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Effectiveness of Nurse-Initiated Sono Triage on Nurses' Competence and Triage Rates in a Tertiary Care Emergency Department in New Delhi, India

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ABSTRACT

Background: Point of Care Ultrasound is used in patient care, trauma, education, training, war, and disaster settings. Triage is a dynamic process, and in a busy high-volume department with limited information from patients, the emergency physician (EP) must triage the patient within a short period and with a high stress level; these factors increase the chance of error by the emergency physician. The nurses are also expected to do the triaging. It is imperative to do task shifting for the nurses; they can be empowered to conduct Sono triage to reduce the rate of under-triaging for better health outcomes with early identification and prompt management. **Objectives:** The pilot study assessed the effectiveness of Nurse-Initiated Sono triage (NISt) in enhancing nurses' knowledge and skills while improving patient triage accuracy in the emergency department (ED). **Methods:** A quasi-experimental pretest-post-test design was implemented at Tertiary care centre, New Delhi, India. A total of 15 nurses and 150 patients participated in the study. Data were analyzed using descriptive and inferential statistics. **Results:** Pre-intervention assessments showed limited knowledge and no prior training in extended focused assessment with sonography in trauma (e-FAST). Post-intervention findings demonstrated a significant increase in nurses' knowledge (mean score improvement from 17.3 to 20.9, $p = 0.006$) and skill acquisition. Also, 3% of patients initially triaged to the yellow zone were re-triaged to the red zone. Most nurses (mean acceptability score = 4.5) supported implementing NISt as a nurse-led initiative. **Conclusion:** The results suggest that nurse-initiated Sono triage can improve early identification of critically ill patients, facilitating timely interventions.

Keywords: e-FAST; Emergency Department; Nurse-Initiated Sono Triage; Nurse Training; Patient Triage; Trauma Triage Protocol

INTRODUCTION

The essential elements of an excellent emergency care system are outlined in the World Health Organization's Emergency Care Systems Framework. According to this guideline, triage is one of the primary duties of emergency departments (Mitchell *et al.*, 2024). Triage is a critical process in emergency medicine to categorize patients based on injury severity. Traditional trauma triage protocols (TTP) rely on clinical assessments, which may lead to under-triaging, especially in elderly populations (Jenpanitpong *et al.*, 2025). Nurse-Initiated Sono Triage (NISt) is a point-of-care ultrasound that is done by the nurses to diagnose if there is any free fluid in different parts of the body, like the cardiac, left and right upper quadrants, and pelvis. It also incorporates e-FAST to enhance triage accuracy.

This study evaluates the impact of NISt on nurses' competency and its effectiveness in triaging patients accurately. The emergency department, the specialty of undifferentiated resuscitation and care, caters to all patients irrespective of age, gender, social status, or disease condition. In the emergency department, ultrasound has long been recognized as a powerful screening and diagnostic tool. There are studies that highlight the utilization of point-of-care ultrasound by the critical care nurses as well (Knutsen & Solbakken,

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2025). The study was to determine whether the FAST examination was a useful adjunct to simple triage and rapid treatment in triaging the yellow triage patients, (requires close monitoring and reassessment), as also seen in the present study. Point-of-care ultrasound is used in patient care, trauma, education, training, war, and disaster settings. There is evidence that point-of-care ultrasound (POCUS) can improve diagnostic decision-making (Moosavi *et al.*, 2023). Also, a study suggests POCUS triage enhances clinical efficiency by decreasing other alternative imaging and investigations and expediting interventions (Biçer *et al*., 2025).

Various countries have their triage protocol as per their patient load, resource availability, economic situation, and manpower of their ED. Some triage systems with good reliability and validity rates are "Emergency Severity Index (ESI), Canadian Triage and Acuity Scale (CTAS), Manchester Triage System (MTS), and Australian Triage Scale (ATS)". All these are five-level triage scales with a declining order of severity. Also, a study (Moon & Cho, 2022) was done utilizing the Korean Triage and Acuity Scale (KTAS) to determine the patient prioritization in the emergency room. A competency-based triage education application was developed to use KTAS to evaluate nurses' competency and performance. However, India has its triage protocol called the AIIMS Trauma Triage Protocol (ATTP), adopted in various states such as Kerala (Sahu *et al*., 2020). This protocol is adapted from the World Health Organization (WHO) and modified as per the need of the Indian population. The nurses are utilizing this protocol to triage the patient.

Triage means sorting the patient and is an ever-changing and dynamic process. In the hustle and bustle of an emergency department, the patients are generally anxious and have limited access to the standards of treatment. Under high levels of stress and in a short period, doctors and nurses must triage patients for the right treatment at the right time. All these factors generally increase the chances of error rate, which is a serious quality indicator. Under-triage is the failure to identify patients with serious conditions who need immediate attention and prompt treatment from those patients with less critical needs. Under-triage and over-triage rates are important quality indicators for trauma centers (Peng & Xiang, 2016). Knowledge of under triage in trauma is important to enhance patient safety, increase the precision of the triaging system, and cater to value-added learning for the hospital and pre-hospital services (Jeppesen *et al*., 2020). It causes a delay in providing time-sensitive intervention, potentially leading to clinical deterioration and an increase in morbidity and mortality for patients. Accurately forecasting clinical outcomes and evaluating patient acuity can be difficult, particularly in complex situations or mass casualty incidents where little information is available. Disparities and discrepancies in patient outcomes may arise from variations in triage decision-making across various settings (Maiti *et al*., 2024).

To sum up, FAST and ultrasound performed by nurses have an important role in emergencies as well as in a triage setting as a valid screening tool. As stated in a study (Su *et al*., 2025), POCUS training in nurses leads to improved clinical nursing decisions and enhances confidence along with professional fulfillment. Over-triage is the tactless triaging of the patient with a less urgent presentation to a step-up triage, activating and involving a health care professional rigorously for a patient with less need, increasing resource utilization with an indirect detrimental effect on the emergency department. The long delay is due to the overcrowding of the Emergency Department. This delay in initial assessment and management is a serious patient safety issue. Under triage in these circumstances adds to the existing problem of delay in initial assessment (Yancey *et al*. 2022). With the footfall of 250 patients every day and a limited number of doctors (1 senior resident and a few junior residents), it is imperative to train the nurses to do the task shifting, especially during a disaster.

METHODOLOGY

A quantitative research design (quasi-experimental one-group pretest-post-test) was conducted at Jai Prakash Narayan Apex Trauma Centre, AIIMS, New Delhi, India. The reporting guidelines used for this study were TRENDS. The inclusion and exclusion criteria were as follows:

Inclusion Criteria

Patients: All patients reporting to the Emergency Department with road traffic incidents, mass casualty incidents, fall incidents, assault, gunshots, or head injuries due to falls or accidents are assessed by the Trauma Triage Protocol. In the yellow triage, patients are assessed by Nurse Initiated Sono triage.

Nurses: All nurses working in the yellow area and the triage counter of the Emergency Department, JPNATC, AIIMS, New Delhi, India.

Exclusion Criteria

Patients: Those who are triaged in the red area (Care cannot be delayed) or green area (treatment can be delayed without risk).

Nurses: Nurses on long leave and unwilling to participate in the study.

This study aims to assess the effectiveness of nurse-initiated sonography triage on nurses' knowledge, skills, and triage rates among patients in the emergency department of a tertiary care center in New Delhi. From the study conducted by Idris (2022), it was observed that nurses are keen to increase their knowledge, especially about triage. The study was conducted from May to November 2023. Fifteen nursing officers posted in the yellow area and 150 patients were the study participants. The patient was triaged by the Trauma Triage Protocol, followed by Sono triage after 10 mins of admission in the Yellow zone. A training module was developed covering e-FAST fundamentals, probe handling, and interpretation techniques. Nursing officers underwent pre-assessment, followed by hands-on training and competency training and certification. Each nurse performed Sono triage on 20 patients after the conventional Trauma Triage Protocol for 2 months. The study was supported by a similar study (Moro *et al*., 2025), which found that after 4 rounds, a final list of 32 variables was approved, which included training, imaging and outcome.

Before the final data collection, each nursing officer had to perform sonography (POCUS) on 20 patients each. After the preassessment on knowledge and skill, the module on e-FAST was handed over to the nursing officers. Following this, the nurses were required to complete the post-test knowledge and post-skill assessments. The expected time to complete an ultrasound is about 3-4 minutes (Desai & Harris, 2017). Validity and reliability were established for all the tools.

Demographic profile sheet of patients and nursing officers (content validity index 0.8), self-structured knowledge questionnaire for nursing officers (reliability r=0.8 by test-retest method) Self-Structured Observation checklist for AIIMS Trauma Triage Protocol (r=0.82 by interrater reliability), Observation checklist for Nurse Initiated Sono triage (r=0.82 by interrater reliability), and the observer's bias was controlled by having different health care personnel as an observer/evaluator. Self-perceived Sono triage acceptability tool (Content Validity Index=1) for Nursing Officers—this tool was developed by the researcher with the expert suggestions from the guide and other experts. The above-mentioned proforma was the main tool used for data collection. All tools were validated by 11 experts from the Department. of Emergency Medicine and Nursing Faculties, and modifications were made as per suggestions. All research participants were informed of the study's details before their participation, and a consent form was obtained. Anonymity and privacy were maintained.

Ethical Consideration

Ethical permission was obtained from the Institute Ethics Committee, All India Institute of Medical Sciences (AIIMS), New Delhi, India with reference number IEC-994/13.01.2023, RP-37/2023, OP-3/16.05.2023, on 18th May 2023.

RESULTS

This pilot study evaluated the effectiveness of nurse-initiated sonography triage on nurses' knowledge, skills, and triage rates among patients in the emergency department. For data analysis, descriptive analysis was done.

Demographic characteristics of nursing officers and patients

The demographic characteristics of the nursing officers and the patients in the study sample are presented in

Table 1: Description of Demographic Details of the Nursing Officer (n=15)

Demographic Profile	Frequency /Percentage
Gender	
Male	7 (46.7)
Female	8 (53.3)
Age	
20-25 years	10 (66.7)
26-30 years	5 (33.3)
Education	
BSc Nursing	12 (80.0)
Post basic BSc	3 (20.0)
Years of working in Emergency Dep artment	
1-5 years	15 (100)
Training in e-FAST	
Yes	-
No	15 (100)

In table 1 participants comprised 7 males (46.7%) and 8 females (53.3%). Majority (n = 10; 66.7%) of them were aged between 20–25 years, with the remaining 5 (33.3%) aged 26–30 years. Most participants held a BSc in Nursing (n = 12; 80.0%), while 3 (20.0%) completed a post-basic BSc. All participants (100%) reported between 1–5 years of experience in the emergency department. None of the respondents had undergone e-FAST training, as indicated by 0% 'Yes' responses and 100% 'No'.

Table 2: Description of Demographic Details of the Patient (n=150)

Demographic Profile	Frequency /Percentage
Age	
Mean (SD)	33.3 (14.1)
Median (IQR)	32.5 (22, 41)
Gender	
Male	115 (76.7)
Female	35 (23.3)
Marital Status	
Single	51 (34)
Married	99 (66)

In table 2 the participants had a mean age of 33.3 years (SD = 14.1; median = 32.5, IQR = 22–41). Most participants were male (76.7%) and married (66.0%). A majority held a bachelor's degree (53.3%) or higher (26.7%). Nearly half worked in private service (43.3%), and most lived in urban areas (60.0%). These demographics frame the baseline context against which all outcome analyses were conducted.

Table 3: Description of Demographic Details of the Patient (n=150)

Demographic Profile	Frequency /Percentage
Educational Qualification	
Postgraduate	40 (26.6)
Graduation	80 (53.3)
High School	20 (13.3)
Middle School	05 (3.0)
Primary School	05 (3.0)
Profession	
Government Service	28 (18.7)
Private Service	65 (43.3)
Self Employed	20 (13.3)
Unemployed	37 (24.7)
Residence	
Urban	90 (60.00)
Rural	60 (40.00)

Table 3 summarizes that the graduates form the majority (n = 80; 53.3%), followed by postgraduates (n = 40; 26.7%); 13.3% had high school education, and only 3.3% each had middle or primary education. The largest employment group is in private service (43.3%), followed by the unemployed (24.7%), government employees (18.7%), and self-employed (13.3%). A majority live in urban areas (60.0%) compared to rural areas (40.0%).

Pretest and Post-test knowledge scores of Nursing Officers on Triage and Sono triage are presented in table 4.

Table 4: Mean and SD of Pretest and Post-test Knowledge Scores of Nursing Officers on Triage and Sono Triage (n=15)

Knowledge Scoring	**Pre-test Scores Mean/SD**	**Post test Scores Mean/SD**	***P* value**
Knowledge Score (Total score=30)	17.3 (2.9)	20.9 (2.0)	0.006*
	Freq/Percentage	**Freq/Percentage**	
Knowledge Categories			
Poor (0-15)	(33.3)	0 (0.0)	
Moderate (15-20)	7 (46.67)	4 (26.7)	
Good (>20)	3 (20.0)	3 (73.3)	

Table 4 shows that a paired-samples t-test examined changes in triage and Sono triage knowledge scores (maximum score = 30). The mean score increased from 17.30 (SD = 2.90) before training to 20.90 (SD = 2.00) after training, t (14) = –4.21, p =0.006. This result demonstrates a statistically significant improvement in knowledge. In terms of categorical performance, participants classified as having "Good" knowledge increased from 20.0% in the pre-test to 73.3% in the post-test, reflecting meaningful gains following the training intervention. The scoring system is based on Bloom's taxonomy, i.e., good knowledge is >80%, moderate knowledge is 60-79%, and poor knowledge is <60%.

Table 5: Skill Assessment Scores of Nursing Officers in terms of Frequency and Percentage of in Trauma Triage Protocol (TTP) (n=15)

Statements	**Frequency/Percentage**
Able to independently assess the patient	150 (100)
Able to identify the physiological parameters (Red/Yellow/Green)	150 (100)
Able to identify the anatomical injuries (Red/Yellow/Green)	150 (100)
Able to identify the mechanism of the injury (Red/Yellow/Green)	150 (100)
Able to categorize the patient to Red, Yellow and Green correctly	150 (100)
Reevaluates the patient (if necessary)	150 (100)
Able to re-triage the patient (if needed)	150 (100)
Mentions injuries identified	150 (100)
Able to do Chest Compression Test	148 (98.7)

Table 5 shows that only 2 participants (1.3%) did not correctly perform the chest compression test, suggesting a potential area for focused reinforcement in future training sessions. Overall, the data reflects high levels of skill acquisition, reinforcing the effectiveness of the training curriculum in promoting standardized triage performance.

The skill assessment scores are further divided as Probe Familiarity, Right Upper Quadrant View, Left Upper Quadrant View, and e-FAST as in Table 6 and Table 7, Table 8, and Table 9.

Table 6 shows the assessment of the nursing officers in performing skill (NISt), where the participants generally showed strong technical skill (~14.9% rated very good; ~76% good) in most procedural aspects of NISt, with high proficiency in probe selection and orientation (~80% scored "good") and hand control. Slight areas for improvement were seen in gel application and keyboard use—likely stemming from less practice in

these subtleties. Overall, the results suggest successful acquisition of key ultrasound competencies, with a few minor procedural elements that could benefit from additional emphasis in practice sessions.

Table 6: Skill Assessment Scores of Nursing Officers in Terms of Mean and Standard deviation of the Nurse Initiated Sono Triage (NISt) (n=15)

Steps of Performing NISt	1 (Not Identified)	2 (Unsatisfactory Technique)	3 (Satisfactory Technique)	4 (Good Technique)	5 (Very Good Technique)	Mean ± SD
Correct Probe chosen	0 (0)	4 (2.7)	9 (6.1)	113 (76.4)	22 (14.9)	3.64 (0.56)
Correct probe orientation	0 (0)	5 (3.4)	8 (5.4)	113 (76.4)	22 (14.9)	3.64 (0.58)
Proper hand technique	0 (0)	4 (2.7)	7 (4.7)	119 (80.4)	18 (12.2)	3.62 (0.53)
Proper gel application	2 (1.4)	0 (0)	23 (15.5)	111 (75.0)	12 (8.1)	3.51 (0.59)
Use of keyboard function	0 (0)	9 (6.1)	11 (7.4)	122 (82.4)	6 (4.1)	3.47 (0.58)
Proper Fanning and tilting	0 (0)	0 (0)	21 (14.2)	120 (81.1)	7 (4.7)	3.52 (0.42)

SD – Standard Division

Table 7: Skill Assessment Scores of Nursing Officers in Terms of Mean and Standard Deviation of the Nurse Initiated Sono Triage (NISt)- Right Upper Quadrant View (n=15)

Right Upper Quadrant (RUQ View)	1 (Not Identified)	2 (Unsatisfactory Technique)	3 (Satisfactory Technique)	4 (Good Technique)	5 (Very Good Technique)	Mean ± SD
Identifies the liver	0 (0)	0 (0)	22 (14.9)	102 (68.9)	24 (16.2)	3.63 (0.56)
Identifies the right kidney	0 (0)	0 (0)	21 (14.2)	111 (75.0)	16 (10.8)	3.58 (0.50)
Identify the Morison's pouch	0 (0)	2 (1.4)	17 (11.5)	119 (80.4)	10 (6.7)	3.54 (0.48)
Identifies hepatorenal recess (border between liver and right kidney)	0 (0)	2 (1.3)	62 (41.9)	82 (55.4)	2 (1.4)	3.22 (0.54)
Locate the diaphragm and mirror artifact	0 (0)	26 (17.6)	94 (63.5)	28 (18.9)	0 (0)	2.72 (0.60)
Points out where fluid would accumulate when supine	4 (2.7)	14 (9.5)	84 (56.8)	46 (31.1)	0 (0)	2.86 (0.70)
Total Time to Complete (Seconds)						
Mean (SD)	16.33 (15.53)					
Median (IQR)	15 (10.20)					
Range (min- max)	10-120					

IQR-Interquartile Range

Also, in Table 7, the RUQ (Right Upper Quadrant) View Performance and Timing was done, which presented the average performance of participants (N=15) on key sonographic tasks within the RUQ scan, alongside timing metrics. The mean ratings (1–5 scale) for tasks such as identifying the liver (3.63 ± 0.56), right kidney (3.58 ± 0.50), and Morrison's pouch (3.54 ± 0.48) indicate consistently strong proficiency, with approximately 80–86% of participants achieving "good" or "very good." The scan was completed in an average of 16.33 seconds (SD = 15.53), with a median time of 15 seconds (ranging from 10 to 120 seconds). The low median and range suggest most participants are efficient, though a few outliers took significantly longer. These findings confirm high competence in structural identification within the RUQ view, but they also highlight areas—particularly artifact recognition and fluid identification.

Table 8: Skill Assessment scores of Nursing Officers in terms of Mean and Standard Deviation of the Nurse Initiated Sono Triage (NISt)- Left Upper Quadrant view (n=15)

Left Upper Quadrant (LUQ View)	1 (Not Identified)	2 (Unsatisfactory Technique)	3 (Satisfactory Technique)	4 (Good Technique)	5 (Very Good Technique)	Mean ± SD
Identifies the spleen	0 (0)	1 (0.7)	26 (17.6)	100 (67.6)	21 (14.2)	3.57 (0.59)
Identifies the left kidney	0 (0)	1 (0.7)	26 (17.6)	110 (74.3)	11 (7.4)	3.51 (0.52)
Identifies splenorenal recess (border between spleen & left kidney)	0 (0)	1 (0.7)	34 (23.0)	113 (76.4)	0 (0)	3.39 (0.44)
Points out where fluid would accumulate in a hemoperitoneum	2 (1.4)	8 (5.4)	104 (70.3)	34 (23.0)	0 (0)	2.84 (0.56)
Total Time Taken to Complete (Sec onds)						
Mean ± SD	16.03 (15.22)					
Median (IQR)	12.5 (10, 20)					
Range (Min- max)	10-120					
Identify bladder trigone/ Catheterized	4 (2.7)	0 (0)	16 (10.8)	107 (72.3)	21 (14.2)	3.56 (0.70)
Points out where possible free fluid would accumulate	0 (0)	6 (4.1)	38 (25.7)	96 (64.9)	8 (5.4)	3.35 (0.62)
Total Time Taken to Complete (Seconds)						
Mean (SD)	12.39 (9.53)					
Median (IQR)	10 (10.20)					
Range (min- max)	10-60					

IQR -Interquartile Range; SD – Standard Division

As seen in Table 8, participants demonstrated satisfactory ability to identify key anatomical structures in the LUQ. The ability to identify the spleen achieved the highest mean score of 3.57 (SD = 0.59), indicating that 67.6% of participants used a good technique and 14.2% achieved an excellent technique. Similarly, the identification of the left kidney yielded a mean score of 3.51 (SD = 0.52), with most participants (74.3%) performing with good technique. The splenorenal recess, which represents the interface between the spleen and left kidney, was recognized by most participants (76.4%). However, the mean score (3.39 ± 0.44) suggested a slightly lower accuracy compared with organ identification. Conversely, the ability to locate potential sites of fluid accumulation in hemoperitoneum was limited, with a mean score of 2.84 (SD = 0.56), indicating that 70.3% of participants performed with only satisfactory technique.

The total time required to complete the LUQ view averaged 16.03 seconds (SD = 15.22), with a median time of 12.5 seconds (IQR: 10–20 seconds) and a range of 10–120 seconds, demonstrating wide variability in scanning speed among participants. The ability to identify the bladder trigone or catheterized bladder had a mean score of 3.56 (SD = 0.70), with 72.3% of participants performing with good technique and 14.2% with very good technique. The parameter assessing participants' ability to identify potential free fluid accumulation sites yielded a mean score of 3.35 (SD = 0.62), suggesting moderate proficiency in recognizing dependent pelvic areas. The average completion time for the bladder view was 12.39 seconds (SD = 9.53), with a median of 10 seconds (IQR: 10–20 seconds) and a range of 10–60 seconds, indicating faster acquisition compared with the LUQ view.

As seen in Table 9, the other component is e-FAST Lung and IVC Skills and Scan Time, which evaluates the mean scores and scan time for lung-window and inferior vena cava (IVC) assessment tasks during an e-FAST examination (N ≈ 150). Lung-related tasks like recognizing the bat-wing sign (2.75 ± 0.45) and lung sliding (2.80 ± 0.48) show moderate proficiency; though around 90% reached "satisfactory," only a small portion reached "good." Mirror artifact recognition posted a slightly lower mean score of 2.58, highlighting that around 25% of participants scored below satisfactorily. IVC evaluation skills were notably poor: IVC diameter assessment (2.05 ± 0.46) and wall apposition recognition (2.03 ± 0.44) both received low mean ratings, indicating that over 70% of participants fell short of basic competency in this area.

The mean duration for completing the lung and IVC assessment was 59.1 seconds (SD = 48.3), with a median of 55 seconds (IQR: 42.5–60 seconds) and a range of 40 to 330 seconds. This wide range and high SD reflect significant variability, suggesting some participants may be under-training or struggling with this segment

of the e-FAST protocol. The nurses were observed by the researcher and the expert trainer while performing an ultrasound.

Table 9: Skill Assessment Scores of Nursing Officers in Terms of Mean and Standard Deviation of The Nurse Initiated Sono Triage (NISt)- e FAST (n=15)

e FAST	1 (Not Identified)	2 (Unsatisfactory Technique)	3 (Satisfactory Technique)	4 (Good Technique)	5 (Very Good Technique)	Mean ± SD
Identify Batwings Sign	0 (0)	12 (8.1)	117 (79.1)	19 (12.8)	0 (0)	2.75 (0.45)
Identify Lung Sliding	0 (0)	11 (7.4)	112 (75.7)	25 (16.9)	0 (0)	2.8 (0.48)
Able to visualize mirror artefact	0 (0)	37 (25.0)	95 (64.2)	16 (10.8)	0 (0)	2.58 (0.58)
IVC diameter: Small/Large	0 (0)	109 (73.7)	38 (25.7)	1 (0.7)	0 (0)	2.05 (0.46)
Able to localize IVC "kissing sign"	0 (0)	113 (76.4)	34 (23.0)	1 (0.7)	0 (0)	2.03 (0.44)
Total Time Taken for Scan (Secs)						
Mean (SD)	59.09 (48.30)					
Median (IQR)	55 (42.5, 60)					
Range (min-max)	40-330					

IQR -Interquartile Range ; IVC - Inferior Vena Cava ; SD – Standard Division

Table 10: Triage Rate Comparison by between Trauma Triage Protocol (TTP) and Nurse Initiated Sono Triage (NISt)N (n=15)

	Triage as Per TTP	Triage After Admission in Yellow as Per NISt (Red area)
Triage Rate	150 (100.0)	5(3.0)

Table 10 compares the Trauma Triage Protocol (TTP) with the Nurse-Initiated Sono triage (NISt) protocol. It was observed that the nursing officers triaged all 150 patients to Yellow area. However, it was later detected that it was an under triage of 3% as per the findings from the Nurse initiated Sono triage (NISt). Hence, it is indicative that the nursing officers were able to determine E FAST positive and immediately shift the patient to red area for further management.

Table 11: Mean and Standard Deviation of Self-perceived Sono Triage Acceptability by Nursing Officers (n=15)

Sl. No.	Items	1 Strongly Disagree n (%)	2 Disagree n (%)	3 Neutral n (%)	4 Agree n (%)	5 Strongly Agree n (%)	Mean (SD)
1.	I am only able to assist the physician in performing FAST	1 (6.7)	2 (13.3)	3 (20)	5 (33.3)	4 (26.7)	3.6 (1.2)
2.	I am able to triagethe patient as per the trauma protocol	0 (0.0)	0 (0.0)	0 (0.0)	3(20)	12 (80)	4.8 (0.4)
3.	I feel I am able to perform the FAST confidently	0 (0.0)	0 (0.0)	4(26.7)	7 (46.7)	4 (26.7)	4 (0.8)
4.	Performing e -FAST is not as simple as doing FAST	0 (0.0)	0 (0.0)	1 (6.7)	11(73.3)	3 (20)	4.1 (0.5)
5.	I feel Nurses are empowered to perform FAST	3 (20)	2 (13.3)	3 (20)	3(20)	4 (26.7)	3.2 (1.5)
6.	I am able to recognize FAST positive easily	0 (0.0)	0 (0.0)	7 (46.7)	1 (6.7)	7(46.7)	4 (1)
7.	Sono triage should be implemented and led by the nurses	0 (0.0)	0 (0.0)	1 (6.7)	10(66.7)	1 (6.7)	4.2 (0.6)
8.	I want to do this new task and add to my job responsibility	0 (0.0)	0 (0.0)	1 (6.7)	6 (40)	8 (53.3)	4.5 (0.6)
9.	Sono triaging done by nurses will be equally efficient as done by the doctors	0 (0.0)	0 (0.0)	0 (0.0)	8 (53.3)	7 (46.7)	4.5 (0.5)
10.	I am glad that Sono triaging is going to help the patients get early intervention	0 (0.0)	0 (0.0)	0 (0.0)	3 (20)	12(80)	4.8(0.4)

SD- Standard Division

Table 11 shows that majority (over 90%) expressed confidence in triage, motivation for added responsibilities, and belief in their efficiency for Sono triage. Strong consensus (100%) that early patient intervention would be improved through nurse-led Sono triage. The mean scores near 4.0–4.8 reflect high overall enthusiasm. However, the lower mean (3.2) and large standard deviation for empowerment show uneven self-assessed readiness, suggesting targeted supports may help build autonomy.

DISCUSSION

The results of the analysis show an increase in the knowledge scores and improved skills among the nursing officers. There was a 3% under triage rate, which established that the nursing officers were able to identify the free fluid in trauma patients. Self-perceived Sono triage acceptability by nursing officers was very interesting, as they were able to identify their self-potential in establishing the Sono triage findings in various aspects.

Triage accuracy can be established only if the health care workers are acquainted with the skills and have professional acumen to deal with and manage the critical conditions. Clear instructions on basic requirements, as well as visible resources, guidelines, and flowcharts, make triage even more accurate (Hinds *et al*., 2025). However, during heavy patient loads or mass casualty events due to shortages of medical professionals, the nursing personnel can step in to take charge of the situation. Also, acting on golden hour is crucial to saving the lives of an individual. Hence, being able to perform ultrasonography to accurately triage the patients not only saves lives but also allows prompt intervention and management to be done. These findings are consistent with a study (Nicola & Dogra, 2016) indicating that the ultrasound can be the first triage too. Also, it decreases the morbidity and mortality of the patients admitted to the trauma center. This is consistent with the findings of the study by Alharbi *et al*. (2021),sono-triage stating that a total of 52 studies were done with a combined 1,106,431 traumatic injury patients for quantitative analysis. The overall mortality rate was 6.77% (n = 74,930).

In this study the demographic details of the nursing officers were both male and female, mostly in the 20-25 age range. Most of them had a B.Sc. in Nursing as their educational qualification. Similar findings could be found in a study by AlMarzooq (2020); the education qualification demonstrated a very high statistical significance difference ($P < 0.001$). This study's findings suggest that nurse-initiated Sono triage significantly enhances nurses' triage skills and helps in the early detection of critical cases. The observed re-triage rate indicates that traditional TTP alone may miss certain high-risk cases. Nurse-initiated Sono-triage can be a valuable addition to emergency triage protocols. These findings were supported by a study (Gimenes *et al*., 2024) that aims to fill the gap in Point of Care Ultrasound (POCUS) training among the nurses for a better patient outcome. A similar study was conducted by Storti *et al*. (2013); the results show that the use of ultrasound FAST performed by trained nurses is very effective, with a sensitivity of 84% (95% CI 72.1-92.2) and a specificity of 97.37% (95% CI 92.55-99.10). Research has demonstrated that POCUS, when utilized by trained personnel in the ED, can significantly influence patient management. The study found that POCUS led to changes in clinical decisions, particularly in specific patient groups, underscoring the importance of integrating ultrasound into routine emergency care practices. This supports the premise of NISt, where nurse-performed ultrasound assessments can lead to timely and appropriate interventions (Laursen *et al*., 2014).

The results showed a statistically significant decrease of 20 minutes in median ED LOS, suggesting that empowering nurses to initiate diagnostic imaging can enhance patient flow and reduce waiting times (Lee *et al.*, 2016). This finding is pertinent to NISt, as nurse-initiated ultrasound could similarly streamline the triage process and improve departmental efficiency. One study was consistent with the present study. The results demonstrated that nurse-performed POCUS is feasible and may have a meaningful impact on physician management of septic patients, potentially leading to improved patient outcomes (Lowe *et al*., 2023). The present study also focuses on decreasing the triage rate by performing the Sono triage accurately to receive prompt treatment and intervention.

Also, the findings show that the respondents' self-perceived acceptability regarding various aspects of ultrasound imaging (FAST and e-FAST) and the potential role of nurses in performing these tasks is doable but

needs assistance. These findings are consistent with the study (Yamada *et al*., 2025), which stated that the nurses need institutional support, mentorship, and guidance along with POCUS certification.

Limitations

The study is limited to one group of nursing officers working in the emergency department due to a new intervention (Sono triaging); hence, the study cannot be generalized. Future studies can have both an experimental and a control group for addressing this gap.

CONCLUSION

Nurse-led Sono triage can improve early triage decisions and patient outcomes. It is a breakthrough in the decision-making capabilities of the nurses working in an emergency setup. The new role of empowerment of nurses will aid the physician in determining the early and prompt interventions for the critically ill patient. The nursing officers showed keen interest in handling the new responsibility with zeal and enthusiasm, as perceived by the acceptability of Sono triaging in better patient outcomes.

The future scope of utilizing Sono triage is to gain insight from these experiences, which can help direct enhancements to nursing education and promote the wider application of POCUS in clinical settings. It should be incorporated in the curriculum for better understanding from early life as a student nurse to manage casualties during disasters. Nonetheless, future studies can include conducting similar study with different research designs for a better outcome.

It can also compare the interrater agreement of the Sono triaging procedure by the nursing officer and by the radiologist for an impactful interpretation.

Conflict of Interest

The authors declare that they have no competing interests.

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