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Developing Portuguese Nurses' Skills in Inter-Hospital Transportation of Critically Ill Patients: Quality Improvement Project

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Abstract: Self-awareness among nurses involved in inter-hospital transport is crucial, as recognizing their limitations helps them improve their skills and make better use of tools that support inter-hospital transport, ultimately resulting in more efficient care. **Objectives:** To evaluate nurses' self-perceived competences in an emergency department in Portugal regarding the inter-hospital transport of critically ill patients, implement interventions to facilitate the development of nurses' competences, and evaluate the interventions carried out. **Methods:** A quality improvement project was conducted in three phases. The first phase involved a diagnostic study, the second phase focused on implementing interventions to improve nurses' performance, and the third phase consisted of a descriptive study to evaluate the interventions implemented. **Results:** A total of 40 nurses participated in the study, with an average age of 39 (39.10 ± 11.83) years old, an average of 16 (16.09 ± 11.06) years of professional nursing experience, and an average of 11 (10.94 ± 10.91) years of experience in inter-hospital transport of critically ill patients. The nursing records during inter-hospital transport received the lowest self-perception rating, prompting the implementation of an intervention in the form of a nursing records checklist. **Conclusions:** The interventions implemented led to a change in self-perceptions of competence. Nurses' self-awareness of their competences and limitations is crucial to deliver safe and quality nursing care. Providing opportunities for reflection on skills is therefore crucial to improving care delivery and encouraging the development of professional skills, attitudes, and behaviors.

Keywords: nursing skills professional competence; critically ill patients; inter-hospital transport

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1. Introduction

Inter-hospital transport (IHT) involves transferring a patient from one healthcare facility to another in order to provide a higher level of care, conduct additional diagnostic or therapeutic tests, or facilitate hospitalization in the desired geographical area for further treatment [1].

The IHT of critically ill patients (CIPs) is characterized by inducing stress, instability, anxiety, and vulnerability for all professionals involved [2], particularly when transfers are made without consistent handoff reports, prompt identification of needs, easy access to admitting clinicians, or timely, adequate evaluation by clinicians [3].

Therefore, the professionals on IHT teams, particularly nurses, must be capable of managing stress and ensuring that all necessary care for the CIP is delivered safely.

Nurses, as part of the transport team, must acquire the necessary competences (including skills, attitudes, and behaviors) to ensure the safety of everyone involved in IHT [1]. The concept of competence is defined as a sphere of action that describes the knowledge, skills, and operations that must be performed and applied in different work situations and that demonstrate competent professional performance [4]. Professional competence is also considered a key element in the quality and safety of the nursing care provision [5].

1.1. Theoretical Framework

In 1982, Benner developed a theory based on the Dreyfus Model of Skill Acquisition, proposing that individuals acquire new skills and knowledge as they progress from novice to expert. This model explains how nurses develop their nursing knowledge, skills, clinical competence, and understanding of patient care through both formal theoretical training and experiential learning, advancing from novice to expert stages [6,7].

Thus, in the IHT context, there is a set of competences that nurses need to obtain, including specific training in Advanced Life Support (ALS), CIP transport, and Advanced Trauma Support (ATS) [1].

The competences must be developed to increase effectiveness in the most frequently performed interventions, including the use of transport monitors, reading and programming monitors, handling intubation equipment, selecting the appropriate oxygen source, preparing electric aspirators and suction devices, managing chest drains, using equipment for puncturing and maintaining intravenous infusions with syringes and volumetric pumps powered by batteries, administering fluid therapy with pressure sleeves, managing medications, operating a ventilator, and ensuring communication between teams [8,9].

Nurses must be prepared to detect and respond effectively in order to anticipate complications and act appropriately when they arise. This requires competences in administering emergency therapy, managing mechanical ventilation, and providing quick, precise responses in emergencies such as airway compromise, loss of vascular access, hypertensive pneumothorax, and other causes of clinical instability [9]. Reducing incidents is crucial to nurses' performance, and it is well-established that incidents are more frequently identified at the destination healthcare facility than during transport, often worsening the consequences [10,11]. Therefore, developing and recognizing the necessary nurse competences is crucial to ensuring the safe execution of IHT in order to prevent common incidents and enable the team to respond effectively to unforeseen situations [12]. For instance, one key recommendation to reduce incidents before an IHT is conducting a risk assessment to identify the most qualified nurses to manage the process—an aspect that should be prioritized by nurse managers [13].

Other aspects of nurses' competences that are considered key factors in reducing incidents include familiarization with guidelines and therapeutic protocols [1] and having dedicated, well-trained, and well-prepared teams [12]. The greatest advantage of working with dedicated and specialized teams includes their familiarity with the procedures to be followed and with the equipment used during the transport process [12]. Studies show that these teams are associated with a lower hospital mortality rate (4.6%) within 24 h of transport, compared to non-specialized teams (6.6%). Additionally, the mortality rate in the emergency department is lower for specialized teams (1.7%) compared to non-specialized teams (4.1%), highlighting the significance of the quality of care during the transport process [14].

1.2. Research Problem

The process of self-awareness for nurses involved in IHT is essential, as acknowledging their limitations allows them to develop their competences and adopt or adjust tools that enhance the transport process, ultimately leading to more effective care.

A quality improvement project was therefore planned to reduce the occurrence of such events.

Thus, the aims of this study were:

- To evaluate the nurses' self-perceived competences in an emergency department in Portugal regarding the IHT of CIPs.
- To implement interventions to facilitate the development of nurses' competences.
- To evaluate the interventions carried out.

2. Results

The 40 nurses who took part in the study were mostly female (82.5%). They had an average age of 39.10 ± 11.83 years, 16.09 ± 11.06 years of professional experience as nurses, and an average of 10.94 ± 10.91 years of experience in HICP (Table 1).

Table 1. Sociodemographic data.

Variable				**n**	**%**
Gender	Female			33	82.5
	Male			7	17.5
Academic degree	Bachelor's degree			32	80.0
	Master's degree			8	20.0
Nursing Speciality	Yes			15	37.5
	No			25	62.5
Speciality Area Detained	Medical–surgical nursing			10	25.0
	Maternal and Obstetric Health Nursing			2	5.0
	Rehabilitation Nursing			2	5.0
	Other			1	2.5
	M	s	Max	Min	
Age	39.10	11.83	62	23	
Length of professional experience (years)	16.09	11.06	41	1	
Transport experience (years)	10.94	10.91	41	0	

Legend: n—absolute frequency; %—percentage; M—mean; Max—maximum value; Min—minimum value; s—standard deviation.

Only 8 nurses (20%) had a master's degree in nursing, although 15 nurses (37.5%) were specialist nurses. The majority (25%) were specialist nurses in medical–surgical nursing (Table 1).

Sperman's correlation test was used to check the correlation between the age variable and the variable time of experience in IHT with the self-perception of each skill and evaluation criterion necessary for IHT transportation. Given the extent of the data, the results that showed statistically significant moderate, strong, and very strong correlations are presented. Table 2 summarizes the results of the correlation tests for the two questionnaires.

Table 2. Nurses' self-perception by age and experience in intra-hospital transport.

	Age		Years of Experience in IHT of CIPs	
	1st Q	2nd Q	1st Q	2nd Q
Assessment Criteria	**r**	**r**	**r**	**r**
"1.1—Applies a set of specific skills required for IHT of CIP"	0.67	*	0.63	*
"1.1.1—Demonstrates knowledge and skills in Advanced Life Support"	*	0.51	*	*
"1.1.2—Demonstrates knowledge and skills in Advanced Trauma Support"	0.52	0.51	0.50	0.50
"1.2—Uses previously acquired experience to optimise the results of IHT the CIP"	0.59	*	0.56	*
"1.2.3—Demonstrates the ability to use transport equipment"	*	*	0.51	*
"1.2.5—Demonstrates knowledge of the transport ambulance and the transport environment"	0.53	*	0.50	*
"3.1.1—Demonstrates knowledge of the safety principles of patient transport"	0.52	*	*	*
"4.1.1—Demonstrates the ability to care for CIP in a transport environment, away from the safety and controlled environment of the hospital unit"	0.53	*	0.65	*
"4.1.4—Carries out specific highly complex interventions/procedures necessary to maintain the stability of the CIP"	*	*	0.51	*
"4.1.5—Carries out appropriate monitoring of the CIP during transport"	*	*	0.50	*
"4.1.6—Demonstrates knowledge and skills to use the portable ventilator"	*	0.51	0.58	0.54
"4.1.7—Demonstrates knowledge of the administration of therapeutics that may be required during transport (including sedatives, muscle relaxants, inotropes and vasopressors)"	0.53	*	0.62	*
"4.1.8—Recognises the seriousness or otherwise of a situation when dealing with a critically ill patient. Prevents worsening of the CIP's clinical condition during transport"	0.53	*	0.58	*
"4.1.9—Demonstrates the ability to recognise sudden changes in the CIP clinical condition"	0.51	0.51	0.56	*
"4.1.10—Demonstrates the skills to respond to sudden changes in the CIP clinical condition"	*	*	0.54	*
"5.1.3—Supports the other members of the transport team, particularly younger and inexperienced members"	0.60	*	0.67	*
"7.1—Evidences a good level of performance when faced with the need to act in a short space of time"	0.60	*	0.62	*
"7.1.1—Assesses the CIP quickly and appropriately"	0.51	0.53	0.59	*
"7.1.2—Handles emergency situations with ease"	0.60	0.52	0.62	0.54
"7.1.3—Ensures effective and sensible decision-making in a short space of time"	0.57	*	0.56	*
"7.2—Responds appropriately to unforeseen events that may arise during the IHT of the CIP"	0.56	*	0.55	*
"7.2.1—Responds quickly and appropriately to the demands of the situation"	*	0.57	*	0.54
"7.2.2—Demonstrates the ability to deal with any occurrence that may arise"	*	*	0.52	*

Legend: 1st Q—1st questionnaire; 2nd Q—2nd questionnaire; r—test value; *—not statistically significant.

In both questionnaires, there were moderate positive correlations in some competences and evaluation criteria. Self-perception of the item evaluated varied according to age. It was observed that the older the nurse and the more experience they had in conducting IHT of CIPs, the higher their self-perception of acquiring the skill or meeting the assessment criteria. It was also found that the items with the lowest moderate correlation were: "demonstrates knowledge and skills in advanced trauma support" and "performs adequate monitoring of the CIP during transport". The items with the highest moderate correlation are "applies a range of specific knowledge necessary for the demands of IHT in CIP" and "supports the other members of the transport team, particularly younger and inexperienced members".

The Wilcoxon test was also used to verify the differences in the nurses' responses between the two moments (questionnaire 1 and questionnaire 2). Table 3 shows which competences and evaluation criteria were perceived by the nurses as different between the two moments.

Table 3. Significant differences in the group between the two evaluation moments.

	1st Q–2nd Q			
Assessment Criteria	**w**	***p***	**M (1st)**	**M (2nd)**
"Carries out specific training in the transport of CIP"	−2.20	0.03	1.85	2.58
"Uses checklists to confirm multiple factors that interfere with the final outcome of the transport"	−2.78	0.01	2.68	2.08
"Performs appropriate monitoring of the HCP during transport"	−2.00	0.05	1.63	1.43
"Makes necessary records during transport"	−4.05	0.00	2.95	2.05
"Demonstrates understanding of ethical issues related to the management of information requested by the CIP and family"	−2.32	0.02	1.78	1.55

Legend: 1st Q—1st questionnaire; 2nd Q—2nd questionnaire; M(1st)—Mean of the 1st questionnaire; M(2nd)—Mean of the 2nd questionnaire; *p*—significance value; w—Wilcoxon test.

The item "makes necessary records during transportation" was the item with the most statistically significant difference value between the questionnaires. The item evaluated with the smallest difference between the two questionnaires, but still with statistically significant values, was "performs adequate monitoring of the CIP during transport".

3. Discussion

This study made it possible to profile the sociodemographic and professional characteristics of the 40 nurses who made up part of the transport team of a general emergency department of a hospital in the central region of Portugal. Most of the nurses who took part in the study were female (82.5%), in line with the data published by the Portuguese Nurses Order [15]. Nursing has historically, socially, and culturally been a female-dominated profession [16]. In the past, caring for sick people was seen as an extension of domestic tasks and was therefore traditionally associated with female responsibility [16]. However, the scenario has changed over the years, as there has been an increasing number of men entering the profession.

As far as professional category is concerned, 37.5% of the nurses held a specialist nurse title, and 62.5% held a generalist title (62.5%). These data are corroborated by the information available from Portugal [17], which identifies that 5.905 (70.72%) nurses did not have any nursing specialty in 2023. In this study, it should be noted that only 25% of the

sample had a specialty in medical–surgical nursing, which is lower than the recommended number to guarantee safe nursing care [18]. According to these recommendations, the emergency services should have at least 50% of specialist nurses in medical–surgical nursing. Although the number of specialist medical–surgical nurses has increased in recent years in the service under study, there is still a significant shortage. This may be due to the fact that nurses in Portugal are required to make a significant financial investment (around 10% per year) of their salaries (EUR 17,329 per year) and must also sacrifice personal time for the educational process, which lasts a year and a half.

In terms of age, the nurses had an average age of 39.10 ± 11.83 years, ranging from 23 to 62 years old. These figures align with the statistics presented [15], which show that the highest number of nurses fall within the 36-to-40-year age group. These data indicate that the team is heterogeneous, with some members nearing retirement age in Portugal (66 years and 3 months [16]), while others are just beginning their careers.

Regarding professional experience, the average length of service as a nurse is 16.09 ± 11.06 years (with a minimum of 1 year and a maximum of 41 years), and the average length of experience in performing IHT of CIPs is 10.94 ± 10.91 years (with a minimum of 0 years and a maximum of 41 years). Recent evidence does not provide specific guidelines regarding the number of years of experience required to acquire and develop competencies in IHT of CIPs. However, some authors highlight three essential areas to consider: nurse training, early intervention, and the nurse's role in managing care before, during, and after transport [19,20]. It is also well-established that there is a strong connection between specialized training and professional experience gained through practice, which enhances the effectiveness of responses to IHT demands and improves the quality of care provided [17,21]. The experience and training of the professionals involved in IHT, along with the standardization of procedures and clinical monitoring equipment, help prevent and minimize incidents, ultimately ensuring higher quality and safer care [10].

It was found that nurses began performing IHT of CIPs in the same year they started working. This factor could lead to increasing emotional distress by nurses and may also contribute to a higher frequency of incidents [2]. This result also contradicts the recommendations, which state that CIP transport should not be carried out by professionals with limited experience, insufficient knowledge of the equipment, or inadequate training [1]. The transport of CIPs should be carried out by a specialist nurse in medical–surgical nursing of CIPs, with differentiated competence in out-of-hospital emergencies [1,21,22]. In this sense, it is important to have specialized nurses with advanced skills who are responsible for managing and coordinating the IHT of CIPs, based on assessment and clinical evolution, with a view to the early detection and resolution of adverse events during transport [23].

Nurses with more experience become increasingly aware of safety concerns and the importance of preventing adverse events. In contrast, less experienced professionals, due to their unfamiliarity with the process, may accept the risks associated with transport. They tend to focus not only on CIPs but also on self-education through trial and error, learning from failure [2].

A moderate positive correlation was observed between the nurses' age, years of experience in IHT, and their self-perception of proficiency in mastering the efficient skills and assessment criteria necessary for the process. These results suggest that in the sample studied, older nurses and the most experienced nurses in IHT are more likely to self-perceive their mastery of competences related to acquiring knowledge and being able to mobilize and demonstrate skills, many of which have been acquired through experience. This idea is supported by Benner's theory [6,7], which argues that nurses develop skills throughout their professional experience, starting at the novice level and progressing to the expert level [7]. The development of competencies in action is, therefore, recognized as

a crucial moment for acquiring and refining the skills, attitudes, and behaviors deemed effective during the IHT process.

The analysis of the results also reveals that the skills mentioned above are more pronounced in older individuals and those with more years of experience in IHT of CIPs during the first assessment (1st questionnaire) compared to the second assessment (2nd questionnaire). It is believed that, during the study period, a process of self-reflection may have occurred among nurses regarding their competence self-awareness. As a result, only seven of the 23 skills presented were self-identified as more developed by nurses with higher age and more experience in IHT, as seen in the second assessment. This could be explained by the natural process of self-awareness fostered through (self)reflection on action, which may have led nurses to recognize their mastery of competencies in IHT. These results may, therefore, suggest positive outcomes driven by the interventions implemented in phase II of the project.

Society and clinical teams expect and demand higher-quality care from experienced nurses in IHT (experts). However, it is important to note that being an expert (someone with extensive experience) does not necessarily mean being more competent. Therefore, combining experience with training is essential for developing the necessary competencies for nurses in IHT. Technical quality is closely related to both training and clinical experience, which are crucial aspects in promoting and ensuring safety during CIP transport [1]. Professionals who provide daily care for CIPs must undergo specific and ongoing training in transport and care for CIPs, ensuring they are qualified to perform these tasks effectively [1,12].

It should also be noted that in the second questionnaire, older nurses self-reported greater mastery of ALS skills, which were more developed compared to younger nurses. Mastery in Basic Life Support (BLS) and ALS skills is crucial for nurses to predict and address unexpected events that may arise during safety IHT [1,17]. Additionally, advanced trauma support training and a course in CIP transport would be desirable [1], reducing distress and anxiety when nurses perceive themselves as incapable or unprepared to perform the procedure.

In the first moment of assessment, older nurses and more experienced nurses in IHT self-perceive greater mastery of the "capacity to care for CIP in a transport environment, away from the safety and controlled environment of the hospital unit". The challenges of providing CIP care outside the hospital environment are varied, including the difficulty of collecting reliable data during IHT. This is why more sophisticated equipment is often chosen to assist in the process [2].

The evidence recognizes that novice nurses are more prone to facing incidents related to lack of poor pre-transport preparation, such as lack of oxygen and low battery capacity of equipment [2]. These two incidents can be avoided or reduced with the adoption of a pre-transport checklist, being an integral part of a CIP safety system [24].

The application of checklists as a reference document to be applied in all IHTs allows all procedures to be anticipated, verified, and guaranteed [1,5]. The use of checklists reduces the occurrence of adverse events by 25%, improving the efficiency of transport and the safety of CIPs [25]. The use of checklists also promotes evidence-based care, standardization of care, improved communication, provision of appropriate equipment, and a reduction in errors due to forgetfulness. To this end, it is recommended that they should be short, concise, objective, and organized, and contain assessment elements such as necessary equipment, transport organization, stages of preparation of the mechanical ventilator, patient assessment (assessments of respiratory, hemodynamic, gastrointestinal, genitourinary, comfort, and safety components) [24,26]. Based on this evidence, a checklist was developed for use in emergency departments. The checklists should be brief, concise,

objective, and well-organized, containing essential assessment elements such as necessary equipment, transport organization, mechanical ventilator preparation, and patient assessments (including respiratory, hemodynamic, gastrointestinal, genitourinary, and safety components) [24,26].

The checklist implemented in the study included general information about the transport team, the departure date and time of the originating service, and the arrival time at the destination service. It also captured details of the originating and destination services, the reason for the transfer, and a reference family member with contact information. The checklist includes a section for the CIP's personal history and allergies. Following this, records are made using the ABCDE systematized assessment, with short entries indicating what is relevant for the transported patient. Additionally, it provides space to record the medications administered, including administration characteristics and doses, as well as a section to monitor vital signs and other key parameters essential for tracking the CIP's condition.

The checklist also included elements for equipment verification and monitoring of vital parameters, areas that, according to evidence, are linked to a reduction in incidents, decreasing their occurrence by 25% [25,27]. It is well-established that the use of checklists promotes evidence-based care, standardizes procedures, enhances communication, ensures the use of appropriate equipment, reduces errors, and minimizes the consequences of forgetfulness [26].

The checklist, however, will only yield the benefits described if nurses consistently complete the records. It is only with this data that an effective assessment can be conducted, such as through an audit process, serving as a valuable tool for quality monitoring [1]. Adequate monitoring of the CIP during transport was one of the evaluation criteria that showed higher statistical significance between the two assessment moments. During CIP transport, nurses must be well-versed in the three levels of monitoring: mandatory monitoring, strongly recommended monitoring, and ideal monitoring. Mandatory monitoring includes continuous monitoring with periodic recording of respiratory rate, fraction of inspired oxygen, pulse oximetry, continuous electrocardiogram (ECG), heart rate, invasive blood pressure, and airway pressure (for mechanically ventilated patients) [1].

To develop other competences identified as needing intervention in phase I, the evidence suggests implementing educational and training programs, although this was not carried out or assessed in this project. However, the importance of scheduling an educational program that incorporates simulation-based training, focusing on the most common incidents reported, was discussed with the nurse manager.

The most commonly reported incidents in evidence include orotracheal extubating, displacement of intravenous catheters, improper oxygen administration, mechanical ventilator malfunction, dislodgement of a chest tube, and battery failure of the equipment used [1]. Simulation-based training in pedagogic strategies is recommended to develop and prepare professionals to deal with and give the best responses in critical situations. It can be employed across multiple medical specialties and is essential for modeling critical events [28].

In our study, it is important to emphasize the criterion related to the ethical responsibilities involved in managing the information requested by the CIP and their family, ensuring that all conscious patients and their informal caregivers/family are fully informed and integrated throughout every stage of the CIP transport process [1]. By recording these data in the implemented checklist, all information becomes easily accessible, allowing nurses to ensure it is properly managed with greater efficiency without neglecting their rights.

3.1. Limitations and Contributions to Clinical Practice in the Context Under Study

As limitations of this study, the small sample size and the inherent constraints of the data collection instrument used are noted. Additionally, as the principal researcher was a member of the team, this may have facilitated an understanding of nurses' challenges in clinical practice but could also have influenced their responses and participation. Despite this, the quality improvement project encouraged the team to reflect on their actions and identify and promote best practices. A notable limitation is the timeline, which did not allow for the development and implementation of other key interventions, such as simulation-based training, ongoing educational programs for nurses, and the creation of a performance flowchart. These interventions are planned for the second cycle of the Deming model, which is currently being planned.

For future interventions, it is recommended to conduct a follow-up consultation with the team to assess their level of engagement and satisfaction with the newly implemented checklist. Additionally, planning clinical audits will be important to verify whether nurses are consistently completing their documentation and to assess whether there has been a significant reduction in adverse situations following the implementation of the nurse support instrument in IHTs. Comparing incidents before and after the interventions will be crucial to evaluating the effectiveness of the checklist.

3.2. Contributions to Clinical Practice

This study's main outcome is the recognition that implementing strategies to address a commonly identified problem, such as IHT preparation, led to changes in nurses' self-perception of their competences regarding it. Self-awareness is crucial for emergency nurses, whose attitudes, behaviors, and decisions directly impact the lives and survival of CIPs. The main contribution of the project is that improved IHT preparation can enhance nurses' perceptions of their own competences, which is vital for ensuring safety and delivering quality care.

Quality improvement projects serve as a valuable methodology in clinical practice by addressing key issues and root causes [29] while helping teams become more self-aware of areas that require improvement. The ability to incorporate new, evidence-based strategies is essential for continuous improvement. The process is easy to implement and ensures long-term sustainability by engaging all team members. This methodology fosters proactive teamwork to resolve practical issues identified within the team, enabling them to apply new knowledge to clinical practice.

4. Materials and Methods

A quality improvement project developed follows the methodology of the Portuguese Nurses Order recommendation for this type of project, using a version of the Deming Model as a reference [29]. This report describes the first cycle of Plan-Do-Check-Act (PDCA) from the quality improvement project.

It was implemented in three phases. The first phase involved a diagnostic study conducted in June 2023, which assisted in the planning process.

In the second phase, interventions were implemented to improve nurses' performance (July 2023 to April 2024). The intervention deemed most crucial was the creation and implementation of a checklist to assist nurses in the preparation, monitoring, and execution of the transport process. This intervention was identified in evidence as capable of improving the problems identified [13] in phase 1.

In the third phase, a descriptive study was carried out in May 2024.

The SQUIRE 2.0 (Standards for Quality Improvement Reporting Excellence) rules were followed when writing this article (Appendix A).

4.1. Sample

Nurses from the emergency department of a hospital in the central region of Portugal were invited to take part in the study. It is a service categorized as a medical–surgical emergency [14], characterized in Portugal as a second level of reception in emergency situations, providing differentiated support to the network of basic emergency services and, when more differentiated care or support from non-existent specialties is required, referral to a multipurpose emergency service [18].

There were 49 nurses working in this service, but only 44 were considered for the study, as they were required to perform IHT. Responses from nurses who completed only one of the questionnaires for phase I or phase III were also excluded (n = 4). As a result, 40 nurses participated, making the sample non-probabilistic and based on convenience.

4.2. Data Collection Instruments

Two electronic questionnaires were developed and made available through the Google Forms® platform in phase I and phase III of the study.

The first questionnaire was divided into two parts. In the first part, questions were asked to characterize the nurses' sociodemographic and professional backgrounds, e.g., gender (female, male, prefer not to answer); age (years); professional experience as nurses (years); professional experience as nurses in IHT for CIPs (years); academic background (bachelor's, master's, doctorate); professional category (specialist or non-specialist); and area of specialty (Medical–Surgical Nursing, Rehabilitation Nursing, Maternal and Obstetric Health Nursing, or Other). In the second part, the Competence Profile scale developed by Gonçalves [17] was applied. This scale was built by the author in 2017, and the content was validated by a Delphi panel. This scale has 69 items, allowing four levels of response: (1) Strongly agree; (2) Agree; (3) Disagree; and (4) Strongly disagree.

The scale allows for the assessment of nine competency factors. The nine factors are: (i) training and experience, (ii) planning and organization, (iii) safety provision, (iv) care provision, (v) teamwork and cooperation, (vi) communication, (vii) management of critical events, (viii) continuous quality improvement, and (ix) ethical commitment.

Those factors were defined by grouping similarities, identifying the domains of competence in accordance with the recommendations and articles found in the literature, and also with the Thematic Notebook of the Professional Development Model and the Regulation of the Specific Competences of the Nurse Specialist in CIP Nursing [17].

The second questionnaire (phase III) was constructed using only the Competence Profile Scale [17] used in the first phase. Before the questionnaire application was conducted, a pre-test was carried out with 10 specialist nurses from other emergency departments with experience (more than two years) in IHT. No changes were suggested to the questionnaires.

Internal consistency values were also calculated for the current sample using Cronbach's alpha for the total scale and each scale factor. There were significant values of internal consistency ($\propto^1 = 0.98$; $\propto^2 = 0.98$, for the total scale in phase I and phase III). Acceptable results were also found for each scale factor: factor (i) "training and experience" ($\propto^1 = 0.94$; $\propto^2 = 0.93$); factor (ii) "planning and organization" ($\propto^1 = 0.68$; $\propto^2 = 0.82$); factor (iii) "safety provision" ($\propto^1 = 0.92$; $\propto^2 = 0.90$); factor (iv) "care provision" ($\propto^1 = 0.94$; $\propto^2 = 0.95$); factor (v) "teamwork and cooperation" ($\propto^1 = 0.85$; $\propto^2 = 0.88$); factor (vi) "communication" ($\propto^1 = 0.75$; $\propto^2 = 0.78$); factor (vii) "management of critical events" ($\propto^1 = 0.95$; $\propto^2 = 0.97$); factor (viii) "continuous quality improvement" ($\propto^1 = 0.79$; $\propto^2 = 0.88$); and factor (ix) "ethical commitment" ($\propto^1 = 0.88$; $\propto^2 = 0.91$).

Since the goal was to compare responses from the questionnaires at two different points in time (phase I and phase III), a code was used by nurses. This code enabled the

pairing of responses by inputting the last four digits of their personal phone number and their favorite color (as indicated in question 2 of the questionnaire).

4.3. Statistical Analysis

Data analysis was performed using SPSS® (Statistical Package for the Social Sciences) version 29.0. A significance level of 95% and an error margin of 0.05 were applied. Non-parametric tests were used due to the non-normal distribution of variables (verified via the Shapiro–Wilk test). Spearman's correlation test analyzed relationships between variables, while the Wilcoxon test assessed differences across two evaluation points within the same sample.

4.4. Ethical Procedures

At the outset, the author who created the Nurse Competence Profile scale for IHT in CIP granted permission for the use of the questionnaire developed in the context of the study [17]. The study adhered to the ethical principles outlined in the Declaration of Helsinki. It received approval from one Ethics Committee (approval code: CiC2Fs 09.OBS.23), and informed consent was obtained from all participants. Throughout the process, participant anonymity and confidentiality were ensured in accordance with the ethical principles and guidelines of the General Data Protection Regulation.

5. Conclusions

This study provided insights into the self-perception of nurses from an emergency medical–surgical department regarding their competencies in IHT. Understanding the nurses' self-awareness allowed for the planning of targeted interventions to enhance the development of critical competences, particularly those with lower self-reported mastery.

The results indicate that the interventions led to changes in the self-perception of skills, suggesting their effectiveness in driving improvements in practice.

It is important to emphasize that healthcare institutions providing IHT services should prioritize the training and professional development of their staff. Investment in tools and resources to improve healthcare, as well as the conditions and preparation of the professionals—namely nurses—is essential for ensuring high-quality care during transport.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) with protocol code CiC2Fs 09.OBS.23 and date of approval 29 May 2023, for studies involving humans.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in this article; further inquiries can be directed to the corresponding authors, including the checklist implemented.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. SQUIRE 2.0—Revised Standards for Quality Improvement Reporting Excellence.

	Text Section and Item Name	Section or Item Description	Page No.
	Title and Abstract		
1.	Title	Indicate that the manuscript concerns an initiative to improve healthcare (broadly defined to include the quality, safety, effectiveness, patient-centeredness, timeliness, cost, efficiency, and equity of healthcare)	1
2.	Abstract	a. Provide adequate information to aid in searching and indexing b. Summarize all key information from various sections of the text using the abstract format of the intended publication or a structured summary such as background, local problem, methods, interventions, results, and conclusions	1
	Introduction	Why did you start?	
3.	Problem Description	Nature and significance of the local problem	1–3
4.	Available knowledge	Summary of what is currently known about the problem, including relevant previous studies	1–3
5.	Rationale	Informal or formal frameworks, models, concepts, and/or theories used to explain the problem, any reasons or assumptions that were used to develop the intervention(s), and reasons why the intervention(s) was expected to work	2–3
6.	Specific aims	Purpose of the project and of this report	3
	Methods	What did you do?	
7.	Context	Contextual elements considered important at the outset of introducing the intervention(s)	3
8.	Intervention	a. Description of the intervention(s) in sufficient detail that others could reproduce it b. Specifics of the team involved in the work	3–4
9.	Study of the Intervention (s)	a. Approach chosen for assessing the impact of the intervention(s) b. Approach used to establish whether the observed outcomes were due to the intervention(s)	4
10.	Measures	a. Measures chosen for studying processes and outcomes of the intervention(s), including rationale for choosing them, their operational definitions, and their validity and reliability5 b. Description of the approach to the ongoing assessment of contextual elements that contributed to the success, failure, efficiency, and cost c. Methods employed for assessing completeness and accuracy of data	3–4
11.	Analysis	a. Qualitative and quantitative methods used to draw inferences from the data b. Methods for understanding variation within the data, including the effects of time as a variable	4
12.	Ethical Considerations	Ethical aspects of implementing and studying the intervention(s) and how they were addressed, including, but not limited to, formal ethics review and potential conflict(s) of interest	4
	Results	What did you find?	
13.	Results	a. Initial steps of the intervention(s) and their evolution over time (e.g.,time-line diagram, flow chart, or table), including modifications made to the intervention during the project b. Details of the process measures and outcome c. Contextual elements that interacted with the intervention(s) d. Observed associations between outcomes, interventions, and relevant contextual elements e. Unintended consequences such as unexpected benefits, problems, failures, or costs associated with the intervention(s). f. Details about missing data	5–7
	Discussion	What does it mean?	
14.	Interpretation	a. Nature of the association between the intervention(s) and the outcomes b. Comparison of results with findings from other publications c. Impact of the project on people and systems d. Reasons for any differences between observed and anticipated outcomes, including the influence of context e. Costs and strategic trade-offs, including opportunity costs	7–11

Table A1. *Cont.*

	Text Section and Item Name	Section or Item Description	Page No.
	Discussion	What does it mean?	
15.	Limitations	a. Limits to the generalizability of the work b. Factors that might have limited internal validity, such as confounding, bias, or imprecision in the design, methods, measurement, or analysis. c. Efforts made to minimize and adjust for limitations	10
16.	Conclusions	a. Usefulness of the work b. Sustainability c. Potential for spread to other contexts d. Implications for practice and for further study in the field e. Suggested next steps	11

Available at https://www.equator-network.org/reporting-guidelines/squire/ (accessed on 8 February 2025).

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