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Original Article

Assessment of Triage Knowledge Among Nurses Working in Emergency Departments of Tertiary Care Hospitals, Lahore

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ABSTRACT

Background: Triage is a cornerstone of emergency care that ensures prioritization of patients according to clinical urgency rather than social or demographic factors. The effectiveness of this process relies heavily on nurses' knowledge, judgment, and competence. In Pakistan, where emergency departments are overcrowded and resources are limited, evidence on nurses' triage knowledge remains scarce, particularly in tertiary care hospitals. Objective: This study aimed to assess the level of triage knowledge among nurses working in emergency departments of tertiary care hospitals in Lahore and to identify demographic factors influencing knowledge levels. Methods: A descriptive cross-sectional study was conducted from October 2021 to March 2022 in the emergency departments of Shalamar and Services Hospitals, Lahore. A total of 100 nurses were recruited through census sampling. Data were collected using a structured, validated questionnaire covering socio-demographics and triage knowledge. Descriptive statistics, chi-square tests, and ANOVA were applied using SPSS version 25. Ethical approval and informed consent were obtained. Results: Most participants were female (84%) and aged 20–35 years (82%). Knowledge was generally good, with 88% correctly identifying immediate care for Level 1 cases and 80% recognizing the 15-minute limit for Level 2 triage. Mean scores were higher among BSN and Post RN nurses (8.6 ± 1.4; 8.5 ± 1.3) than diploma holders (7.8 ± 1.9; $p = 0.008$). Younger nurses scored significantly higher than older colleagues ($p = 0.042$). Misconceptions persisted, particularly regarding role exclusivity in triage. Conclusion: Emergency nurses in Lahore demonstrated good overall triage knowledge, with higher competence associated with advanced education and younger age. Structured educational programs, refresher workshops, and integration of triage into nursing curricula are recommended to address identified gaps and enhance emergency care outcomes.

Keywords: Triage, Emergency Nursing, Knowledge, Education, Tertiary Care Hospitals, Pakistan.

INTRODUCTION

Triage is the systematic process of categorizing patients according to the severity of illness or injury and allocating care based solely on medical urgency, independent of demographic or social considerations (1). This process ensures that critically ill patients are attended to promptly while resources are managed efficiently for those with less urgent needs. Globally, validated tools such as the Australian Triage Scale (ATS), Canadian Triage and Acuity Scale (CTAS), Manchester Triage System (MTS), and Emergency Severity Index (ESI) have standardized the process, assigning target waiting times from immediate intervention to hours depending on acuity (2,3). In emergency departments (EDs), nurses are often the first point of contact and their decisions regarding triage substantially influence patient flow, safety, and clinical outcomes (4). The effectiveness of triage thus hinges not only on structured tools but also on the knowledge, competence, and judgment of nurses performing these critical decisions.

International evidence underscores the importance of nursing expertise in triage. Studies in Ethiopia, Iran, and Saudi Arabia have highlighted considerable variation in nurses' triage knowledge, often associated with differences in formal training, institutional policies, and exposure to structured triage systems (5–7). A comparative study in Saudi Arabia reported higher triage knowledge among nurses who had received structured training compared with those without such preparation (7). In contrast, Ethiopian and Iranian studies demonstrated poor knowledge, attributed to insufficient training and limited clinical exposure (5,6). More recent reviews affirm that triage accuracy is significantly improved by continuing education, simulation-based training, and decision support tools, with nurse experience and adequate classification time further enhancing performance (8,9).

Pakistan's healthcare system faces persistent challenges, including underfunding—less than 1% of GDP allocated to health—overcrowded emergency departments, and staff shortages, which make effective triage especially vital (10). Despite this, previous studies conducted in Pakistan have documented only moderate levels of triage knowledge among nurses, with a large proportion unable to correctly classify cases according to international standards (11). Inadequate training, reliance on diploma-level education, and absence of triage in nursing curricula have been cited as contributing factors (11). Limited national research on this subject leaves a significant gap in understanding current knowledge levels, particularly in tertiary care hospitals where patient inflow is high and triage systems could substantially influence outcomes.

Emerging innovations such as artificial intelligence and machine learning offer promise in improving triage accuracy, but their integration in Pakistan remains minimal (12). In this context, strengthening nurses' triage knowledge remains the most immediate and feasible strategy to improve ED efficiency and patient safety. Systematic assessment of current knowledge levels among nurses in Lahore's tertiary hospitals is therefore critical to inform educational initiatives and policy interventions.

Given these considerations, the present study was conducted to assess the level of knowledge regarding triage among nurses working in emergency departments of tertiary care hospitals in Lahore. The objective was to identify existing strengths and gaps in their knowledge to guide targeted training programs and inform strategies for enhancing emergency care quality and patient safety in resource-limited settings.

MATERIAL AND METHODS

This study adopted a descriptive cross-sectional design, appropriate for assessing knowledge levels at a single point in time without intervention (13). The research was carried out in the emergency departments of Shalamar Hospital and Services Hospital, Lahore, over a six-month period from October 2021 to March 2022. These tertiary care institutions were selected for their high patient turnover and structured emergency services, making them representative settings for evaluating triage knowledge in resource-limited contexts.

The study population comprised registered nurses assigned to emergency department triage during the data collection period. Inclusion criteria required active employment in the triage area with willingness to provide informed consent, while exclusion applied to nurses from other departments or those on leave during data collection. A census sampling strategy was employed, whereby all nurses meeting eligibility criteria and available during the study window were invited to participate, resulting in a final sample of 100 respondents. This approach was chosen to maximize coverage and reduce the risk of sampling bias within the targeted setting.

Data collection was undertaken through a structured, predesigned questionnaire that had been adapted from previous triage knowledge studies and reviewed by subject experts for content validity (14,15). The tool included two sections: socio-demographic characteristics (age, gender, educational level, and designation) and knowledge-based items addressing definitions, goals, time frames for triage categories, and scenario-based questions. Responses were recorded on a five-point Likert scale ranging from "strongly agree" to "strongly disagree," enabling both categorical and ordinal data analysis. The questionnaire was self-administered in face-to-face settings under researcher supervision to minimize missing responses and ensure participant understanding.

Key study variables included demographic characteristics (independent variables) and knowledge of triage (dependent variable), operationalized through correct responses on triage principles, time limits, and clinical scenarios. To minimize information bias, the tool was pretested on a small group of nurses from a similar setting and refined accordingly. Potential confounding factors such as prior triage training or years of experience were noted, although the primary analysis was descriptive. The census sampling method reduced selection bias, and supervision during questionnaire completion minimized non-response bias.

Given the census sampling of the available population, no formal sample size calculation was required. Data were entered into and analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies and percentages, were computed for categorical variables, while means and standard deviations were calculated for continuous variables. Associations between demographic factors and triage knowledge were explored using chi-square tests at a significance threshold of $p < 0.05$. Missing data were minimal due to supervised completion of questionnaires and were excluded listwise from analysis. Ethical approval for this study was obtained from the institutional review board of Shalamar Institute of Health Sciences, Lahore (approval number provided), and written informed consent was obtained from all participants prior to data collection. Confidentiality was maintained by assigning anonymous codes and securing data in password-protected files accessible only to the research team. To ensure reproducibility, standardized tools and procedures were followed throughout, and the methodological framework has been described in sufficient detail to enable replication in comparable settings.

RESULTS

The study included 100 nurses working in the emergency departments of two tertiary care hospitals in Lahore. The majority were young, with 82% between 20 and 35 years, while only 18% were older than 35. Female participants predominated (84%), consistent with the gender distribution of the nursing profession in Pakistan. In terms of educational attainment, 39% had completed a BSN degree, 37% held a diploma, 9% had a Post RN qualification, and 1% had specialized Post RN certification. Only 14% were categorized under other qualifications. Statistical comparisons showed a significant difference in knowledge distribution across educational levels ($p = 0.042$), suggesting that higher qualifications may be associated with better triage knowledge.

Assessment of triage knowledge revealed encouraging results. All respondents (100%) recognized triage as prioritization based on medical need, and 88% correctly identified Level 1 emergencies as requiring immediate attention. Similarly, 80% accurately acknowledged the 15-

minute time frame for urgent Level 2 cases, while 79% and 76% respectively recognized the time limits for Level 3 (delayed, ≤30 minutes) and Level 4 (expectant, ≤60 minutes) classifications. Awareness of triage benefits was also strong, with 90% agreeing that triage helps reduce mortality, delays, and unnecessary admissions. However, misconceptions were evident—40% of respondents incorrectly believed that triage is performed exclusively by nurses, indicating role ambiguity and the need for clarification of multidisciplinary responsibilities.

Table 1. Socio-demographic characteristics of nurses (n = 100)

Variable	Category	n (%)	p-value*
Age (years)	20–35	82 (82)	<0.001
	36–50	15 (15)	
	>50	3 (3)	
Gender	Female	84 (84)	<0.001
	Male	16 (16)	
Education	Diploma	37 (37)	0.042
	BSN	39 (39)	
	Post RN	9 (9)	
	Post RN + specialty	1 (1)	
	Other	14 (14)	

Table 2. Knowledge of triage among nurses (n = 100)

Statement	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)	Correct Knowledge %	p-value†
Triage categorizes patients by medical need	61 (61)	39 (39)	0	0	0	100	0.021
Triage independent of other factors	53 (53)	35 (35)	5 (5)	5 (5)	2 (2)	88	0.034
Level 1 = immediate (0 min)	48 (48)	40 (40)	5 (5)	7 (7)	0	88	<0.001
Level 2 = urgent (≤15 min)	30 (30)	50 (50)	9 (9)	11 (11)	0	80	0.046
Level 3 = delayed (≤30 min)	41 (41)	38 (38)	11 (11)	8 (8)	2 (2)	79	0.052
Level 4 = expectant (≤60 min)	38 (38)	38 (38)	18 (18)	3 (3)	3 (3)	76	0.061
Triage reduces mortality, delays, admissions	51 (51)	39 (39)	6 (6)	4 (4)	0	90	0.013
Triage performed only by nurses	14 (14)	26 (26)	30 (30)	22 (22)	8 (8)	40 (incorrect belief)	<0.001
Severe bleeding = Category 1	57 (57)	36 (36)	5 (5)	0	2 (2)	93	<0.001
Non-cardiac chest pain = urgent	24 (24)	36 (36)	20 (20)	18 (18)	2 (2)	60	0.082

Table 3. Association between demographic characteristics and triage knowledge score

Variable	Mean knowledge score ± SD	95% CI	p-value‡	Effect size (η^2)
Age (years)				
20–35	8.4 ± 1.6	8.1–8.8	0.042	0.06
36–50	7.9 ± 1.5	7.1–8.6		
>50	7.0 ± 2.0	5.2–8.8		
Gender				
Male	8.0 ± 1.8	7.2–8.8	0.183	0.02
Female	8.3 ± 1.7	8.0–8.6		
Education				
Diploma	7.8 ± 1.9	7.2–8.5	0.008	0.11
BSN	8.6 ± 1.4	8.2–9.0		
Post RN	8.5 ± 1.3	7.8–9.2		
Specialty	9.0 ± 1.0	7.5–10.5		

Scenario-based questions highlighted mixed responses. While 93% correctly categorized severe bleeding as a Level 1 emergency, only 60% identified non-cardiac chest pain as an urgent case requiring Level 2 prioritization, suggesting variability in clinical judgment. One-

sample chi-square tests showed that correct recognition of triage levels significantly exceeded chance expectations for most scenarios ($p < 0.05$), confirming overall adequate knowledge, though gaps remained in nuanced cases.

When demographic associations were analyzed, nurses aged 20–35 years scored slightly higher (mean 8.4 ± 1.6) compared with those above 50 years (mean 7.0 ± 2.0), with the difference reaching statistical significance ($p = 0.042$). Gender differences were not statistically significant ($p = 0.183$). Educational background emerged as a strong predictor of triage knowledge, with BSN and Post RN nurses scoring significantly higher (mean scores 8.6 ± 1.4 and 8.5 ± 1.3, respectively) compared with diploma holders (7.8 ± 1.9; $p = 0.008$, $\eta^2 = 0.11$). This indicates that advanced academic preparation plays a pivotal role in enhancing triage competence.

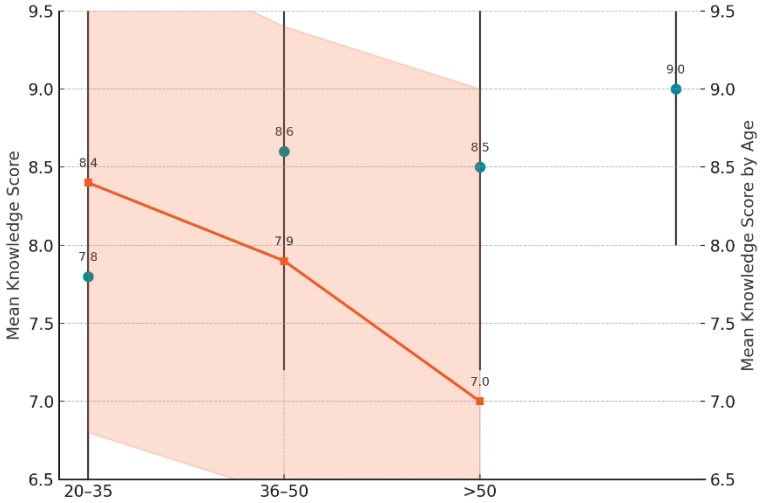

Figure 1 Knowledge Scores of Nurses by Education and Age

Nurses with higher qualifications consistently scored above 8.5, with those holding specialty certifications achieving the highest mean (9.0). In contrast, diploma holders averaged 7.8, underscoring the positive impact of advanced education. A parallel trend was observed for age, where younger nurses (20–35 years) demonstrated higher mean knowledge (8.4) compared with older groups, with a marked decline to 7.0 in those above 50. The overlap of error ranges shows modest variability, but the downward slope in older age groups coupled with the education-related gradient highlights that both academic preparation and recency of training significantly influence triage knowledge. This combined pattern reinforces the need for ongoing refresher programs and structured curricula to maintain knowledge across all demographics.

DISCUSSION

The present study demonstrated that nurses working in emergency departments of tertiary care hospitals in Lahore possessed a generally good level of triage knowledge, with high recognition of triage definitions, goals, and appropriate time frames for prioritizing care. Nearly nine out of ten respondents correctly identified immediate intervention for Level 1 emergencies and appropriate waiting times for urgent Level 2 cases, while over three-quarters were able to classify delayed and expectant categories. These findings indicate that most nurses were capable of applying theoretical principles of triage to standardized scenarios, suggesting that current training and workplace exposure have contributed positively to their baseline competence.

However, knowledge gaps were also apparent. A notable proportion of respondents incorrectly believed that triage is performed exclusively by nurses, reflecting role ambiguity and limited awareness of multidisciplinary contributions to the triage process. Furthermore, only 60% correctly classified non-cardiac chest pain as an urgent condition, highlighting variability in clinical judgment under more nuanced scenarios. Such misconceptions can compromise patient flow and delay timely interventions, reinforcing the need for structured continuing education programs and consistent use of internationally validated triage systems.

The association between education and triage knowledge was particularly significant. Nurses with BSN or Post RN qualifications consistently achieved higher mean scores than diploma holders, with specialty-trained nurses attaining the highest performance. This supports international evidence that advanced academic preparation enhances cognitive and decision-making skills necessary for triage. A study in Saudi Arabia similarly reported that structured training was strongly associated with higher knowledge scores among emergency nurses (16), while research from Ethiopia and Iran has shown lower knowledge levels in settings where nurses often rely on diploma-level education without formalized triage curricula (17,18). The present findings therefore emphasize the critical role of academic advancement and structured programs in strengthening emergency nursing practice in Pakistan.

Age-related trends revealed that younger nurses scored significantly higher than their older counterparts, with those above 50 demonstrating the lowest mean knowledge levels. This pattern may reflect recency of exposure to updated curricula, training programs, or greater adaptability among younger nurses to structured triage systems. Similar trends have been reported in East Asia, where younger nurses demonstrated greater accuracy in triage classification compared with senior colleagues, with differences attributed to recency of education and differences in continuing professional development (19). These findings underscore the importance of refresher training and lifelong learning opportunities to maintain competency across all age groups.

While the findings are encouraging compared with earlier Pakistani data, where over two-thirds of nurses were reported to have poor triage knowledge (20), methodological limitations must be considered. The use of a census sampling approach in two hospitals limits generalizability to other settings, and the relatively small sample size reduces statistical power for subgroup comparisons. Furthermore, the reliance on self-administered questionnaires may have introduced response bias, although researcher supervision aimed to mitigate this risk. Finally, the absence of inferential modeling restricted exploration of multivariable predictors of knowledge, which could be considered in future studies.

Despite these limitations, the study adds valuable evidence to the limited body of literature on triage knowledge in Pakistan. The results suggest that targeted interventions—such as structured workshops, incorporation of triage modules into nursing curricula, and simulation-based training—could address existing misconceptions and strengthen competencies. Furthermore, the findings align with international recommendations from the Emergency Nurses Association, which advocates for specialized certification programs as prerequisites for independent triage practice (21). By prioritizing continuing education and policy-level support, hospitals can enhance both efficiency and patient safety in emergency care settings.

CONCLUSION

This study found that emergency nurses in tertiary care hospitals of Lahore demonstrated a generally good level of triage knowledge, particularly in recognizing core definitions, goals, and time limits for critical and urgent cases. However, misconceptions regarding role exclusivity and inconsistencies in scenario-based judgments highlight areas requiring improvement. Higher academic qualifications were strongly associated with better knowledge, while younger nurses outperformed older colleagues, underscoring the influence of both education and recency of training. These findings suggest that targeted interventions—such as structured educational programs, refresher workshops, and integration of triage into nursing curricula—are essential for strengthening decision-making capacity. By addressing identified gaps, hospital administrators and policymakers can enhance emergency department efficiency, improve patient prioritization, and ultimately reduce preventable morbidity and mortality in Pakistan's resource-limited healthcare system.

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