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Correlates of Cardiology Nurses' Clinical First Aid Competence in a Selected Hospital in Shandong, China

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Abstract: As a cardiology department is an important place to receive critically ill patients, the improvement of nurses' own quality can significantly improve the first aid competence and resuscitation success rate, thus saving patients' lives. The clinical emergency care competencies of cardiac nurses include the ability to recognize changes in a patient's status in a timely manner during the course of treatment, as well as the ability to carefully assess the situation and make timely judgments. This ability to provide emergency medical care under stress is critical to the overall competence of the nurse. Cardiology nurses should improve their ability to learn on their own, continue to learn new knowledge and techniques, enhance their level of professional benefit, and actively participate in cardiovascular specialty nurse training in order to improve their critical care and emergency care abilities.

Keywords: Cardiology; Nurses; Nursing Ability; Clinical First Aid Competence; Influencing Factors.

1. Introduction

Cardiovascular disease (CVD) involves health-related conditions involving the heart and the blood vessels. As such, nurses are involved in their care and play an essential role in maintaining their health. With these, nurses are primarily engaged in the care and continue to do so. The relevance of this concept is that nurses may have difficulty providing care. This brings to mind that nurses are coping with caring for persons with cardiovascular disease [1]. As the frontline healthcare providers caring for cardiac patients, nurses play a vital role in emergency response and clinical management of cardiovascular events. However, studies show that nurses often lack confidence in handling cardiac emergencies due to inadequate training opportunities [2].

Cardiovascular disease is not an uncommon, chronic disease among middle-aged and older adults. According to WHO, 17.9 million people died of cardiovascular disease. In 2019, cardiovascular diseases (CVD) accounted for 46.74% and 44.26% of all deaths in rural and urban areas, respectively. Two out of every five deaths are due to CVD [3]. It is estimated that about 330 million people in China suffer from CVD. The numbers of patients with stroke, coronary heart disease, pulmonary heart disease, heart failure, atrial fibrillation, rheumatic heart disease, congenital heart disease, lower extremity arterial disease, and hypertension are 13 million, 11 million, 5 million, 8.9 million, 4.9 million, 2.5 million, 2 million, 45.3 million and 245 million, respectively [4]. It is estimated that by 2030, more than 23 million people will die annually from cardiovascular disease [5]. China is facing the dual pressures of an aging population and a continued rise in the prevalence of metabolic risk factors, and the burden caused by cardiovascular disease will continue to increase, placing new demands on the capacity of Chinese caregivers and the allocation of healthcare resources. A great deal of researchers has made known that the load of care has turned into a rife matter for family nurses with chronic Heart Failure Patients [5]. Therefore, it is particularly momentous for nurses to help chronic Heart Failure Patients look for ways to deal with the load of care. Some studies have also shown that nurses suffer from depression.

Nurses are increasingly important in promoting human health activities [6]. The role function of nurses has been given a new connotation in the development and change of the healthcare environment and has become not only the guardians of health but also the educators and coordinators of health [7]. With the acceleration of globalization, the healthcare system has become one of the most potent symbols of a country. China's vast healthcare system comprises the government, hospitals, healthcare, and patients [8]. Hospitals are a core part of the healthcare system. Due to the large population base, some problems in China's healthcare system cannot be ignored. China's healthcare system suffers from tensions between doctors and patients, uneven allocation of healthcare resources, and public health issues [9]. Research has shown that improving the healthcare system requires the joint efforts of the government, hospitals, healthcare providers, and patients, which requires doctors to master the latest medical knowledge and technology and improve their quality and competence [10]. Nurses must be better prepared for the second quality and safety of nursing services, gain a sense of occupational benefit, improve independent learning and clinical first aid competence, and drive the healthcare system towards safer aspects [8].

Sense of occupational benefit is a positive affective state in which a practitioner perceives actual benefits from the occupation they are working in and feels satisfied by liking the occupation they are working in and considering it valuable [11]. It is an endogenous motivational factor that positively influences their occupation. Nurses' sense of occupational benefit refers to the nursing staff experiencing the occupational to the individual gains and benefits in the process of practice [12]. Recognition of long-term practice can effectively achieve the comprehensive enhancement of individual capacity and progress, enhance the nurses' sense of occupational benefit, and primarily reduce the high turnover rate of nursing practitioners, prompting excellent nursing practitioners to remain on the job and take the initiative to participate in the organization's decision-making [12]. It can not only improve the current shortage of nursing talents and

mismatch between supply and demand, improve the quality of nursing services, and enhance the organization's competitiveness, but also stimulate the independent learning ability of nurses and further improve their first-aid ability.

Self-directed learning refers to the active learning behavior in the learning process[13]. The connotation of medicine with the progress of the times is constantly updated and expanded. Clinical nurses can only learn new theories and new technologies based on consolidating basic knowledge and better serving most patients through continuous learning. Cultivating the self-directed learning ability of clinical nurses helps change their function and improve the connotation of nursing [14]. The traditional biomedical model is gradually evolving into a biopsychosocial medical model, and psychological, environmental, and social factors are increasingly emphasized [15]. To adapt to the requirements of the development of the times and the transformation of patients' health concepts, the content of nursing work should gradually shift from simple disease care to a nursing model that integrates psychology, rehabilitation, and prevention. Nursing staff must continue to learn professional knowledge, update and broaden their knowledge to better adapt to the development and requirements of society, and better serve the general public. A study suggests that lifelong learning is crucial for nurses, emphasizing the importance of adopting a "live to learn" mindset. [16], and that learning is a task that runs through the caregiver's career. Learning is a task throughout the career of nursing staff. When they are out of school and out of the passive learning environment, the ability of self-directed learning is crucial for clinical nurses, and only through self-directed learning can nurses continue to improve their first aid ability and adapt to the changes in the medical model of the new era.

Nurses' clinical first aid ability refers to the comprehensive ability of nursing staff in clinical nursing work to acutely and timely discover different conditions of patients and their changing conditions, analyze and judge them, and make use of skillful skills and techniques to make calm, decisive and reasonable resuscitation or nursing treatment [17]. In addition, the quality of resuscitation of acute and critical patients is an important indicator of the overall level of hospitals and their ability to save lives, which is directly related to the safety of patients' lives[18]. Nurses engaged in clinical frontline work, first aid ability is a necessary and should be skillful skills[19]. In clinical work, the first aid ability of nurses in non-emergency departments is easily neglected. The results of one study showed that nurses have varying levels of clinical first aid competence, which needs to be emphasized by nursing administrators and systematically trained to improve their first aid competence [12].

In China, relevant policies mention the clinical nursing competence and professional and technical level of nurses as the leading indicators, strengthening the specialized training of clinical nurses and realizing the sustainable development of the nursing team [20]. However, a unified standard has not yet been formulated, and its influencing factors have yet to be examined. The construction and training of the nursing team should focus on first-aid competence [21]. Nurses' core competencies have a vital position in nurses' personal and professional development, and focusing on and developing nurses' first aid competencies will optimize the competency structure of nursing staff [22]. In addition, improving nurses' clinical first aid competence can enhance the overall quality of the nursing workforce, increase the social adaptability, competitiveness, and sense of self-fulfillment of nursing staff, which will facilitate personal development, stabilize the nursing workforce, and promote the sustainable development of the nursing career[23].

Regarding practical skills, reacting rapidly to emergencies without panicking is paramount. Combined with assessment proficiency, this allows for proper identification of illness severity and prioritization of care. Substantial first aid technical abilities then facilitate the provision of the appropriate treatment. Effective communication ensures that other staff are informed and families receive updates [24]. In addition, the more often they are involved in resuscitation at work, the more competent nurses are in first aid [25]. There are also a small number of studies showing that nurses' clinical first aid competence is related to nurses' sense of professional interest and self-directed learning ability[7], but there is a lack of research on the correlation between nursing staff's sense of professional interest and self-directed learning ability and clinical first aid competence due to the lack of attention paid by the researcher to the humanistic care of clinical nurses, and this is one of the problems that need to be solved in the present study.

In China, research on nurses' clinical first aid competence has focused on first aid care for psychological trauma and the development of clinical first aid care competence, while less research has been reported on the factors influencing nurses' clinical first aid competence. The current study addresses this gap by exploring correlates of first aid competence among nurses at a selected hospital in Shandong province. This study aimed to assess cardiac nurses' clinical first aid competence to provide a baseline assessment regarding cardiac nurses' awareness, emphasis, and practice of clinical first aid. Insights gained can help identify strategies for strengthening frontline cardiac emergency response capabilities in China's mixed urban-rural healthcare system.

2. Objects and Methods

2.1. Subjects

This study aimed to assess cardiac nurses' clinical first aid competence to provide a baseline assessment regarding cardiac nurses' awareness, emphasis, and practice of clinical first aid.

2.2. METHODS

2.2.1. Study Design

The study is descriptive correlational research to determine a significant relationship between the respondents' socio-demographic and work profile, sense of occupational benefit, and self-directed learning with their clinical first aid competency.

2.2.2. Samples/Participants

This study adopts a random sampling method. Since this study already has a list of all the nurses in the hospital's cardiology department and relevant information (including age, working hours, whether they have participated in emergency training, etc.), the data for this study will be obtained from this list. In sample size method, 5 to 10 times the number of independent variables were taken. In this study, there were six items of general demographic information, five dimensions of the career benefit scale, four dimensions of self-directed learning ability scale, and a total of 29 items of achievement ability scale, and the sample size was 220~440 cases. Combining inclusion and exclusion criteria, the final

sample size of this study participants will be 412. Inclusion criteria as follows: 1) nurses working in the department of Cardiology, aged 22-45 years, the age was set at less than 46 years old to minimize the interference of other factors, 2) at least one year of clinical cardiology and, 3) able to consent in the study.

2.2.3. Research Instruments

Four sets of questionnaires were used in the study.

1) A Personal Demographic profile questionnaire developed by the researchers that includes cardiology nurses' age, gender, year of work in the department of cardiology, employment form position, nurse level, education background, number of rescue efforts, whether rescue efforts have been organized, whether to participate in electrocardiogram special training, whether cardiovascular nurses, whether first aid or ICU transfer experience. To obtain information on these variables, we consulted the records.

2) The Self-Directed Learning Competency Scale consists of 34 items in 4 dimensions: self-motivation, self-control and regulation, task analysis, and self-evaluation. The scale is based on a 5-point Likert scale, with a total score of 34-170. The higher the total score, the stronger the nurses' self-learning ability; the Cronbach's coefficient of the scale is 0.944, and the Cronbach's coefficient of the dimensions is between 0.701-0.887; the overall semi-reliability is 0.894, and the semi-reliability of the dimensions is between 0.701-0.887; the overall semi-reliability is 0.894, and the semi-reliability of the dimensions is between 0.894, and the semi-reliability of the dimensions is between 0.894 and 0.894. The overall half-confidence was 0.894, and the half-confidence of each dimension ranged from 0.721 to 0.832. The S-CVI was 0.97, indicating that the scale had high reliability and validity, which could be used to objectively assess the nurses' independent learning ability.

3) The Sense of Occupational Benefits Scale was used to investigate nurses' occupational benefits, which consisted of 5 dimensions and 33 items: positive occupational perceptions (7 items), identification with family and friends (6 items), sense of belonging to the team (6 items), good nurse-patient relationship (6 items), and self-growth (8 items). The scale was scored on a 5-point Likert scale ranging from 1 to 5, with 5 points for strongly agree, 4 points for relatively agree, 3 points for uncertain, 2 points for relatively disagree, and 1 point for strongly disagree, and a total of 33-165 points for the scale, with the higher scores indicating a higher sense of occupational benefit among the respondents. The Cronbach's coefficient of the scale was tested to be 0.958, and the Cronbach's coefficient of each dimension ranged from 0.821 to 0.893, which had good reliability and validity.

4) The Clinical First Aid Competence Measurement Form for Non-Emergency Department Nurses was based on a Likert 5-point scale, with each entry option in the questionnaire being completely non-compliant, basically non-compliant, unclear, basically compliant, and completely compliant, in that order, with a score of 1 to 5. The total score ranged from 28 to 140, with higher scores representing a higher level of clinical emergency care competence among cardiology nurses. The Cronbach's alpha coefficient of the questionnaire was 0.927, the folded half reliability coefficient was 0.861, and the re-test reliability coefficient was 0.977. 50 cardiology nurses were pre-surveyed with the questionnaire on Clinical First Aid Competence of Nurses in Non-emergency Departments, and the Cronbach's alpha coefficient of the questionnaire was 0.965, and the reliability of the questionnaire was 0.960 at the re-test of 2-4 weeks. 0.960, with good reliability and validity. Nurses' career benefit scale, the Cronbach's alpha coefficient of each dimension of the scale was 0.958, and the content validity was 0.97. Nurses' independent learning ability scale had a Cronbach's alpha coefficient of 0.944, and the content validity was 0.97, which could objectively evaluate the independent learning ability of nursing staff.

2.2.3.1 Data Collection

After obtaining Ethics Review Board approval and permission to conduct the study at a selected hospital in China, data were gathered through electronic questionnaires. Respondents could access and fill out the web-based questionnaires by clicking on distributed links. Each person's questionnaire was independent and did not interfere with others. On the webpage, uniform instructions were used to explain the survey purpose to participants, who anonymously filled it out after providing informed consent. The electronic questionnaire was designed with required answers and logical data controls to ensure data quality.

2.2.3.2 Data Analysis

All data was analyzed using IBM SPSS version 29.0. Frequency distributions and percentages were used to describe the demographic profile of the respondents. Descriptive statistics, including mean, median, and standard deviations, were computed for clinical first aid competency, self-directed learning competency, and sense of occupational competence. The point-biserial correlation was utilized to study associations between demographic characteristics and clinical first-aid competence. Spearman's correlation was employed to examine the relationship between age and Clinical First Aid Competency, given that age is an ordinal variable. The Kruskal-Wallis H test was performed to determine differences in sense of occupational benefits and clinical first aid competence. Finally, Pearson's correlation coefficient was derived to assess the link between self-directed learning ability and clinical first-aid competence.

2.2.3.3 Ethical Considerations

This study was conducted with utmost attention given to research ethics and participants' rights. Before data collection, the research proposal and methodology underwent a rigorous review by the Angeles University Foundation–Ethics Review Committee. Various aspects were carefully evaluated such as the study's purpose and significance, research design and methodology, participant selection process, methods for obtaining informed consent, potential risks and benefits to participants, privacy and confidentiality measures, data management and storage procedures, and dissemination of findings. After thorough deliberation, the Ethics Review Committee approved the study and granted the research an ERC code: 2023-MAN-Student-130. This approval ensures that the study was carried out in full compliance with the university's research ethics guidelines and the national and international standards for protecting human subjects. Participation was voluntary, and informed consent was obtained from all participants. Strict measures were taken to protect participant's privacy and confidentiality throughout the research and in reporting the findings.

3. Results

3.1. Demographic Information of Respondents

A total of 412 respondents in the Cardiology department

surveyed nurse professionals [Table 1]. In terms of age distribution, the majority falls within the range of 26 to 30 years (33.98%), followed closely by those aged 20 to 25 years (28.88%). The gender distribution indicates a slightly higher representation of women (60.68%) compared to men (39.32%). Regarding the years of work in the Cardiology department, a substantial portion of respondents have been serving for 6 to 10 years (33.98%), demonstrating a moderate level of professional experience. In terms of education, the majority hold a bachelor's degree (60.19%), while a significant proportion are College graduates (35.19%). The positions held within the department are predominantly Nurse 1 (Registered Nurse) (42.48%) and Nurse 2 (Nurse Practitioner) (32.04%). The data also reflects a high level of participation in rescue efforts, with 76.7% involved 1 to 10 times. Notably, all respondents have engaged in organized rescue efforts, emphasizing a collective commitment to emergency response. Furthermore, the overwhelmingly positive response to electrodiagram special training (95.87%) and Cardiovascular nursing affiliation (100.00%) highlights a proactive approach to professional development within the department. Additionally, the majority possess First Aid or ICU transfer experience (90.78%), showing a well-rounded skill set among the surveyed Cardiology professionals.

Table 1. Demographic Information of Respondents

Characteristic	Frequency (%) n = 412
Age in years	
20 – 25	119 (28.88)
26 – 30	140 (33.98)
21 – 35	84 (20.39)
36 – 40	35 (8.5)
41 – 45	34 (8.25)
Gender	
Man	162 (39.32)
Woman	250 (60.68)
Years of work in Cardiology department	
1 – 5 years	85 (20.63)
6 – 10 years	140 (33.98)
11 – 15 years	115 (27.91)
16 years or more	72 (17.48)
Education level	
College	145 (35.19)
Bachelor's degree	248 (60.19)
Master's degree or above	19 (4.61)
Position	
Nurse 1 (Registered Nurse)	175 (42.48)
Nurse 2 (Nurse Practitioner)	132 (32.04)
Nurse 3 (Charge Nurses)	87 (21.12)
Nurse 4 (Deputy Chief Nurses and Chief Nurses)	18 (4.37)
Number of rescue efforts (overlapping categories)	
1 – 10 times	316 (76.7)
10 – 20 times	86 (20.87)
20 – 30 times	9 (2.18)
30 times or more	1 (0.24)
Whether rescue efforts have been organized [NA = 1]	
Yes	411 (99.76)
No	0 (0.00)
Whether to participate in electrodiagram special training	
Yes	395 (95.87)
No	17 (4.13)
Whether Cardiovascular nurses	
Yes	412 (100.00)
No	0 (0.00)
Whether with First Aid or ICU Transfer experience	
Yes	374 (90.78)
No	36 (8.74)

3.2. Descriptive Statistics on the Clinical First Aid Competence

On the Clinical First Aid Competence, the majority of respondents demonstrated a high level of competence in grasping the basics and principles of acute and critical care situations, as reflected in the consistently high mean scores [Table 2]. However, a noteworthy percentage expressed hesitation or lack of knowledge regarding ethical considerations and legal aspects associated with first aid.

Table 2. Descriptive Statistics on the Clinical First Aid Competence

Clinical First Aid Competence	Frequency (%)					Mean	Mode
	Not at all	Basically not	Unclear	Basically consistent	Completely Consistent		
1. I am able to grasp the basics of acute and critical care situations	8 (1.94)	11 (2.67)	12 (2.91)	241 (58.5)	140 (33.98)	4.2	4
2. I am able to grasp the principles of treatment and key points of care for acute and critical illnesses	6 (1.46)	10 (2.43)	11 (2.67)	245 (59.47)	140 (33.98)	4.22	4
3. I'm not willing to learn about the ethics, laws, etc. that may be involved in first aid	215 (52.18)	67 (16.26)	18 (4.37)	64 (15.53)	48 (11.65)	2.18	1
4. I am able to proactively round on patients and patiently listen to patients with physical or psychological complaints.	5 (1.21)	9 (2.18)	3 (0.73)	135 (32.77)	260 (63.11)	4.54	5
5. I know how to properly assess a patient's condition.	6 (1.46)	6 (1.46)	10 (2.43)	190 (46.12)	200 (48.54)	4.39	5
6. I am able to synthesize the patient's condition and anticipate possible progression based on the patient's positive signs.	6 (1.46)	9 (2.18)	33 (8.01)	205 (49.76)	159 (38.59)	4.22	4
7.I don't know the critical presentations of patients in my department and I don't know what they mean.	214 (51.94)	73 (17.72)	9 (2.18)	71 (17.23)	45 (10.92)	2.17	1
8.I'm able to recognize subtle changes in a patient's condition.	5 (1.21)	11 (2.67)	24 (5.83)	208 (50.49)	164 (39.81)	4.25	4
9.I know that when a patient's condition is critical, it's important to resuscitate the patient first.	8 (1.94)	4 (0.97)	3 (0.73)	132 (32.04)	265 (64.32)	4.56	5
10.When I make ward rounds, I pay special attention to the changes in the condition of critically ill patients	8 (1.94)	3 (0.73)	3 (0.73)	128 (31.07)	270 (65.53)	4.58	5
11.I'm the first to notify a doctor when a patient is in critical condition.	8 (1.94)	3 (0.73)	2 (0.49)	113 (27.43)	286 (69.42)	4.62	5
12.When I'm the only one on duty, I don't know how to give first aid to a patient in a critical situation.	209 (50.73)	77 (18.69)	12 (2.91)	65 (15.78)	49 (11.89)	2.19	1
13.I know the resuscitation protocols for common diseases and critical situations in my department.	5 (1.21)	4 (0.97)	11 (2.67)	168 (40.78)	224 (54.37)	4.46	5
14.I am very proficient in basic emergency nursing techniques and procedures such as CPR	4 (0.97)	4 (0.97)	13 (3.16)	166 (40.29)	225 (54.61)	4.47	5
15.I don't know how to use a defibrillator or any other common first aid device.	208 (50.49)	79 (19.17)	15 (3.64)	70 (16.99)	40 (9.71)	2.16	1
16.I am able to quickly and accurately document patient resuscitation procedures while resuscitating a patient	4 (0.97)	8 (1.94)	13 (3.16)	176 (42.72)	211 (51.21)	4.41	5
17.I don't know what first aid equipment to have on hand for first aid.	238 (57.77)	74 (17.96)	9 (2.18)	54 (13.11)	37 (8.98)	1.98	1
18.I don't know how to troubleshoot a simple malfunction in a first aid kit.	209 (50.73)	75 (18.2)	28 (6.8)	63 (15.29)	37 (8.98)	2.14	1
19.I know the names, dosages and uses of common first aid medicines	4 (0.97)	12 (2.91)	13 (3.16)	161 (39.08)	222 (53.88)	4.42	5
20.I am able to maintain a clean and safe environment when resuscitating patients.	8 (1.94)	7 (1.7)	18 (4.37)	163 (39.56)	216 (52.43)	4.39	5
21.Through the patient's nonverbal messages (body language or changes in expression), I was able to understand the patient's distress	7 (1.7)	6 (1.46)	21 (5.1)	184 (44.66)	194 (47.09)	4.34	5
22.I don't know how to comfort a patient when they suddenly need resuscitation.	204 (49.51)	93 (22.57)	13 (3.16)	63 (15.29)	39 (9.47)	2.13	1
23.I am able to look at the patient and predict whether he is at risk of suicide, self-injury, running away, or aggressive impulses based on the patient's condition and mood.	9 (2.18)	12 (2.91)	33 (8.01)	189 (45.87)	169 (41.02)	4.21	4
24.I am able to fully respect the wishes of patients and families (especially terminally ill patients)	8 (1.94)	5 (1.21)	9 (2.18)	156 (37.86)	234 (56.8)	4.46	5
25.I am not able to empathize with the emotions of the patient's family, nor do I know how to comfort the	225 (54.61)	74 (17.96)	15 (3.64)	60 (14.56)	38 (9.22)	2.06	1
26.I am able to effectively coordinate between health care, medical aspirations, and patient care to avoid some disputes	9 (2.18)	9 (2.18)	24 (5.83)	183 (44.42)	187 (45.39)	4.29	5
27.I am able to work proactively and quickly with doctors and assist other nurses with resuscitation efforts	8 (1.94)	5 (1.21)	8 (1.94)	155 (37.62)	236 (57.28)	4.47	5
28.I am able to quickly coordinate all the necessary equipment, medicines and supplies for first aid.	7 (1.7)	11 (2.67)	17 (4.13)	166 (40.29)	211 (51.21)	4.37	5

Score	Minimum	Maximum	Mean	Standard Deviation
Overall Clinical Competency Score[a]	28	140	104.86	14.54

Note: a – sum of the items
Mean Interpretation: 1.00 – 1.79 = Not at all
1.80 – 2.59 = Basically not
2.60 – 3.39 = Unclear
3.40 – 4.19 = Basically consistent
4.20 – 5.00 = Completely consistent

Additionally, some respondents indicated uncertainty or limited proficiency in specific clinical skills, such as using a

defibrillator or troubleshooting a first aid kit. Overall, the mean interpretation suggests that the respondents, on average, fall within the "Basically Consistent" range, indicating a solid foundation in clinical first aid competence. The standard deviation values highlight some variability in individual responses, emphasizing the importance of targeted training and education to address specific areas of uncertainty or lower proficiency. The overall mean score of 104.86 indicates a generally high level of self-reported clinical first aid competence among the surveyed healthcare professionals.

3.3. Descriptive Statistics on the Self-Directed Learning Competency Scale

Regarding the Self-Directed Learning Competency Scale, most respondents demonstrated a high level of competence in grasping the basics and principles of acute and critical care situations, as reflected in the consistently high mean scores. However, a noteworthy percentage expressed hesitation or need for knowledge regarding ethical considerations and legal aspects associated with first aid. Additionally, some respondents indicated uncertainty or limited proficiency in specific clinical skills, such as using a defibrillator or troubleshooting a first aid kit. Overall, the mean interpretation suggests that the respondents, on average, fall within the "Basically Consistent" range, indicating a solid foundation in clinical first aid competence. The standard deviation values highlight some variability in individual responses, emphasizing the importance of targeted training and education to address specific areas of uncertainty or lower proficiency. The overall mean score of 104.86 indicates a generally high level of self-reported clinical first aid competence among the surveyed healthcare professionals [Table 3].

Table 3. Descriptive Statistics on the Self-Directed Learning Competency Scale

Self-Directed Learning Competence	Frequency (%)					Mean	Mode
	Not at all	Basically not	Unclear	Basically consistent	Completely Consistent		
Self-Motivated Benefits							
A1. I'm sure I have a strong understanding	6 (1.46)	8 (1.94)	52 (12.62)	156 (37.86)	190 (46.12)	4.25	5
A2. No matter what my study results are, I never doubt my abilities	18 (4.37)	43 (10.44)	60 (14.56)	163 (39.56)	128 (31.07)	3.83	4
A3. I think I am capable of solving the problems I encounter in my studies	9 (2.18)	6 (1.46)	66 (16.02)	162 (39.32)	169 (41.02)	4.16	5
A4. I think I can apply what I've learned to my job	5 (1.21)	5 (1.21)	50 (12.14)	172 (41.75)	180 (43.69)	4.25	5
A5. I think learning is fun	8 (1.94)	23 (5.58)	61 (14.81)	151 (36.65)	169 (41.02)	4.09	5
A6. I am willing to participate in all kinds of learning activities (e.g., business studies, special lectures, etc.) organized in the hospital	12 (2.91)	23 (5.58)	66 (16.02)	137 (33.25)	174 (42.23)	4.06	5
A7. When new equipment is brought into the ward or new techniques or methods are introduced, I am eager to figure them out	8 (1.94)	8 (1.94)	45 (10.92)	153 (37.14)	198 (48.06)	4.27	5
A8. I can take the initiative to learn the knowledge and skills I need to acquire	5 (1.21)	6 (1.46)	51 (12.38)	150 (36.41)	200 (48.54)	4.3	5
A9. Whenever I decide to study, no matter how busy I am, I will make time to study	5 (1.21)	16 (3.88)	60 (14.56)	159 (38.59)	172 (41.75)	4.16	5
A10. Whenever I have a question at work, I always try to figure it out	5 (1.21)	4 (0.97)	58 (14.08)	161 (39.08)	184 (44.66)	4.25	5
A11. I think it's a meaningful challenge for me to learn something new	6 (1.46)	11 (2.67)	58 (14.08)	146 (35.44)	191 (46.36)	4.23	5
A12. I often choose journals or books to read that have guided me in my nursing work, even if this takes a lot of time and effort	7 (1.7)	23 (5.58)	69 (16.75)	141 (34.22)	172 (41.75)	4.09	5
A13. I have a sense of satisfaction after acquiring a certain amount of knowledge	4 (0.97)	3 (0.73)	57 (13.83)	137 (33.25)	211 (51.21)	4.33	5
A14. Learning new things has helped me in my job	4 (0.97)	3 (0.73)	49 (11.89)	142 (34.47)	214 (51.94)	4.36	5
Mission Analysis							
B1. Prior to learning, I can identify my learning needs and set learning objectives	5 (1.21)	10 (2.43)	64 (15.53)	158 (38.35)	175 (42.48)	4.18	5
B2. I usually set more specific learning objectives	3 (0.73)	18 (4.37)	69 (16.75)	157 (38.11)	165 (40.05)	4.12	5
B3. While setting distant learning goals, I will set immediate goals	5 (1.21)	15 (3.64)	72 (17.48)	156 (37.86)	164 (39.81)	4.11	5
B4. I generally set learning goals that are at a high level and achievable with my efforts	4 (0.97)	26 (6.31)	75 (18.2)	148 (35.92)	159 (38.59)	4.05	5
B5. I know common learning methods	5 (1.21)	11 (2.67)	74 (17.96)	162 (39.32)	160 (38.83)	4.12	4
B6. I can choose effective learning strategies correctly according to my situation	5 (1.21)	11 (2.67)	70 (16.99)	158 (38.35)	168 (40.78)	4.15	5

Self-monitoring and regulation							
C1. I will create a realistic study plan for my situation	5 (1.21)	10 (2.43)	64 (15.53)	160 (38.83)	173 (41.99)	4.18	5
C2. I will ask for help when I am having trouble with my studies	3 (0.73)	5 (1.21)	62 (15.05)	165 (40.05)	177 (42.96)	4.23	5
C3. I am aware of access to a variety of information resources (e.g., nursing journals, databases, web, etc.)	5 (1.21)	9 (2.18)	67 (16.26)	158 (38.35)	173 (41.99)	4.18	5
C4. I can effectively use a variety of methods of accessing information resources to find the learning materials I need.	4 (0.97)	8 (1.94)	69 (16.75)	160 (38.83)	171 (41.5)	4.18	5
C5. I can analyze and synthesize the information collected into a valuable report	4 (0.97)	16 (3.88)	78 (18.93)	153 (37.14)	161 (39.08)	4.09	5
C6. I can persevere no matter what difficulties I encounter in my studies	4 (0.97)	16 (3.88)	76 (18.45)	146 (35.44)	170 (41.26)	4.12	5
C7. When wants to learn, I can get into the groove quickly	2 (0.49)	12 (2.91)	71 (17.23)	158 (38.35)	169 (41.02)	4.17	5
C8. I can always check my learning situation and find out the problems in time	5 (1.21)	21 (5.1)	65 (15.78)	155 (37.62)	166 (40.29)	4.11	5
C9. Study methods were not appropriate at the time, I can adjust in time	4 (0.97)	14 (3.4)	83 (20.15)	148 (35.92)	163 (39.56)	4.1	5
C10. I can adjust my study program in a timely manner according to the actual situation	4 (0.97)	13 (3.16)	72 (17.48)	153 (37.14)	170 (41.26)	4.15	5
Self-evaluation							
D1. After the learning activity, I will review the whole process in my mind	6 (1.46)	13 (3.16)	69 (16.75)	150 (36.41)	174 (42.23)	4.15	5
D2. After the study, I often summarize the lessons learned	5 (1.21)	11 (2.67)	68 (16.5)	159 (38.59)	169 (41.02)	4.16	5
D3. I am clear about how this learning will guide future learning	4 (0.97)	8 (1.94)	73 (17.72)	150 (36.41)	177 (42.96)	4.18	5
D4. Learning is poor because of my limited ability	44 (10.68)	70 (16.99)	80 (19.42)	108 (26.21)	110 (26.7)	3.41	5

Score	Minimum	Maximum	Mean	Standard Deviation
Overall Score[a]	34	170	140.76	25.74
Self-motivated benefits	14	70	58.62	10.69
Mission analysis	6	30	24.74	5.05
Self-monitoring and regulation	10	50	41.50	8.02
Self-evaluation	4	20	15.90	3.22

Note: a – sum of all the items (from A1 to D4)
Mean Interpretation: 1.00 – 1.79 = Not at all
1.80 – 2.59 = Basically not
2.60 – 3.39 = Unclear
3.40 – 4.19 = Basically consistent
4.20 – 5.00 = Completely consistent

3.4. Descriptive Statistics of Sense of Occupational Benefits

In terms of Sense of Occupational Benefits, a notable proportion of respondents (13.59%) acknowledge the career opportunities and job stability within the nursing profession. Additionally, a significant majority (28.88%) express pride in the positive public image associated with nursing, emphasizing its life-saving role. The stability and security of income are highlighted by 18.2% of respondents, while 27.43% find fulfillment in contributing to social value through their nursing careers.

Regarding nurse-patient relationships, a substantial number (34.71%) derive encouragement from patients' understanding and satisfaction, and 15.29% express a sense of accomplishment when patients recover under their care. Recognition by family and friends emerges as a prominent theme, with nearly half of the respondents (46.84%) indicating understanding and support from their families. A considerable percentage (20.39%) emphasizes the empowerment of self-care and healthcare access for family and friends.

The importance of team belonging is evident, with a significant majority of respondents (26.46%) highlighting trust and support from colleagues. Positive dynamics within work teams are emphasized by 43.93% of respondents. Finally, self-growth is a prevalent theme, with nurses attributing personal development to their profession. This includes enhanced tolerance, maturity, conscientiousness, and improved psychological resilience [Table 4].

Table 4. Descriptive Statistics of Sense of Occupational Benefits

Characteristic	Frequency (%) n = 412
Positive career perceptions	
Career opportunities and job stability for nurses	56 (13.59)
Nursing profession gives people a good image of "white angel" and "saving lives", which makes me feel proud	119 (28.88)
The nursing profession has given me a stable and secure income	75 (18.2)
The nursing profession enables me to make use of my strengths and realize my social value	113 (27.43)
I think it's good to be a nurse	49 (11.89)
Good nurse-patient relationship	
Patients' understanding and satisfaction with my work is an encouragement to me	143 (34.71)
I feel happy to be able to help patients at work	61 (14.81)
The praise or gratitude I receive from patients and their families after successfully saving a patient's life enhances my sense of professional value	105 (25.49)
It's comforting to know that my patients understand what I'm doing	23 (5.58)
Seeing patients suffering from illnesses and pains makes me cherish life and be contented with everything	17 (4.13)
The patient got better/recovered under my care, which gave me a sense of accomplishment	63 (15.29)
Recognition by family and friends	
My family understands the characteristics of my work and the value of society, and is more concerned about and takes care of me	193 (46.84)
Family and friends are very supportive of my work because they benefit from my career	15 (3.64)
The nursing profession has empowered me to provide self-care and preventive health care	46 (11.17)
I can provide professional guidance to my family members when they are sick (including seeking medical treatment, medication, etc.)	51 (12.38)
A career that enables me to provide easy access to healthcare resources for my family and friends	11 (2.67)
I can provide specialized care for my family when they are ill	12 (2.91)
I spread health care knowledge to my family members and help them develop good living habits and correct health concepts	84 (20.39)
Team belonging	
I can get trust and support from my colleagues or subordinates at work	109 (26.46)
Mutual interaction with colleagues increases my confidence and strength	64 (15.53)
My work team helps each other and gets along well, which makes me feel warm and fuzzy	181 (43.93)
I am able to receive guidance and recognition from my leaders in my work	9 (2.18)
The work organization can provide me with more opportunities for professional learning and make me feel valued and nurtured	49 (11.89)
Self-growth	
Being a nurse has made me broad-minded and more tolerant of others.	114 (27.67)
My professional mindset is maturing as my professional competence continues to grow	61 (14.81)
The nursing profession has made me more conscientious and responsible.	90 (21.84)
The nursing profession has encouraged me to work with a wide variety of people, which has enhanced my interpersonal skills	33 (8.01)
I often encountered unexpected situations at work, which enhanced my level of psychological quality (e.g., coordination, resilience, etc.)	59 (14.32)
Being able to communicate well and get along well with patients at work is a pleasure for me	55 (13.35)

3.5. Correlation of Variables with Clinical First Aid Competency

Regarding the Correlation of Variables with Clinical First Aid Competence [Table 5], the coefficients and p-values indicate the strength and significance of these associations. Notably, age shows a very weak positive and significant relationship with competence (rho=0.123, p-value=0.012), suggesting a gradual increase with advancing age. The demographic factors of years of work in the cardiology department and participation in electrodiagram special training exhibit moderate positive associations (rho=0.142, p-value=0.004) with competence. Self-directed learning, self-motivation, self-control, task analysis, and self-evaluation demonstrate strong positive correlations, highlighting the crucial role of individual attributes in enhancing clinical

competence.

The sense of occupational benefits was assessed through the Kruskal-Wallis test. The test compares the distributions of competence scores across different categories of the sense of occupational benefits variables. The variables "Recognition by family and friends" and "Self-growth" demonstrate statistically significant differences in their distributions of clinical competence scores. This suggests that healthcare professionals who perceive higher levels of recognition by family and friends, a stronger sense of team belonging, and personal growth also tend to exhibit elevated levels of clinical emergency care competence.

Table 5. Correlation of Variables with Clinical First Aid Competency

Variable	Coefficient	p-value
Demographic Profile		
Age	0.123[a]	0.012*
Gender	0.071[b]	0.150
Years of work in Cardiology department	0.142[b]	0.004*
Education level	0.047[b]	0.336
Position	4.563[c]	0.207
Number of rescue efforts	0.063[b]	0.205
Whether rescue efforts have been organized	-	-
Whether to participate in electrodiagram special training	-0.083[b]	0.093
Whether Cardiovascular nurses	-	-
Whether with First Aid or ICU Transfer experience	0.057[b]	0.251
Self-directed Learning	0.492[d]	<0.001*
Self-motivation	0.488[d]	<0.001*
Self-control and regulation	0.461[d]	<0.001*
Task analysis	0.446[d]	<0.001*
Self-evaluation	0.477[d]	<0.001*
Sense of Occupational Benefits		
Positive career perceptions	4.858[c]	0.302
Good nurse-patient relationship	9.921[c]	0.078
Recognition by family and friends	32.819[c]	<0.001*
Team belonging	9.038[c]	0.061
Self-growth	23.637[c]	<0.001*

*Note: * - significant at 5% level of significance*
a – Spearman Correlation
b – Point Biserial Correlation
c – Kruskal-Wallis Test
d – Pearson Correlation
Spearman Correlation Interpretation: 0.01 – 0.19 = Very weak (positive/negative) relationship
0.20 – 0.29 = Weak (positive/negative) relationship
0.30 – 0.39 = Moderate (positive/negative) relationship
0.40 – 0.69 = Strong (positive/negative) relationship
0.70 – 1.00 = Very strong (positive/negative) relationship
Pearson Correlation Interpretation: 0.01 – 0.19 = Very weak (positive/negative) correlation
0.20 – 0.39 = Weak (positive/negative) correlation
0.40 – 0.59 = Moderate (positive/negative) correlation
0.60 – 0.79 = Strong (positive/negative) correlation
0.80 – 1.00 = Very strong (positive/negative) correlation

Source: https://www.researchgate.net/figure/Interpretation-Table-of-Spearman-Rank-Order-Correlation-Coefficients_ tbl1_ 267339455

4. Discussions

The study highlights that clinical first-aid competency is a complex construct influenced by multiple factors. Age, specific professional experience, and training are crucial components in acquiring competence, while individual attributes and positive perceptions of occupational benefits also play a significant role. Recognizing and understanding these factors can contribute to effective training programs and strategies for enhancing clinical first-aid competence.

Age and clinical first aid competency revealed a very weak positive relationship, implying that emergency care competency increases gradually as age increases. This could

be attributed to accumulated experience and knowledge over time, which enhances their skills and ability to handle emergencies effectively. However, the relationship is described as weak, which implies that age alone is not a strong influence on emergency care competency. Conversely, perceived competencies increased over time following the implementation of a strengths-based nursing approach, with age and length of employment hindering improvement in specific competencies [26]. This finding suggests that while age may influence clinical competency, it is not the sole determining factor, such as the years of work experience in the cardiology department, which shows a moderate association. This indicates that as years of experience increase, the ability to manage cardiovascular emergencies improves, demonstrating experience's critical role in this field. This finding supports a recent study that experience plays a crucial role in developing competency among nurse professionals [27]. With each passing year, nurses can refine their skills and knowledge, leading to improved patient outcomes in treating cardiovascular emergencies.

Self-directed learning has a strong positive association with clinical first aid competency, including self-motivation, self-control, task analysis, and self-evaluation under self-directed learning, which has a strong positive relationship, highlighting the crucial role of individual attributes in enhancing clinical competence. This is further supported by the positive correlation between clinical competency and self-directed learning in nursing students [28]. A similar study suggests that individuals who engage in self-directed learning may possess a unique set of attributes that enable them to more effectively develop and apply their clinical skills [29], leading to enhanced competence in providing first aid among cardiology nurse. Self-directed learning has been identified as a potential way to enhance clinical skills and increase motivation to pursue training. This emphasizes the significance of continuous learning and development in healthcare. It is crucial to emphasize the importance of ongoing education and training for cardiology nurses to ensure they possess the requisite knowledge and skills to deliver quality care. This initiative is critical to ensure their readiness to navigate cardiovascular emergencies' intricate and time-critical nature. Healthcare organizations can contribute to this by facilitating opportunities for ongoing professional development and motivating nurses to pursue continuing education and training in cardiology. Such initiatives not only optimize patient outcomes but also contribute to an overall enhancement in the quality of healthcare provision.

In terms of sense of occupational benefits, the findings that "Recognition by family and friends" and "Self-growth" yielded statistically significant differences indicate nurses who feel more recognized and personally fulfilled in their roles tend to demonstrate higher emergency skills proficiency. This makes intuitive sense - when nurses feel respected and find meaning/learning through their work, they are likely more engaged, motivated to develop expertise, and confident in high-pressure clinical situations [30], such as working in a cardiac unit. Interestingly, "sense of team belonging" did not demonstrate the same statistical significance. Perhaps clinical first aid competence is a more individual metric than communal affiliation, or it could be that teams already provide a baseline level of belongingness, so small variances had less impact on scores compared to the more personally defined variables tested.

Self-growth is a prevalent theme, with nurses attributing personal development to their profession [30]. The findings showed a strong link between nurses in the cardiac department's perceptions of self-growth in their occupational roles and their levels of demonstrated clinical first-aid competence. This proves that self-growth satisfies our innate human needs for learning, challenging oneself, and achieving mastery in one's field over time[30;31]. Those who see their roles as a journey of self-improvement rather than a stagnant routine will be more compelled to engage in ongoing education and skill enhancement. They want to test themselves against ever-elevating bars of ability. Fostering an environment and attitude where growth is expected and enabled seems key to maintaining excellence in emergency healthcare. Competence correlates with continually expanding one's knowledge and talents to one's highest potential.

The finding that healthcare workers' perceptions of recognition from family and friends correlated positively with higher levels of assessed clinical competence in emergency first aid is quite revealing. It suggests that social support plays a meaningful role in empowering nurses to perform at their best. Recognition from family is highly valued among Chinese nurses because of the culture's emphasis on collectivism and group harmony. In Chinese society, one's actions are a reflection of their entire family network [32;33]. When a nurse's loved ones take pride in caring for patients, it brings honor and respect to the whole family unit. Their competence and skills are a source of collective achievement rather than just individual accomplishment [32]. When loved ones express pride and appreciation for the life-saving work that healthcare professionals do, it seems to boost a practitioner's sense of purpose and motivation. Feeling respected by one's close social circle likely alleviates some of the daily stresses of the job, leaving more bandwidth for focusing mental acuity on patient care tasks [12]. This finding underscores the importance of bolstering morale outside the clinical setting as much as within it. Healthcare organizations would do well to not only implement programs that foster team cohesion and appreciation between colleagues but also encourage health care's loved ones to express gratitude for staff's life-saving roles. Multi-pronged support seems critical to enabling top-level emergency care competence.

4.1. Implications for Nursing Practice

Adopting a multifaceted approach addressing individual, educational, and organizational factors can continuously enhance cardiology nurses' clinical first-aid competence. This supports the delivery of quality, safe patient care during medical emergencies. Regular assessments of nurses' clinical first aid competence help identify strengths and weaknesses, leading to tailored development plans. Just-in-time training programs cover essential skills like CPR and emergency medication administration. Simulation-based training provides a safe environment for practicing skills. Online modules and case studies enable self-directed learning. In-service programs incorporate ethics and legal topics to ensure an understanding of duty of care, consent, and negligence issues. Rotating high-performing nurses as preceptors transfers experience and motivates all nurses. Recognizing top performers through awards, certifications, or expanded responsibilities boosts motivation. Adequate staffing, especially during high-acuity shifts, reduces burnout and supports competence.

4.2. Limitations and Recommendations for Nursing Research

This study only measured the participants' clinical first-aid competence through questionnaires and scales, and no fieldwork was conducted. Therefore, a broader and more objective measurement tool and fieldwork should be used, which would be helpful for further research. Second, this study included only one hospital in Shandong province, China, which may have potential selection bias, and the results cannot be generalized to the entire Chinese nursing team. Therefore, an increase in the study sample size and a nationwide study targeting nursing staff in different regions would be beneficial. Finally, cardiology nurses' emergency competence is multifaceted and complex. Further prospective longitudinal studies are necessary to understand their implications in detail.

5. Conclusion

This study highlights the multilevel nature of clinical first-aid competence. While age, specific professional experience, and training contribute to the development of competence, individual attributes and positive perceptions of occupational benefits also play a key role. Future research could explore other factors that influence clinical competence and consider interventions to enhance these factors to continually improve first-aid practice in healthcare settings. Therefore, emphasis should be placed on training cardiology nurses in first-aid skills and developing in-service education programs to improve their clinical first-aid competence. In addition, training of nurses in ethical considerations and legal aspects of first aid should be enhanced to ensure a comprehensive understanding of the responsibilities and ethical considerations in the provision of clinical first aid and to improve their ability to cope in emergencies.

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