Are Emergency Departments in the United States Following Recommendations by the Emergency Severity Index to Promote Quality Triage and Reliability?

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Contribution to Emergency Nursing Practice

- The current literature on scientific knowledge of best practices in 5-level ED triage systems indicates that nurse experience, triage system education, and monitoring of triage decision accuracy are necessary to maintain the reliability of the triage system and promote accuracy of triage decisions.
- This article contributes findings that the majority of emergency departments studied did not have policies and/or processes implemented to guide the use of the triage system.
- Key implications for emergency nursing practice found in this article are that policies and procedures related to staff qualifications, triage training, and quality monitoring of triage decision accuracy need to be implemented in emergency departments.

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Abstract

Introduction: The purpose of this study was to explore and describe (1) the extent to which emergency departments in the United States are promoting the quality of triage and the reliability of triage systems according to recommendations in the *Emergency Severity Index (ESI) Handbook* and (2) if relationships existed between triage *structure* (policies) and *process* (procedures) in emergency departments that promote accuracy of triage decisions.

Methods: Donabedian's Structure, Process, Outcome model guided this descriptive, correlational study. Nurses were recruited from all geographic regions in the United States, and the ED TRiAGE Structure and Process Survey was developed to collect data. X^2 tests of independence, Fisher's exact tests, and Kendall's τ were used to assess relationships of structure and process.

Results: The majority of emergency departments did not meet at least the minimum recommendations of the ESI triage system. Significant positive relationships were found when an emergency department had *structure* (policy) to guide *process* (procedures). Differences were reported in the type, amount, and focus of the policies and procedures.

Discussion: Donabedian's model emphasizes that good structure and process are antecedents of good outcomes. This study serves as a foundation on which to examine the consistency of emergency departments meeting the ESI guidelines that promote triage accuracy and maintaining the reliability of evidence-based triage acuity systems.

Key words: Triage; Emergency Severity Index; Triage systems; Quality; Emergency department

Introduction

A majority of emergency departments in the United States experience crowding,[1-3] in which the number of people seeking care is greater than the available resources in the emergency department.[1] It is paramount, in these situations, that the limited number of resources (eg, emergency nurses, providers, beds in the treatment area, and available diagnostic services) are used optimally for patients in need of urgent treatment and intervention.[3] Emergency departments use the triage process to sort patients by assigning an acuity level, which determines the order in which patients are managed.[2] Triage decisions are reflected in the assignment of a triage level indicating which patients should be evaluated first.[4-7]

Five-level triage systems are considered the gold standard of ED triage.[8-14] Although there are variations in determining how patients are classified in each of the major 5-level triage systems developed around the world (Manchester Triage System [MTS], UK; Australian Triage Score [ATS]; Canadian Triage and Acuity Scale [CTAS]; and Emergency Severity Index [ESI], United States), all systems must be used consistently to maintain reliability. The MTS, ATS, CTAS, and ESI have all published guidelines that recommend consistent education, implementation, and quality audits to promote triage decision accuracy and reliability.[10,12-14]

The ESI is the most commonly used 5-level triage system in the United States[2] and has been used in practice for nearly 2 decades,[15] with well-documented inter-rater reliability.[15-23] In the reliability studies, the highest weighted kappas of 0.759[21] and 0.89[18] measured between triage nurse and expert nurse were at sites that reported initial ESI training, ongoing ESI training, and quality monitoring of triage decisions. The 4 ESI reliability studies with the lowest weighted kappas for inter-rater reliability did not report if ongoing education and quality monitoring occurred in the emergency departments included in the studies.[19-20,22-23] The *ESI Handbook Version 4*, updated in 2012, is the most current resource available to individual emergency departments. The *ESI Handbook* includes 4 recommendations that are stated in absolute language for ESI users to *always* follow to promote quality triage, consistent use of the system, and triage accuracy:[14] (1) "Nurses who participate in an ESI educational program are expected to be experienced triage nurses and/or to have attended a separate, comprehensive triage educational program" (page vi); (2) "triage nursing staff will need a full orientation to the ESI" (page 55); (3) "every patient [should] be assigned a triage score on arrival" (page 64); and (4) "at a minimum [for evaluation and quality improvement], always monitor accuracy of the triage level" (page 64).

Several research studies have focused on the accuracy of triage decisions using ESI when the accuracy of triage decisions reflected the performance of the triage nurse.[24-30] Accuracy rates for triage decisions were found as low as 48%[29] and as high as 80%,[27] reflecting a wide range of decision accuracy. However, it was not reported if emergency departments included in the studies followed the minimum, absolute recommendations in the *ESI Handbook* to promote accuracy. The *ESI Handbook* recommends that individual emergency departments set a target triage accuracy goal and noted that 90% accuracy was a frequently selected threshold.[14]

Further investigation is needed to better understand if individual emergency departments have adopted the 4 absolute ESI recommendations to promote accuracy and maintain reliability of the triage system. The purpose of this study was to explore and describe (1) the extent to which emergency departments in the United States are promoting the quality and reliability of triage systems according to the 4 absolute recommendations in the *ESI Handbook* and (2) if relationships existed between triage *structure* (policies) and *process* (procedures) in emergency departments that promote accuracy of triage decisions.

Donabedian's Structure, Process, Outcome Model, based on a 3-part approach in which good structure increases the likelihood of good processes, and good processes increase the likelihood of good outcomes, was used to frame this study.[31] *Structure* refers to the attributes of the setting in which care takes place[31] such as organizational policies. S*tructure* represented triage policies, specifically for: triage nurse qualifications, triage system education, and quality monitoring of triage decision accuracy in emergency departments. *Process* encompasses what is actually done in the exchange of care or seeks to answer if "good" medical care has been applied. [31] *Process* represented what was actually being done in emergency departments, specifically, years of experience required before assuming the triage nurse role, providing triage system training, assigning acuity levels for all patients, and monitoring triage decision accuracy. Before quality assessment can begin, a relationship between structure and process and process and outcome should be established.[32] The structure and process of triage in emergency departments in the United States is unknown, therefore establishing *if* this relationship exists precedes establishing if a relationship exists among process and outcome and quality assessment of the effectiveness of triage.

Methods

This study used a descriptive correlational design and was approved by the university Institutional Review Board and the ENA's Institute for Emergency Nursing Research (IENR) to purchase the member list.

The target population was licensed RN leaders in emergency departments who were familiar with the *structure* (policies) and *process* (the actual procedures) of triage nurse qualifications, triage education, and quality monitoring of triage decision accuracy in their respective departments. Thus, a convenience sample of 1,456 RNs from the ENA ED managers list was used as the primary sampling method. Criteria for inclusion were as follows: licensed RN, currently working in an emergency department, access to a computer and the Internet, and able to read and write English. Exclusion criteria were self-reports that the participant was not knowledgeable about the *structure* (policies) and *process* (procedures) of triage in the emergency department. *A priori* power analysis for the χ^2 statistic using G*Power 3.1.9.2 indicated that a sample size of 122 emergency nurses was needed for a power of .80, β of .20, and α of .05.

Each of 1,456 members on the ED managers list was mailed a letter introducing the study, including links to the web address and a QR code scan to access the survey. A monetary incentive of $1 was included with each mailing. ENA did not officially endorse or sponsor the study.

The ED TRiAGE Structure and Process Survey was developed by the first author using the *ESI Handbook*, previous research literature, The Joint Commission guidelines, and ED experts. Face and content validity of the instrument were estimated using 2 experts in ED triage and the ESI triage system. Further, the survey was evaluated by 5 ED leaders for readability, clarity, and time required to complete the survey.

The survey was administered, and data were collected via the Internet using Qualtrics Survey Software (Qualtrics, Provo, UT). Data were electronically transferred to IBM, SPSS Statistics Version 24 (SPSS, Chicago, IL) for analysis. Data analyses included descriptive statistics, χ^2 tests of independence, and Fisher's exact tests to examine relationships among emergency departments, triage *structure,* and triage *process*. Kendall's τ was used to describe correlations of summed structure scores and summed process scores. Odds ratios were used to describe the strength of associations.

Results

SAMPLE CHARACTERISTICS

Of the 148 participants included in this study, the majority (76.4%) were emergency nurse managers, 45.9% held Bachelor of Science degrees, 41.9% held graduate degrees or higher and had a range of years of ED experience (n = 146) of 0 to 48 years (M = 17.83, SD = 9.62). They represented emergency departments from all regions in the United States, nondesignated and Levels 1 to 3 designated trauma centers, and annual patient volumes from less than 25,000 to greater than 100,000 visits (Table 1). The majority of participants reported that the ESI 5-level triage system was used in the represented emergency departments (n = 139, 93.9%). Other participants indicated that their emergency departments used a 3-level triage system (n = 4), 4-level triage system (n = 2), CTAS (n = 2), and a modified ESI (n = 1). Participants were asked to estimate the average number of hours of crowding per day in the emergency department. Crowding was operationally defined as having at least 1 patient in urgent need of placement in the treatment area who has to wait in a waiting area for 30 minutes or more. The responses covered the entire range of 0 to 24 hours (M = 6.14, SD = 5.56), and 88% reported at least 1 hour of crowding per day.

TABLE 1
ED demographics (n = 148)

ED characteristic	n (%)
Trauma center designation	
Not designated	72 (49)
Level 1	31 (21)
Level 2	24 (16)
Level 3	20 (14)
Number of annual patient visits	
<25,000	41 (28)
25,000 to 49,999	36 (25)
50,000 to 74,999	37 (25)
>75,000 to 99,999	21 (14)
>100,000	11 (8)
ED location by region	
Midwest	48 (33)
South	42 (28)
Northeast	29 (20)
West	28 (19)
Triage acuity system	
3-level triage	4
4-level triage	2
5-level Canadian Triage Acuity Scale	2
5-level Emergency Severity Index	139
Other (modified ESI)	1

STRUCTURE AND PROCESS CHARACTERISTICS

When considering triage nurse qualifications, 68% of the emergency departments had *structure* (a policy) that defined qualifications of the triage nurse. For triage education, slightly more than half of the emergency departments (54.5%) had *structure* (a policy) for triage system training. However the majority of emergency departments (76.2%) reported the *process* of triage system education was required. The *structure* of a policy for quality monitoring of triage decision accuracy was present in less than one third of the emergency departments (31.7%). However, nearly two thirds (61.6%) reported *process* of monitoring triage decision accuracy in the emergency department. Of the emergency departments that monitored triage decision accuracy, approximately half (51.1%) monitored on an as-needed basis, whereas others indicated scheduled monitoring that occurred on a monthly (32.2%), quarterly (13.3%), and annual (3.3%) basis. Overall, only 30% of the emergency departments in this study monitored triage decision accuracy consistently.

RELATIONSHIPS BETWEEN STRUCTURE AND PROCESS

Each of the *structure* (policy) and *process* (procedure) pairs was analyzed to determine if a significant relationship existed using χ^2 tests of independence. The emergency departments with *structures* (policies) in place were significantly more likely to report that the ESI-recommended *process* was used in the emergency department (Table 2). For example, emergency departments that had a triage system training policy were significantly more likely to require nurses to complete a triage system education program before working as a triage nurse than those emergency departments without policies (χ^2 [1, N = 141] = 22.84, $P = < 0.001$). The estimated odds of emergency departments following the ESI recommendation of triage system training were nearly 8 times higher among emergency departments with policies for triage system training relative to emergency departments without triage system training policies (odds ratio [OR] = 7.94; 95% confidence interval [CI] = 3.15, 19.99).

INFLUENCES OF ED VOLUME, TRAUMA-CENTER DESIGNATION, AND TRIAGE SYSTEM

Although all emergency departments share the same mission to treat and stabilize emergency medical conditions, the characteristics and resources at individual emergency departments differ. Three variables that could have potentially influenced the relationship between *structure* and *process* were identified: triage system used, trauma center designation, and annual volume of patients (Table 3). These ED characteristics were analyzed statistically with each *structure* and *process* recommendation using χ^2 or Fisher's exact test analyses when appropriate. There were no significant findings.

TABLE 2
Relationship of emergency departments that had policies (*structure*) that followed ESI recommendations (*process*)

ESI recommendations (Process)	Policy (n)	No policy (n)	χ^2	Odds ratios OR 95% CI	
General triage training (n = 141)					
Yes	47	22	8.01*	2.67	1.34-5.31
No	32	40			
Triage system training (n = 141)					
Yes	72	35	22.84*	7.94	3.15-19.99
No	7	27			
Monitor triage decision accuracy (n = 137)					
Monitored	43	40	31.38*	18.28	5.28-63.24
Not monitored	3	51			
Routine monitoring of accuracy† (n = 83)					
Scheduled	29	11	13.24*	5.45	2.13-14.02
Not scheduled	14	29			

CI, confidence interval
* All χ^2 tests were significant at $P \leq 0.005$.
† In emergency departments that indicated triage decision accuracy was monitored.

TABLE 3
Percentage of *structure* (policies) and *process* (procedures) in emergency departments by annual patient volume, trauma designation, and triage system

	Annual patient volume				Trauma center designation				Triage system	
	< 25,000	25,000 to 49,999	50,000 to 74,999	> 75,000	Not designated	Level 1	Level 2	Level 3	Non-ESI	ESI
Structure (Policy)										
Triage nurse qualifications										
Yes	62.5	73.5	77.1	68.7	69.1	80.6	58.3	72.2	44.4	72.2
No	37.5	26.5	22.9	31.3	30.9	19.4	41.7	27.8	55.6	27.8
Triage training										
Yes	41.0	60.0	64.7	59.4	51.4	64.3	52.2	63.2	66.7	55.3
No	59.0	40.0	35.3	40.6	48.6	35.7	47.8	36.8	33.3	44.7
Triage quality monitoring										
Yes	25.0	44.1	41.9	23.3	30.4	37.0	31.8	38.9	22.2	34.4
No	75.0	55.9	58.1	76.7	69.6	63.0	68.2	61.1	77.8	65.6
Process (Procedure)										
Years of experience for triage nurse										
No minimum	36.5	16.7	5.6	15.7	25.0	6.7	12.5	25.0	44.4	17.5
3-6 m	4.9	2.8	5.6	3.1	4.2	3.3	4.2	10.0	-	5.1
>6 m-1 y	12.2	19.4	25.0	28.1	19.4	26.7	25.0	10.0	33.3	19.7
>1 y-2 y	39.0	52.8	55.6	50.0	45.8	56.7	45.8	50.0	22.2	51.1
>2 y	7.3	8.3	5.6	3.1	5.6	3.3	12.5	5.0	-	6.6
Require triage system training										
Yes	63.4	72.2	86.1	84.4	69.4	90.0	91.7	60.0	66.7	76.8
No	36.6	27.8	13.9	15.6	30.6	10.0	8.3	40.0	33.3	23.2
Monitor triage acuity accuracy										
Yes	48.8	66.7	66.7	67.8	56.9	72.4	58.3	65.0	77.8	60.6
No	51.2	33.3	33.3	32.2	43.1	27.6	41.7	35.0	22.2	39.4
Frequency*										
Planned	30	50	75	33.3	41.5	52.4	57.1	53.8	14.3	51.8
As needed	70	50	25	66.7	58.5	47.6	42.9	46.2	85.7	48.2
Assign a triage acuity to every patient										
Yes	100	100	100	100	100	100	100	100	100	100

ESI, Emergency Severity Index
* For emergency departments in which triage acuity accuracy was monitored, frequency represented if accuracy was monitored on a planned or as-needed basis.

EXTENT OF EMERGENCY DEPARTMENTS FOLLOWING ALL ESI RECOMMENDATIONS

The extent that emergency departments have implemented recommendations in the *ESI Handbook* was measured by assigning 1 point for each of the absolute ESI-recommended *structure* (policy) and *process* (procedure) present in individual emergency departments. Nearly one quarter (24.6%) of the emergency departments did not have any of the policies in place to support the ESI recommendations; however, 29.2% of the participants reported that all 3 policies (structures) existed in their emergency departments.

All participants responded that a triage acuity level was assigned for every ED patient upon arrival. Nearly three fourths (73.1%) of the emergency departments did not follow all of the *process* (procedures) recommended in the *ESI Handbook*; however, 26.9% of the emergency departments had implemented all of the recommended processes. Overall, only 16.2% of participants in this study indicated that *all* of the absolute ESI recommended *structures* (policies) and *processes* (procedures) were used in their emergency department. A significant positive correlation was found using Kendall's τ between the summed score of the *structure* and the summed score of *process* used in emergency departments ($\tau = 0.452$, $P < 0.001$).

Discussion

The majority of emergency departments (94%) reported using an ESI 5-level triage system. This finding was higher than previous reports in the literature in which two thirds of the participants reported using ESIs.[33] This may be explained by the fact that nearly a decade has passed since a national assessment of the use of the ESI triage system has been reported. The nurses in this study estimated similar crowding to the Institute of Medicine (IOM) report[3] that 91% of emergency departments in the United States experience overcrowding, indicating that a triage process is needed in the majority of emergency departments.

Of the triage *structure* explored in this study, participants most often reported an ED policy that defined the qualifications of nurses who perform triage. Although this study did not explore defining characteristics of qualified triage nurses, participants were asked to indicate the minimum years of ED experience required for triage nurses in their emergency departments. Nearly half of the emergency departments in this study reported emergency nurses with less than 1 year of ED experience were qualified to work in the triage nurse role, which is less than the amount of required experience reported in recent literature.[22,28] In a free text response, a nurse in the study explained that, because of current staffing patterns, emergency nurses were triaging "sooner rather than later."

This study found a significant positive relationship between emergency departments that had *structure* (a policy) for a triage training program and emergency departments that *process,* required triage system training and general triage training. A significant positive relationship was also found in emergency departments with *structure* (a policy) for quality monitoring and *process,* emergency departments that conducted scheduled monitoring of triage decision accuracy. However, a higher number of emergency departments had a *process* (procedure) of quality monitoring of triage decisions compared with the number of emergency departments that had *structure* (policy) to guide quality monitoring of triage decisions. Although it appeared that some emergency departments recognized the need for a quality monitoring process, irrespective of *structure* (a policy) in place to guide the activity, "consistency" is a key concept in maintaining the reliability of the triage system.

Limitations and Strengths

A few limitations for this study must be considered. The ED TRiAGE Structure and Process Survey was developed for this study, limiting the comparison of results with previous studies. There was a possibility that more than 1 nurse from the same emergency department received the invitation letter. However, the emergency departments represented in the study were checked for independence, and no 2 emergency departments had the same characteristics. Also, the participants were recruited from a convenience sample of nurses from the ENA ED managers list, which limits generalizability of the study. The response rate was 10.5% and may lack a full representation of emergency departments in the United States. Lower response rates, the cost of mailing, and undeliverable mail were anticipated challenges of using the survey research method.[34] E-mails and letters were received from members on the ED manager's list who were not clinically based in emergency departments and did not meet the inclusion criteria of the study. Therefore, the actual response rate of eligible participants is unknown. However, a strength of the study was that the sample size (148) exceeded the number of subjects needed based on the power analysis (122), and all regions of the United States were represented.

Implications for Emergency Nurses

To maintain the reliability and validity of a triage system, consistent education and triage accuracy quality monitoring are crucial and are recommended by ATS, CTAS, ESI, and MTS evidence-based triage systems.[12-14] The results from this study reveal that structure and process for triage nurse qualifications, triage education, and quality monitoring of triage decisions did not reflect that ESI guidelines are consistently used in practice.[14] In fact, less than one fifth of emergency departments had all of the minimum *structure* and *process* recommended in the *ESI Handbook*.

An appropriate starting point for meeting these recommendations is for leaders in individual emergency departments to prioritize a review (or establish) the *structure* (policies) that support triage accuracy and reliability of the

triage system. The policies should be written based on the individual emergency department and what can be realistically achieved and based on resources, reflecting currency with evidence-based guidelines[14] and recommendations by nursing organizations.[35] Assessment of *process* (what is actually done) for congruency with *structure* (policies) should also be undertaken. Interdisciplinary collaboration when reviewing the triage process is recommended, and triage nurses should be consulted for input and in prioritizing the development and implementation of structure and process to improve triage practice.

Conclusions

The findings reported from this study reflected input from ED leaders and data from emergency departments across the nation. This was the first study to report the status of ESI recommendations in the form of *structure* (policies) and *process* (procedures) of triage in emergency departments throughout the United States. Although many emergency departments have adopted evidence-based 5-level triage systems, many are not following the minimum *structure* and *process* to promote the quality of triage decisions and reliability of the triage system.

Results indicated that the *structure* to guide triage processes was lacking in emergency departments, and *processes* in emergency departments were not guided by policies. Positive relationships between *structure* (an emergency department having a policy) and *process* (what is actually done in the emergency department) were found, supporting Donabedian's model that structure is an antecedent to process in quality care.[32] Using the Structure, Process, Outcome model,[31] the next step is to study if relationships exist between triage *process* and *outcomes*. Once it is determined that relationships exist, quality-assessment studies of ED triage can ensue to direct intervention studies aimed at improving outcomes of triage acuity decisions.

Author Disclosures

Conflict of interest: none to report.

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