of care they need, according to severity. The triage can be conducted by a nurse or by a physician. In Spain today, triage is mostly performed by nurses.[9] In Catalonia, Spain, the Catalan government proposed several measures aimed at improving patient care.[10] One of these measures was to implement the Andorran Triage Model (ATM). According to this model, if AMI is suspected, the nurse is responsible for performing the electrocardiogram (ECG) within the stipulated time, and, if the patient's ECG demonstrates any pathologic alteration, the nurse should alert the physician to interpret the ECG, diagnose pathology, and initiate treatment.[11]

Several studies have evaluated the competence of physicians in electrocardiographic interpretation,[12–14] but few have been conducted on nurses in the hospital environment.[4] Moreover, most of these studies have focused specifically on recognizing alterations in the ST segment.[4,15–17] Most investigators have observed that the level of knowledge of nursing professionals is lower than desired but higher among nurses who have received training courses.[4] Several authors have demonstrated the effectiveness of educational programs.[17,18] Zhang and Hsu[19] observed that nurses working in cardiology had better electrocardiographic knowledge than those in intensive care and emergency departments and that training programs increased their levels of knowledge. All these studies have focused on electrocardiographic interpretation for a specific type of pathology or arrhythmia. In this study, however, we determined the current competence of ED nursing professionals in electrocardiographic interpretation by taking into account the most important pathologies to be detected in order to improve the quality of health care and minimize the risks in emergency situations.

Methods

STUDY DESIGN

This cross-sectional study was conducted using a questionnaire administered between September 2014 and May 2015.

SETTING AND PARTICIPANTS

Selected for the study were the emergency departments of 2 regional hospitals (ED 1 and ED 2) and an AMI code reference (referral) hospital (ED 3) from a region in the southeast of Spain with approximately 800,000 inhabitants.

Convenience sampling was used to recruit study participants. Participants were ED nurses employed in the participating hospitals who had been working for 1 or more years and 1 or more days per week in the emergency department. Participation was voluntary. During the time of the study, 135 nurses were working in the participating emergency departments, and 60 completed the study questionnaire.

OUTCOME MEASURE

Our study outcome was competence in interpretation of ECGs. We created a 2-part questionnaire. Part 1 elicited