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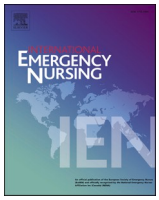

Difficulties of Spanish Primary Health Care nurses to assist emergencies: A cross-sectional study

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ABSTRACT

Background: The competence of a Primary Health Care nurse to handle emergency situations depends largely on prior acquisition of theoretical knowledge to make appropriate decisions, combined with the corresponding practical skills to carry out swift and effective interventions.
Methods: Cross-sectional study conducted in through a survey auto-administered to a simple random sample of 269 nurses (n) with replacement of Asturias, Spain from the total nursing staff of 730 members (N) in Asturias.
Results: In rural areas, the most frequently mentioned reasons were the lack of practical skills (18.9%) and the absence of adequate material (14.4 %). In the semi-urban area, the most common reasons were the lack of practical skills (13.2 %) and the lack of theoretical knowledge (10.3 %). Finally, in the urban area, the main reasons were the lack of practical skills (14.4 %) and the absence of adequate material (7.2 %). The differences were significant ($p = 0.025$).
Conclusions: Despite the requirement that they acquire the necessary theoretical and practical skills, not all PHC nurses perceive themselves to be sufficiently prepared. The degree of self-perceived acquisition of this knowledge and skills, which is so important and necessary, is heterogeneous, with clear differences according to the respective field of work.

1. Introduction

The current Spanish model of Primary Health Care (PHC) includes among the duties of nurses the duty to render assistance to patients in an emergency [1]. In Spain, healthcare staff respond to approximately 28 million emergency pre-hospital each year, and this makes it necessary that the nursing staff that provides treatment in these situations should be properly trained in specific techniques such as Basic and Advanced cardiopulmonary resuscitation (CPR), orotracheal intubation or providing care to polytraumatized patients [2]. In addition, nurses must update their theoretical knowledge and practical skills in these types of procedures on a continuous basis to be able to provide an adequate quality of care to patient [3–6].

Pre-hospital emergency nursing care refers to the nursing care provided to patients before their arrival at the hospital after the activation of the emergency team. This care is given for analytic, resuscitative, stabilizing, or preventative purposes before the patient is transferred to healthcare facilities [7,8].

The ability of a nurse to manage emergency situations depends primarily on their prior acquisition of theoretical knowledge to make appropriate decisions, as well as the corresponding practical skills to carry out swift and effective interventions [9]. Despite having adequate theoretical and practical training, a PHC nurse may be unable to act in an emergency due to the unavailability or poor condition of necessary equipment. This can lead to unequal outcomes in healthcare interventions [10]. In sub-Saharan Africa, primary healthcare (PHC) services are typically led by nurses with support from care workers, doctors, and allied medical professionals [11]. While nurses in PHC may not always be prepared to act as first responders in emergency situations, their leadership is crucial at the PHC level where a doctor, specialist nurse, or specialised team may not always be available to take the lead. It is vital to ensure that all healthcare professionals, including nurses, clinical associates, and doctors practicing in PHC facilities, are equipped and confident to lead a team in the emergency care process [12]. A study conducted by nurses from the Massachusetts General Hospital in Boston, Massachusetts, USA, concluded that the role of

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nursing in disaster medicine and life-threatening emergencies will continue to grow in years to come. Therefore, it is important for nurses to be adequately trained in this field [13].

The objective of this study is to describe the training received by nurses and identify the limitations and difficulties they face in providing healthcare during accidents and emergencies, as self-perceived by primary care nurses. Additionally, it analyses the differences in various areas of work.

2. Methods

2.1. Instrument

A cross-sectional study was conducted using a self-administered survey on a simple random sample of 269 nurses (n) with replacement at PHC centers in eight health areas of the Principality of Asturias. The total nursing staff in Asturias is 730 members (N).

The nurse's geographical scope of work was classified according to the definitions of the Spanish Institute of Statistics (INE) [14]. The classification distinguishes between rural areas (entities with a population of 2,000 or fewer people), semi-urban areas (from 2,001 to 10,000 inhabitants), and urban areas (10,001 inhabitants or more).

During the literature review, it was found that there is no validated questionnaire available to study the self-perception of factors contributing to inadequate care in emergencies in primary healthcare. Therefore, the authors created a questionnaire specifically for this study. The questionnaire was tested on 30 PHC nurses through a pilot study or cognitive pre-testing to determine the appropriate question type, response scale, length, comprehensibility, and logical structure of the questions. The authors also assessed the time required to complete the questionnaire and its acceptance rate. The four most common reasons for failing to recognize or respond to an emergency are: lack of theoretical knowledge, lack of skills, lack of necessary materials, and poor conditions of the necessary materials. The questionnaire used in this study was deemed appropriate, with a Cronbach's alpha coefficient for internal consistency exceeding 0.7. The final version of the questionnaire included items about training in emergency medicine (EM) and seasonal procedures. The Cronbach's alpha value was greater than 0.9. To evaluate the accessibility of emergency equipment at each health center, a Likert-type scale ranging from 0 (minimum) to 10 (maximum) was used.

2.2. Statistical analysis

The study employed various statistical methods, including absolute and relative frequencies, measures of central tendency and dispersion, and a Chi-square test to assess perceived motives. The normality of the distribution was checked using the Shapiro-Wilk test when calculating differences in average endowment of materials and equipment across different work areas. A p-value of less than 0.000 was obtained for each of the three areas, leading to the rejection of the hypothesis of normal distribution. As a result, the non-parametric Kruskal-Wallis test was applied. Estimates were made using a 95 % confidence interval. Significant differences between parameters were compared with a probability of less than 5 % error ($p < 0.05$).

3. Results

Out of the 269 nurses who participated in the study, 226 (84.0 %) were women and 43 (16.0 %) were men. Of these nurses, 111 (41.2 %) worked in urban areas, 90 (33.5 %) in rural areas, and 68 (25.3 %) in semi-urban areas. Only 4 nurses (1.5 %) were specialists in community nursing. Table 1 displays the dates when the surveyed nurses last completed courses in Basic CPR, Advanced CPR, and care of polytraumatized patients.

Fig. 1 displays the reasons for not taking urgent or emergency action in the relevant area of work. In rural areas, 46 nurses (51.1 %) reported familiarity with proper emergency procedures in all interventions. 17 (18.9 %) reported difficulties or limitations due to lack of practical ability, 13 (14.4 %) due to absence of suitable equipment and material, 12 (13.3 %) due to lack of theoretical knowledge, and 2 (2.2 %) due to inadequate equipment and material conditions.

In semi-urban areas, 45 nurses (66.2 %) reported knowing the proper emergency procedures for all interventions. Nine (13.2 %) identified difficulties or limitations due to a lack of practical skills, while seven (10.3 %) cited a lack of theoretical knowledge. Four (5.9 %) mentioned the absence of suitable equipment and materials, and three (4.4 %) noted inadequate equipment/material conditions.

In urban areas, 81 nurses (73 %) reported being aware of proper procedures in all the emergencies in which they had intervened. Of the remaining nurses, 16 (14.4 %) reported difficulties or limitations related to the lack of practical ability, 8 (7.2 %) reported issues with the absence of necessary equipment and material, 4 (3.6 %) reported a lack of theoretical knowledge, and 2 (1.8 %) reported inadequate conditions of equipment/material for intervening in the emergency department. There was a significant difference (p value = 0.025) in the ability of nurses to intervene adequately due to a lack of knowledge in three different areas. However, no significant differences were found in the other three reasons given.

Overall, emergency equipment/material availability from the PHC centers in Asturias was rated an average of 6.14 points out of 10 (95 % CI: 5.89–6.37). The study found that the perception of availability of emergency equipment/material did not differ significantly between rural (5.85, 95 % CI: 5.44–6.27), semi-urban (6.60, 95 % CI: 6.28–6.92), and urban (5.87, 95 % CI: 5.21–6.41) areas. Table 2 presents the frequency of need and non-availability of emergency equipment/material

Table 1
When nurses surveyed completed their last course in Basic CPR, Advanced CPR, and care of polytraumatized patients.

Last course completed	Area								
	Rural			Semi-urban			Urban		
	Basic CPR (% responses rate)	Advanced CPR (% responses rate)	Politraumatyzed patient (% responses rate)	Basic CPR (% responses rate)	Advanced CPR (% responses rate)	Politraumatyzed patient (% responses rate)	Basic CPR (% responses rate)	Advanced CPR (% responses rate)	Politraumatyzed patient (% responses rate)
5 years or less ago	28,9	15,5	16,7	19,1	10,3	8,8	11,7	6,3	5,4
More than 5 and less than 10 years ago	1,1	5,6	15,5	0	7,3	5,9	0	4,5	3,6
10 years or more ago	4,4	13,3	24,8	2,9	4,4	7,3	1,8	2,7	4,5
Never	65,6	65,6	43	78,0	78,0	78,0	86,5	86,5	86,5

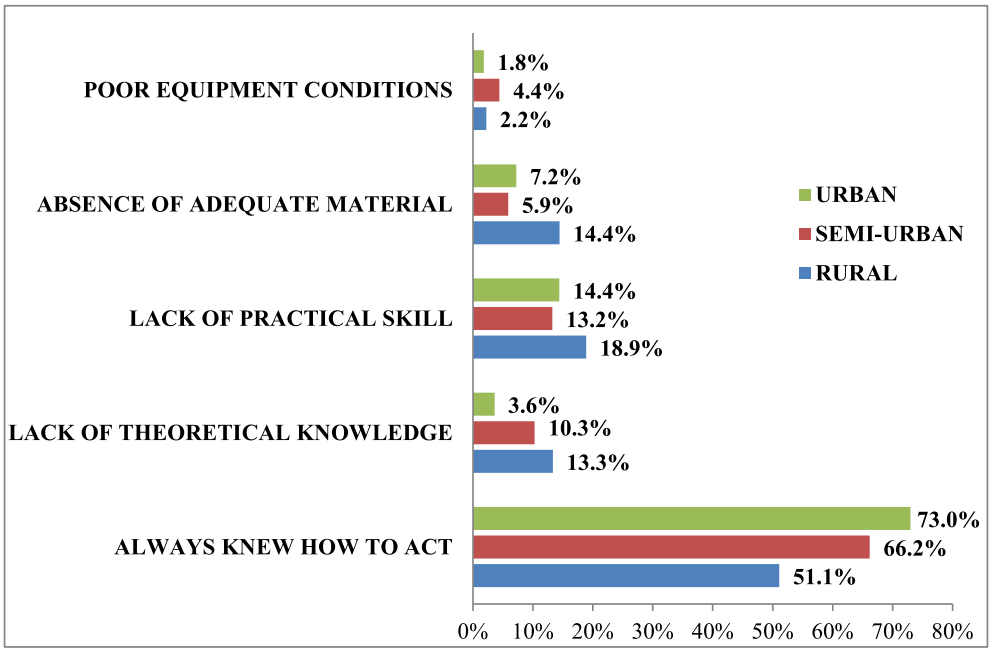

Fig. 1. Perceived reasons for not having acted in an urgency or emergency according to the area of work.

in PHC centers by work setting.

4. Discussion

The study findings indicate that the main factors limiting PHC nurses are the lack of practical skills and insufficient equipment/materials at their health center. The nurses perceive their theoretical training as adequate. However, a high percentage of them only proceed correctly in emergency situations. No similar studies were found in the published literature for comparison.

Van Dillen [15] and Su [16] suggest that PHC nurses gain experience through handling emergencies, which requires specific training at regular intervals. It is recommended that emergency training be updated at least every 2 years to reduce the loss of skill over time [17]. However, PHC nurses often have limited opportunities to put this training into practice, which can limit their ability to manage emergency situations. Furthermore, following six months of training in emergency procedures, including CPR, there is a noticeable decrease in the rate of knowledge acquisition. Therefore, it appears necessary to introduce experience-based training [18], which should combine both theoretical and practical training, as outcomes are superior to those of purely theoretical training [19,20]. Abelsson et *al.* [21] provided evidence of inadequate theoretical and practical training among nurses working in prehospital care in Sweden. The percentage of nurses who perceive their theoretical training as inadequate is 45 %, while 50 % perceive their practical training as insufficient. These percentages increase to 63 % and 65 %, respectively, for nurses with experience in emergencies. Although various techniques for out-of-hospital emergencies have been considered for PHC professionals, not all are used with the same frequency. Reinforcing techniques such as immediate life support, helmet removal, and intravenous line administration could equip PHC nurses with the theoretical knowledge and practical skills necessary to successfully manage a range of extra-hospital emergencies [22]. It is crucial to train PHC nurses in emergency techniques to enhance their practical skills in this field. Yorganci [23] conducted a study on PHC nurses in Turkey and found that they scored 58.6 out of 100 in theoretical and practical knowledge of emergency techniques. This result is consistent with the self-perception of Asturian nurses surveyed. It is necessary to increase training in this field due to the complexity of care that PHC professionals must provide in emergencies. Thus, emergency professionals, specifically nurses, must receive adequate training to provide the necessary care [24].

Garvey et *al.* [25] suggest that simulation has been implemented to mitigate the deficit in training and experience among nurses working in prehospital care. This has resulted in a significant increase in both theoretical and practical skills. The results are promising, and simulation could be applied in PHC to alleviate the training deficit perceived by nurses. Simulation-based education has been shown to improve provider confidence and comfort during emergency response [26–28]. Monachino et *al.* [29] state that simulation is used to improve knowledge and communication skills, as well as technical and non-technical skills such as effective communication and teamwork. Lavelle et *al.* [30] found that the use of moderate-fidelity manikins increases staff education, confidence, and teamwork.

A growing body of evidence supports the use of high-fidelity simulation in nursing training. The literature notably supports the beneficial effects of high-fidelity simulation on knowledge acquisition and skill improvement [31–33].

Emergency nursing has become a mandatory course in nursing education in China [34]. The course emphasizes clinical skills, basic theoretical knowledge, understanding of applied medical theory, and skills in handling severe disease diagnosis and treatment. Emergency nurses have become a major force in the fight against severe diseases, accidents, rescue, and catastrophe response. The integration of digital techniques into modern medical and nursing education is a desired trend [35]. Online courses are particularly urgent for emergency nursing, which requires a thorough understanding of disease mechanisms in addition to proficient knowledge and clinical skills [36]. Lei et *al.* [37] concluded that open online courses are efficient and effective tools for emergency nursing theory instruction.

Nurses generally perceive the material resources in Asturias' PHC centers as mediocre, and sometimes not in adequate conditions for use. This is a significant limitation on the proper handling of emergencies. The data has been compared to Yorganci's study [23], which found that only 67 % of the analyzed centers had the eight basic instruments necessary for treating patients in emergency situations: oropharyngeal cannula, resuscitative balloon, oxygen, nebulizer, tourniquet, intravenous cannula, glucometer, and sphygmomanometer. This suggests

inadequate supply planning and availability of equipment/materials in these centers. Furthermore, these data have been compared to the study conducted by Sempowski [38]. The study found that the supply of available materials in Canadian primary care emergency centres was poor and that these centres were inadequately prepared to provide emergency assistance. In Spain, physicians perceived the provision of equipment as the most significant barrier when dealing with emergency cases [2]. However, physicians in Norway considered the provision of equipment in primary healthcare centres in both rural and urban areas to be satisfactory [39]. In Spain [40], Australia [41], and Saudi Arabia [42], most PHC centres lacked equipped ambulance cars, laboratory facilities, and X-ray machines, making them ill-prepared for emergency situations.

Toback [43] and Shenoi [44] concluded that primary healthcare (PHC) centres should have a written emergency protocol to effectively deal with emergency cases. Several studies conducted in Norway [45] and the Netherlands [46] have shown that emergency cases represent a significant proportion of cases seen at PHC centres.

In addition to the factors outlined above, it is important to consider other circumstances that can play a key role in proper emergency procedure and care provision. One such factor is stress. According to Loro et *al.* [47], nurses are increasingly exposed to physical and mental overload in emergency situations. Several studies indicate that nurses who handle pre-hospital emergencies experience high levels of stress [48,49]. Nurses must possess the agility and security to carry out emergency procedures while maintaining emotional balance [47]. Periodic refresher courses for nurses at primary healthcare centres, including both theoretical knowledge and practical skills in emergencies, combined with regular monitoring of the equipment and materials available at the centres (both their condition and quantity), would help enable nurses to provide emergency healthcare of the highest quality possible. Dermitas et *al.* [50] demonstrated the positive effects of clinical simulation on anxiety and stress outcomes in nursing students and graduate nurses.

Several authors [9,51–53] argued that PHC nurses working in emergencies require additional qualities, such as effective stress management, the ability to prioritize, teamwork skills, and leadership capacity. The role of PHC nurses in emergencies is a contentious issue, as they are often assigned tasks that support the team leader, who is typically a doctor. Leading and decision-making are presumed to be the responsibility of the doctor, and in rare circumstances, a specialist nurse [39]. However, for any healthcare practitioner to provide effective emergency care, there must be a support system in place that enables effective practice, regardless of the context. Unfortunately, doctors often assume leadership roles even though they are not permanently available at the clinics, instead of supporting and developing the nurse's leadership role. It is important to clarify roles and develop team leadership in emergency care for primary healthcare (PHC) contexts [12].

5. Study limitations

This study was conducted solely within the geographical area of the Principality of Asturias. Therefore, its results cannot be directly extrapolated to the rest of the Spanish Autonomous Communities. The study examines the nurses' self-perceived limitations and difficulties in providing a specific type of medical care during emergencies. However, it does not evaluate the practical ability of professionals to act in emergency situations through any form of examination or practical case, as this is not its explicit or implicit objective.

6. Conclusions

Training in emergencies is a fundamental part of the curriculum for PHC nurses. However, not all PHC nurses perceive themselves to be sufficiently prepared, despite the requirement that they acquire the necessary theoretical and practical skills. The degree of self-perceived acquisition of this knowledge and these skills is heterogeneous, with clear differences according to the respective field of work. By the same token, adequate availability of material and equipment used in emergencies, as well as its proper maintenance, is essential for achieving the optimal response and quality of care provided by nurses in pre-hospital emergencies. To ensure equity in the provision of healthcare during multiple casualty incidents in different geographical areas, the Health Administration must ensure that their PHC nurses possess a homogenous level of theoretical knowledge and practical ability. Additionally, PHC centers must comply with standards for the availability, quantity, and quality of materials and equipment required to respond to emergencies.

Ethical statement

None.

Author contributions

JC researched literature and conceived the study and wrote the first draft of the manuscript. PA and RC performed the statistical analysis. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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CRediT authorship contribution statement

José Antonio Cernuda Martínez: Methodology, Investigation, Formal analysis. **Rafael Castro Delgado:** Validation, Supervision, Resources, Conceptualization. **Pedro Arcos González:** Visualization, Supervision, Project administration, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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