Cogitare Enfermagem

ORIGINAL ARTICLE

Impact of a training activity on emergency nurses' knowledge about Sepsis Fast Track (*Via Verde Sepse*)*

HIGHLIGHTS

1. A lack of specific training on Sepsis Fast Track was identified.
2. A large portion of the sample was unaware of the current definition of sepsis.
3. Continuing education promotes care based on scientific evidence.
4. Training activities have a positive impact on the level of knowledge.

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ABSTRACT

Objective: To analyze the impact of a training activity on the development of nurses' knowledge about Sepsis Fast Track (Via Verde Sepse) in the approach to critically ill patients. **Method:** This was a quasi-experimental, within-group, quantitative study conducted with 61 nurses from an emergency service in northern Portugal. A questionnaire was administered before and after a training activity between November 2024 and February 2025. Efficacy was analyzed using a paired t-test. **Results:** The mean score increased from 61.27 ± 17.18 to 85.76 ± 11.36 after the intervention ($t = -11.242$; $p < 0.001$), respectively. A reduction in very poor/poor knowledge levels and an increase in the very good level were observed, which went from 1.6% to 42.6% of participants. **Conclusion:** The training activity had a positive and statistically significant impact by strengthening nurses' knowledge and promoting the early recognition of sepsis.

DESCRIPTORS: Knowledge; Education, Continuing; Emergency Service, Hospital; Nurses; Sepsis.

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INTRODUCTION

Sepsis is defined by the World Health Organization as a response of the human body to any infectious process that, if not identified and treated early, can progress to septic shock, multiple organ failure, or death[1]. Its definition has undergone several changes over time. Despite these multiple changes, sepsis continues to be considered a medical emergency that requires early recognition and treatment[2]. This rapid recognition and implementation of appropriate treatment measures improves the outcomes obtained[2].

Sepsis is, therefore, a potentially fatal disease caused by the body's response to an uncontrolled infection, accounting for more than half of all hospital deaths, and representing a burden on healthcare systems[1].

According to data from a study on the incidence and mortality of sepsis, in 2017 there were 48.9 million cases of sepsis and 11 million deaths related to this condition worldwide, accounting for 20% of all global deaths[3]. This increase in the number of cases is related to the aging population, increased life expectancy, the growing prevalence of immunosuppression due to disease or iatrogenic causes, and the increasing use of invasive techniques[4].

In Portugal, fast track was implemented as a strategy to improve the quality of care and ensure rapid access and immediate treatment in previously identified situations, based on the most recent scientific recommendations, aiming to reduce morbidity and mortality associated with time-dependent conditions. The best known are Stroke Fast Track, Coronary Fast Track, and Sepsis Fast Track (SFT - *Via Verde Sepse*)[5].

In the Portuguese context, the Directorate General of Health (DGH) published, in 2010, Standard 01/2010 for the implementation of SFT in all emergency services (ESs) (in Portugal, designated as urgency services), similar to other fast tracks already existing in Portugal, such as those for stroke and acute myocardial infarction[4].

The Surviving Sepsis Campaign (SSC) regularly updates guidelines that support evidence-based clinical practice, and the DGH has aligned its standards with the SSC recommendations[2]. It is known that rapid recognition of sepsis and implementation of recommended therapeutic measures significantly improve clinical outcomes[2]. The adult SFT guidelines were updated in 2016 and published in 2017, establishing criteria for assessing presumed infection and systemic inflammation, criteria for basic and advanced therapy, and a description of ES organization for the rapid and immediate care of suspected sepsis cases[6].

SFT Standard 010/2016, published by the DGH, is organized into four distinct stages[6]: Stage 1 - immediate identification of a suspected SFT case at the time of triage or by outpatient teams. At this stage, patients must simultaneously present with an altered ear temperature (< 35°C or > 38°C), a presumptive infection criterion, and at least one criterion for systemic inflammation; Stage 2 - identification of a confirmed case of SFT by the sepsis team in ESs or by the physician from the outpatient teams. For confirmation at this stage, it is necessary to associate one or more severity criteria and confirm the absence of exclusion criteria; Stage 3 - compliance with the basic assessment and treatment algorithm; Stage 4 - compliance with advanced assessment and treatment algorithm.

For the effective implementation of SFT, it is essential that nurses possess the expertise and ability to identify signs and symptoms of sepsis from the triage stage, as these can be subtle and hinder early recognition of the disease. This immediate recognition is considered essential for the successful treatment of sepsis[7].

Rapid sepsis diagnosis has a greater impact on outcomes than the therapeutic methods themselves, reinforcing the importance of the nurses' role in triage and activating SFT[8]. Other studies in the field support the relevance of training healthcare teams, indicating that adequate training and the implementation of specific protocols improve the prognosis of patients with sepsis[9].

Continuing education involves a set of educational activities aimed at updating individuals' knowledge, promoting their development and effective participation in the institution's daily life[10]. Updating knowledge and practices influences learning and promotes educational changes, leading workers to recognize the need to readjust and reorient their work processes, which supports and justifies the implementation of a continuing education strategy[11]. From 1984 onwards, the paradigm was reconfigured, emphasizing continuing education in health and valuing work as a space for knowledge production, based on critical reflection and the leading role of professionals in improving care[12]. A qualitative meta-synthesis of literature[13], which included 25 articles, showed that continuous professional development is essential for nurses' lifelong learning, being fundamental for updating knowledge and improving skills, as well as contributing to raising the standards of care provided to patients.

Through the training of ES nurses for the effective implementation of the specific SFT protocol, with the implementation of a training activity, the aim is to improve the care provided to critically ill patients (CIPs) with sepsis seeking ES care. The main objective of this study is to analyze the impact of a training activity on the development of nurses' knowledge about SFT in CIP management.

METHOD

This is a quasi-experimental study with a within-group design, since assessments were carried out before and after a training activity, allowing each participant to serve as their own control[14].

The target population consisted of all nurses (n=88) working in the medical-surgical department of a Local Health Unit located in northern Portugal. Participant selection was based on non-probabilistic convenience sampling, with sample composition conditioned by contextual and operational factors[15]. Nurses currently working and directly providing care in the ES were included. Those on vacation, leave, or temporary incapacity, and those who did not participate in the training activity on SFT or did not respond to the diagnostic questionnaire, were excluded. Based on invitations and the availability of volunteer nurses, a final sample of 61 nurses was obtained. A diagnostic questionnaire was administered to them before SFT training activity to assess their prior knowledge. Three weeks after the intervention, the same questionnaire was administered again to assess the impact of the activity and the retention of acquired knowledge. All participants responded again.

To assess nurses' knowledge of SFT in the approach to CIPs, a self-administered questionnaire, previously developed[16], was used, the final version of which resulted from a pre-test conducted by the respective author, involving a sample of 20 nurses from an adult ES with similar characteristics. The questionnaire consisted of three parts, relating to sociodemographic characteristics, professional characteristics, and an assessment of knowledge about the stages of SFT (comprising 16 multiple-choice questions). Each correct answer received 6.25 points, and incorrect or blank answers received zero, resulting in an overall score between 0 and 100. The classification of the level of knowledge followed criteria previously described in the literature, with

categorization into: very poor (0-24); poor (25-49); reasonable (50-74); good (75-89); very good (90-100)[17]. The use of this instrument was previously authorized by the author.

Data collection was conducted in person between November 2024 and February 2025 by delivering questionnaires to nurses in the nursing department who met the inclusion criteria and agreed to participate voluntarily, according to the availability of the researcher and participants.

The training activity was conducted in sessions distributed to cover the entire sample, on pre-scheduled dates. Based on prior planning, an expository and dialogical methodology was used, employing a PowerPoint presentation, in which epidemiological data on sepsis and the definition of the concept were initially addressed. Following this, SFT and the main aspects of SFT Standard 010/2016, issued by the DGH, were presented[6]. The discussion session provided an opportunity to share experiences and opinions on the topic.

Data analysis was performed using IBM® SPSS® Statistics version 28.0.1. A descriptive statistical analysis of sociodemographic and professional/academic variables, as well as responses to the questionnaire administered before and after the training intervention, was conducted. For categorical variables, absolute and relative frequencies were calculated. For the total questionnaire scores, the mean, standard deviation, as well as the minimum and maximum observed values were determined. Inferential analysis aimed to assess the effectiveness of the training activity by comparing the mean scores before and after the intervention, using paired-samples t-test and adopting a significance level of 0.05. The use of a t-test implied the prior verification of assumptions, including the assessment of normality using the Shapiro-Wilk test ($W=0.960$; $p=0.128$).

The study project was previously submitted for approval to the Research Ethics Committee and the institution's board of directors and received a favorable opinion for its implementation (Opinion 64/2024). Participation was voluntary, with prior clarification of the study's objectives and the data collection instrument, in compliance with ethical principles. Informed consent was provided to all participants. Each questionnaire received an alphanumeric code to ensure matching of responses before and after the training intervention on SFT. Anonymity and confidentiality of data were guaranteed throughout the process.

RESULTS

A sample of 61 nurses was obtained, of which 42 (68.9%) were female and 47 (77%) were under 40 years of age. Concerning education, 51 (83.6%) have a bachelor's degree in nursing and 32 (52.5%) have graduate degrees. Only 17 (27.9%) have a specialization, with medical-surgical nursing/CIP being the predominant one. Most of the sample attended the Manchester Triage System course, and 14 nurses (23.0%) reported prior training in SFT. The corresponding data are in Table 1. The mean number of years of professional experience is 10.8 years (SD = 6.4) and, in ES, 6.5 years (SD = 6.2).

The data obtained show a significant improvement in the level of knowledge of nurses after the training intervention on SFT. A significant increase was observed in the proportion of correct answers in all dimensions assessed, as can be seen in Table 2.

Table 1. Sociodemographic and professional characterization of the sample included in the study. Northern Region, Portugal, 2025

SOCIODEMOGRAPHIC VARIABLES		Absolute frequency (n)	Relative frequency (%)
Sex	Female	42	68.9
	Male	19	31.1
Age	Up to 30 years	18	29.5
	31-40 years	29	47.5
	41-50 years	14	23.0
Academic qualifications	Undergraduate degree	51	83.6
	Master's degree	10	16.4
Professional experience in pre-hospital emergency care	Yes	25	41.0
	No	36	59.0
Graduate studies	Yes	32	52.5
	No	29	47.5
Graduate studies	Out-of-hospital emergency/ trauma/disaster/emergency/ critically ill person	28	87.6
	Anesthesiology nursing/ management/wound care/ clinical supervision	4	12.4
Specialty	Yes	14	27.9
	No	44	72.1
Specialty	Medical-surgical nursing/ critical care for individuals	16	94.1
	Community health nursing	1	5.9
Manchester Triage Course	Yes	51	83.6
	No	10	16.4
Training in SFT	Yes	14	23.0
	No	47	77.0
Training in SFT	On-the-job training	8	57.1
	Conferences/seminars	6	42.9
Total		**61**	**100.0**

Legend: n = 61; SFT - Sepsis Fast Track; n - sample; % - percentage.
Source: The authors (2025).

Table 2. Correct responses from participants to the questionnaire before and after the training activity. Northern Region, Portugal, 2025

(continue)

Questions	Before training n (%)	After training n (%)
1. The most accurate definition of sepsis corresponds to which of the following statements: Dysregulated response of the organism to infection	18 (29.5)	43 (70.5)
2. The criteria for presumed infection in SFT always include a change in temperature: Temperature <35°C or > 38°C	29 (47.5)	57 (93.4)

Table 2. Correct responses from participants to the questionnaire before and after the training activity. Northern Region, Portugal, 2025

(conclusion)

Questions	Before training n (%)	After training n (%)
3. A change in temperature and at least one of the following symptoms constitute presumptive criteria for infection in SFT: All of the above	28 (45.9)	48 (78.7)
4. A change in temperature and at least one of the following symptoms constitute presumptive criteria for infection in SFT: A and B are correct	18 (29.5)	40 (65.6)
5. Identifying a suspected case of SFT requires at least one criterion for presumed infection and one criterion for systemic inflammation. Which of the following are criteria for systemic inflammation? Confusion and/or altered state of consciousness	19 (31.1)	41 (68.9)
6. One of the severity criteria in SFT is: Hyperlactacidemia >2 mmol/L	54 (88.5)	61 (100.0)
7. SFT severity criteria are: All of the above	51 (83.6)	58 (96.7)
8. SFT exclusion criteria include: All of the above	42 (68.9)	59 (96.7)
9. SFT exclusion criteria include: All of the above	38 (62.3)	49 (82.0)
10. The algorithm for managing SFT involves the early administration of: Crystalloid bolus 20-30ml/kg	30 (49.2)	53 (86.9)
11. The algorithm for action in SFT assumes in the first 15 minutes: All of the above	45 (73.8)	58 (95.1)
12. The algorithm for action in SFT assumes in the first 15 minutes: None of the above	27 (44.3)	48 (78.7)
13. The algorithm for action in SFT assumes in the first 60 minutes: A and B are correct	57 (93.4)	58 (95.1)
14. STF activation considers: A and B are correct	43 (70.5)	53 (86.9)
15. Following the basic assessment and therapeutic algorithm, the advanced therapeutic assessment algorithm is introduced, assuming that: A and B are correct	48 (78.7)	52 (85.2)
16. After fluid resuscitation, the vasopressor of choice is: Noradrenaline	51 (83.6)	56 (91.8)

Legend: n - sample; % - percentage; SFT - Sepsis Fast Track.

Source: The authors (2025).

The assessment of nurses' knowledge before and after the training intervention revealed positive progress. Initially, a significant portion of the sample presented knowledge levels classified as very poor, poor, or reasonable. After the training, it was observed that no participant remained at the very poor or poor levels, while there was a significant increase in the number of nurses classified as good and very good (Table 3).

Table 3. Level of knowledge about Sepsis Fast Track. Northern Region, Portugal, 2025

Level of knowledge	Before training n (%)	After training n (%)
Very poor	2 (3.3)	0 (0.0)
Poor	8 (13.1)	0 (0.0)
Reasonable	34 (55.7)	9 (14.8)
Good	16 (26.2)	26 (42.6)
Very good	1 (1.6)	26 (42.6)

Legend: n =61.
Source: The authors (2025).

The intervention's effectiveness was statistically validated by comparing the mean scores obtained in the questionnaires before and after the training. A significant increase in the mean score on the overall questionnaire was observed from 61.27 (SD = 17.18) to 85.76 (SD = 11.36), a statistically significant difference ($p < 0.001$), as shown in Table 4. These results demonstrate a positive impact of the training on professionals' knowledge regarding SFT.

Table 4. Minimum, maximum, and mean scores before and after the training activity, with statistical significance for the overall questionnaire score. Northern Region, Portugal, 2025

"*Conhecimentos dos enfermeiros sobre a Via Verde Sepse*" Questionnaire	Before training	After training	T-test value	p-value
Minimum and maximum overall score	6.25-93.75	50.00-100.0	-	-
Mean overall score (with standard deviation)	61.27 (17.18)	85.76 (11.36)	-11.242	<0.001

Source: The authors (2025).

DISCUSSION

Sepsis is a major global public health problem, associated with high morbidity and mortality rates and a significant impact on healthcare systems. It is recognized as a time-dependent condition, in which delays in identification and initiation of treatment worsen clinical outcomes[1,3]. In this context, the implementation of structured protocols, such as SFT, is recommended as a strategy to standardize procedures and reduce the time until critical interventions are carried out[4,6].

This study demonstrated that training on SFT significantly improved nurses' knowledge across all dimensions assessed.

The sample profile, with a predominance of females, aligns with the scenario reported by the Order of Nurses in Portugal[18]. The low proportion of nurses with training in SFT is consistent with other findings[16,19]. The literature highlights the importance of ongoing training for nursing teams, given their crucial role in the early identification of sepsis, and associates a lack of knowledge with late sepsis diagnosis[20].

Prior to the intervention, significant gaps were identified in the understanding of the current definition of sepsis, with some professionals still associating the concept with the idea of generalized infection. This finding is consistent with studies that highlight difficulties in incorporating the definitions of Sepsis-3, proposed in the Third International Consensus Definition for Sepsis and Septic Shock[21], among nursing

professionals[22-23]. The significant improvement observed after the training activity reinforces that targeted educational interventions are effective in reducing the gap between scientific consensus and clinical practice.

Regarding clinical criteria, the initial difficulty in recognizing hypothermia as a warning sign is consistent with the literature, which describes an underestimation of this finding, despite its association with greater severity[24]. The confusion observed between criteria for presumed infection and systemic inflammation has been described in other studies[22-23], reflecting weaknesses in the understanding of the initial phases of the septic process.

On the other hand, the high level of prior knowledge about hyperlactacidemia as a severity criterion and about norepinephrine as the vasopressor of choice is aligned with the SSC[2] recommendations and current clinical evidence[8,25]. Nevertheless, the training activity contributed to the consolidation of this content, reducing the variability of responses and strengthening the standardization of behaviors.

One of the most relevant findings concerns the temporal organization of interventions, a central aspect in the care of septic patients. It is noteworthy that the study results directly align with DGH guidelines for SFT, which establishes timeframes for critical interventions, including the administration of crystalloids, oxygen therapy, and arterial blood gas analysis with lactate measurement within the first 15 minutes, as well as blood culture collection, microbiological testing, laboratory assessment to identify the infectious focus, and antibiotic administration within 60 minutes[4,6].

Emphasizing the importance of administering antibiotics within the first hour is particularly relevant, as the literature demonstrates that delays in antibiotic therapy are associated with a significant increase in mortality in septic patients[2,9,26]. Thus, adequate knowledge of these goals represents not only theoretical mastery of protocol, but an essential component of patient safety and quality of care. Incorporating critical windows into clinical reasoning helps reduce variability in treatment and align clinical practice with evidence-based recommendations, a central objective of sepsis bundles and rapid response systems for clinical deterioration[2,6].

The advancement in recognizing the appropriate volume of crystalloids reinforces the importance of protocol-based education. Training programs are associated with a reduction in therapeutic errors and greater adherence to evidence-based recommendations[26]. Similarly, the increased emphasis on recording the activation time of SFT reflects a broader understanding of time-oriented care, an essential component in sepsis bundles and healthcare quality monitoring systems[2,9].

Several studies point to a limited level of knowledge about sepsis among nurses[16,22-23,27]. The overall improvement in scores, with the elimination of the very poor and poor knowledge categories, confirms the effectiveness of the educational methodology adopted. Continuing and permanent education is described as an essential strategy for improving healthcare practices[11-12]. Studies that have used educational interventions in sepsis also demonstrate a positive impact on patient knowledge and safety[28-29].

Thus, the results reinforce that strengthening knowledge about SFT contributes to reducing the gap between theoretical knowledge and timely clinical action, promoting faster and more coordinated interventions, a crucial aspect in a condition where minutes directly influence outcomes[1,3].

Limitations remain, such as the small sample size, non-probabilistic nature, and performance in a single ES, in addition to a possible memory effect resulting from

the reapplication of the instrument in a short interval. Nevertheless, the findings offer relevant data to support the systematic inclusion of sepsis content in institutional continuing education programs, a strategy considered essential for improving clinical outcomes[20,29].

CONCLUSION

The main knowledge gaps among nurses, identified prior to the implementation of the training activity on SFT, focused on the definition of sepsis and the recognition of criteria for presumed infection and systemic inflammation, which are fundamental for early detection and effective action when faced with a patient with sepsis seeking urgency services.

The training intervention for urgency service nurses proved effective and promoted a significant improvement in their knowledge levels. After its implementation, most nurses in the sample showed a good or very good level of knowledge.

These results corroborate the scientific evidence that highlights the importance of continuing education in strengthening clinical skills in the context of an ES, particularly in the early identification and appropriate management of sepsis in patients seeking emergency care.

The structured integration of theoretical and practical content on SFT into the training plans of nursing staff in ESs is recommended as a way to promote safer, more informed, and more effective clinical practice.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Basto RP, Magalhães CP.** Drafting the work or revising it critically for important intellectual content - **Basto RP, Magalhães CP.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Basto RP, Magalhães CP.** All authors approved the final version of the text.

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