Evaluation of Nurse-Physician Inter-Observer Agreement on Triage Categorization in the Emergency Department of a Taiwan Medical Center

Song-Seng Loke, MD; Shiumn-Jen Liaw[1], MD; Lee Keong Tiong, MD; Tiing-Soon Ling, MD; Wang-Tsai Chiang, MD

Background: To examine nurse-physician inter-observer agreement on triage categorization and analyze their differences for future reference.

Methods: A retrospective observational study was performed. Patients entering a 3500-bed medical center emergency department (ED) from July 1 to 31, 1998 were randomly selected. We compared triage assignments made by nurses and 2 ED physicians, and examined them for inter-observer agreement (kappa-statistic) within each illness category.

Results: We found that the overall nurse-physician agreement on triage categorization had a £e-value of 0.32 (99% confidence interval, 0.27-0.37). The level of inter-observer agreement was not consistent across all illness categories. Agreement was better when assigning critical patients, but it was poor when assigning non-emergency patients.

Conclusion: The overall nurse-physician agreement with triage categorization was poor. The lack of agreement on triage decision making has important implications for EDs in which the priority of care is based on nursing triage categorization. Detailed chart recording and continued work is necessary to improve the agreement between nurse-physician triage categorization.

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Key words: triage, nurse-physician inter-observer agreement, emergency department.

Triage is a critical component of any emergency department (ED). The main goal of a triage system is to assign a degree of urgency to each patient, so that the most seriously injured or ill receive medical attention more quickly. Triage is also used to measure the ED workload and to predict resource utilization. Despite its importance and widespread use, there is little agreement on triage protocols and poor validation of its relationship to important outcome variables.

Existing triage systems use from 2 to 7 priority categories. Degree of urgency is decided based on patient complaints, physiological measurements, premorbid illness, test results, and historical cues concerning the current illness.[1,2] Nurses who have received training usually perform triage categorization. The benefits claimed for triage include improved patient flow resulting in a reduction in

From the Department of Emergency Medicine, Chang Gung Memorial Hospital, Taipei; [1]Department of Emergency Medicine, St. Paul's Hospital, Kweishan, Taoyuan.

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Address for reprints: Dr. Song-Seng Loke, Department of Emergency Medicine, Chang Gung Memorial Hospital. 5, Fu-Shing Street, Kweishan, Taoyuan 333, R.O.C. Tel.: 886-3-3281200 ext. 2482; Fax: 886-3-3287715; E-mail: cgmhpcmd@ms4.hinet.net

waiting times, and increased patient satisfaction.[3]

Several studies[2-21] have been conducted to evaluate different triage protocols, and most of these studies showed that nurse-physician inter-observer agreement with triage levels is poor to fair.[3-6,22] Very few authors have studied this relationship to departmental performance, patient satisfaction, and clinical outcomes. Some studies reported that triage systems do improve patient flow in emergency departments;[2,10] however, 1 study suggested that the triage system was related to increased patient waiting time and unaffected or decreased patient satisfaction.[21] A triage system's ability to predict clinical outcomes has also not been established. One study showed that none of the triage decisions made by nurses, physicians, or a computer was able to accurately predict hospitalization.[5]

In Taiwan, a new triage protocol has been developed in response to implementation of the National Health Insurance Plan, and has been used in most emergency department since May 1998. Using the triage criteria, triage nurses assign a priority to a patient to be seen and treated according to the triage system. No studies have yet investigated the reliability and validity of the triage protocol. The purpose of this study was to examine nurse-physician inter-observer agreement on triage levels using this triage protocol, and to further determine if the level of agreement is consistent among different illness categories.

METHODS

We conducted a retrospective observational study in a 3500-bed tertiary medical center ED. Using the ED database of all patients who visited our ED from July 1 to 31, 1998, every third patient on the list was selected until a sample size of 2200 subjects was reached. Patients who were 17 years of age or younger were excluded from the study due to the different emergency setting and triage criteria for pediatric patients.

The triage categories were defined as follows

I. Patients assigned to triage level I require immediate medical attention, or their lives could be in danger. Examples of such conditions are cardiac or respiratory arrest, chest pain of cardiac origin, suspected myocardial infarction, internal or large external bleeding, seizures, sudden loss of consciousness, open fractures, rape, respiratory distress, systolic blood pressure (BP) < 90 or > 220 mmHg, and body temperature (BT) > 41 or < 32°C.

II. In level II, patients should receive medical attention within 10 min. The delay poses no immediate threat to life or limb, but the patient is in severe pain, or the vital signs are abnormal. Examples of these conditions are syncope, sudden onset of neurological deficit, severe pain, chest pain without definite etiology, moderate asthma, suicidal tendency, violent behavior against others, a small open wound, and possible fracture. Other indications include systolic BP between 180 and 220 mmHg, and BT between 39 and 40°C or between 32 and 35°C.

III. Assignment to triage level III means that ED care is needed, and the patient should receive medical attention within 30 min. Examples of these conditions are fever greater than 39°C, mild injuries without an open wound, headaches, stomach upset, diarrhea, dizziness, black stool passage, back strain, and skin rash.

IV. Assignment to triage level IV indicates that the condition with which the patient presents is non-urgent, that medical care can be delayed, and that the patient should be referred to appropriate alternatives.

For each subject, we recorded the chart number, gender, age, date and time of ED presentation, triage category assigned by the nurses, date and time of leaving the ED, chief complaint(s), vital signs, final diagnosis, and disposition from the ED.

In addition to the triage assignment made by nurses, 2 emergency physicians, 1 attending and 1 senior resident, retrospectively assessed patient conditions from the triage record and chart, and then assigned each patient a triage category using the same triage protocol. The triage note, developed for each patient, included information on age, vital signs, coma scale, chief complaint(s), and brief past and current medical histories. The 2 physicians initially assessed and assigned a triage category to each patient independently, and then they discussed the cases for which they had assigned different triage categories for the same patient and tried to reach a consensus. During the review process, the 2 physicians also discussed the conditions which were not listed in the triage protocol, and then agreed to the

assignment of the triage category. The research assistant then added the decisions to the triage protocol, which provided future references for chart review and triage assignments.

To evaluate nurse-physician agreement on triage categories, the chance-adjusted measure of agreement (κ-value) was calculated. Although there is no universal agreement on κ-values that represent "good" or "poor" agreement, several authors have suggested that a κ-value of 0.5 is often consider fair agreement.[4,5] Kappa statistics were compared by calculating the standard error.

RESULTS

A sample of 2200 patients was initially selected from the ED network using a systematic sampling method, and 38 patients were subsequently excluded due to incomplete records in their ED charts. Of the 2162 patients enrolled in the study, 59% were men and 41% were women. The mean age of the study subjects was 48.6 years, with 75% aged between 18

Table 1. Nurse and Physician Assignment to Triage Levels

Assignment by nurses			Assignment by physicians		
Triage	Count	%	Triage	Count	%
1	51	2.36	1	120	5.55
2	380	17.58	2	516	23.87
3	1657	76.64	3	1457	67.39
4	74	3.42	4	69	3.19

Table 2. Triage Agreement between Physicians and Nurses

		Retrospective triage by physicians				
		1	2	3	4	Total
Prospective	1	35	13	3	0	51
triage by	2	58	191	126	5	380
nurses	3	27	308	55	49	1657
	4	0	4	55	15	74
Total		120	516	1457	69	2162

Kappa = 0.32; 99% CI = 0.27, 0.37.

Table 3. List of Categories of Illness and Nurse-physician Agreement with Respect to Each Category

Disease	Total cases	Dr. > Nurse	Agree	Nurse > Dr.	Kappa	99% C.I.
Non-traumatic						
Cardiovascular	128	49	67	12	0.24	0.04, 0.43
Respiratory	165	42	103	20	0.27	0.10, 0.44
Gastrointestinal	337	27	287	23	0.14	0.00, 0.31
Liver/biliary	93	7	80	6	0.25	0.00, 0.62
Urinary	250	35	199	16	0.29	0.13, 0.46
Endocrine	55	10	33	12	0.19	0.10, 0.59
Joint/skeletal	58	8	49	1	0.35	0.00, 0.81
Cerebrovascular	109	51	41	17	0.07	0.00, 0.36
Infectious	45	11	30	4	0.35	0.00, 0.65
Muscular	42	10	26	6	0.10	0.00, 0.51
Oncology	135	24	98	13	0.16	0.00, 0.37
Psychiatric	30	8	20	2	0.29	0.00, 0.74
Gynecological	63	3	53	7	0.33	0.00, 0.72
ENT	69	9	53	7	0.20	0.00, 0.53
Dermatology/allergy	48	6	40	2	0.14	0.00, 0.62
Other	121	26	85	10	0.25	0.01, 0.49
Traumatic						
Head/spinal injury	88	24	55	9	0.40	0.19, 0.62
Trunk injury	50	21	24	5	0.11	0.00, 0.49
Fracture/dislocation	65	21	35	9	0.13	0.00, 0.43
Burn	19	3	12	4	0.41	0.00, 0.88
Extremity injury	104	35	65	4	0.30	0.02, 0.57
Facial injury	58	20	32	6	0.14	0.00, 0.47
Other	21	0	21	0	1.00	1.00, 1.00

and 64 years, and 25% 65 years and older. Nineteen percent of patients were trauma cases and 81% were non-trauma cases. The total number and percentage of patients in each triage level assigned by nurses and physicians are shown in Table 1.

Table 2 compares the overall agreement on triage categories as determined by nurses and the 2 ED physicians. There was poor agreement between the 2 assignments (Cohen's kappa = 0.32; 99% confidence interval [CI], 0.27-0.37), and it is clear that the physicians tended to assign higher degrees of urgency to patients than did the nurses. The nurse-physician agreement on triage categories was poor for both trauma and non-trauma cases, with £e values of 0.31 and 0.28, respectively. Table 3 shows the list of categories of presenting conditions and the kappa values within each category. The level of physician-nurse agreement was not consistent across all illness groups. Within the non-trauma group, physician-nurse agreement was poor across all illness conditions, with higher £e values for joint/skeletal and infectious illness categories. Within the trauma group, agreement as indicated by £e value exceeded 0.4 for cases with burns and head/spinal injuries, and was complete for cases with other conditions (including dead on arrival, injuries to internal organs, and suicide).

DISCUSSION

This study demonstrates that physicians and nurses had poor agreement on triage assignments. There are possible explanations for our findings. Limitations of our retrospective study might have biased our results. Medical charts do not provide the wealth of information that a physician can obtain from seeing a patient, and possible inadequate recording on the medical charts could also have biased our results. However, another study demonstrated that physicians who saw patients at triage were not likely to agree with nurse triage categorization.[4] This is because physicians' visual assessment added 2 elements to the triage process. First, the physician was able to ask the patient questions he or she considered most important. The second advantage was that a patient's physical appearance may greatly influence a physician's decision making.

One study reported that the agreement between nurses' prospective triage categorization and physicians' retrospective triage categorization was poor (£e = 0.18).[6] Brillman et al. found fair agreement between nurses' and physicians' prospective triage decisions (£e = 0.45).[5] Another study showed that the agreement between 2 clinicians was fair (£e = 0.42).[3]

This study shows that the level of physician-nurse inter-observer agreement was not uniform across all diagnostic groups. We found that physician-nurse inter-observer agreement was better for many trauma cases and a few non-trauma cases (involving the joint/skeleton and infection); this finding is supported by other studies. It is believed that non-trauma cases may be more difficult to assess, and therefore, would result in more discrepant assignments; on the contrary, trauma cases may be more straightforward and are easier to assess quickly by nurses and physicians.

This study also demonstrates that physicians tended to assign higher degrees of urgency to patients, regardless of their diagnostic groups, than did nurses. This could be due to the fact that the physicians we chose were more conservative, especially since they did not actually see and interview the patients. For example, the physician would probably place an elderly patient complaining of chest pain into category 1 if the chart record did not give detailed information on whether the pain was of cardiac or noncardiac origin. For patients presenting with loss of consciousness, the nurse put them into category 2, but actually they belonged in category 1 as assigned by the physicians. For patients presenting with abdominal or flank pain, the physician placed them into category 3 if the chart did not record the severity of pain, but the nurses would place them into category 2 after seeing them in pain.

This study also shows that triage criteria have crucial limitations. Triage studies have stated important principles in the application of triage criteria, and 1 of them includes sensitive criteria which can find all potentially critical patients.[2]

Although the triage system did not perform well in predicting which patients required hospitalization, it is generally agreed that there are limitations in using hospital admissions as an outcome variable. Physicians' decisions to admit patients are often based on medical, social, and economic considerations. We understand that not all patients who

require ED care require admission; however, at this time, admission is the only concrete outcome standard available.

The lack of physician-nurse agreement and the inability to predict outcomes have important implications for patient access to health care and for hospital planning. In general, because of differences in triage techniques and policies for hospital admission, it is essential to evaluate triage criteria in multiple emergency departments. Nevertheless, the findings in our study can serve as a future reference for improving triage criteria and the further analysis of triage systems.

Conclusions

We retrospectively evaluated a triage protocol in an emergency department. The physician-nurse inter-observer agreement with regards to triage decisions was poor. The lack of agreement on triage decision making has important implications for EDs in which the priority of care is based on nursing triage categorization.

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台灣某醫學中心急診檢傷分類：護士醫師認知一致性之評估

駱聰成　廖訓禎[1]　李強忠　林忠順　江旺財

背 景： 評估急診護理人員與醫師間檢傷分類的一致性，並分析兩者不同之原因爲何，以作爲臨床之參考及改進。

方 法： 採回溯性的研究，利用急診室電腦病患輸入資料，從87年7月1日至同年7月31日，隨機採樣病患2,200位。比較護士於現場對病患檢傷分類及急診醫師從病例審查中所給的檢傷等級的一致性。

結 果： 護理人員普遍在檢傷分類等級上有比較醫師低，而醫師和護理人員檢傷分類一致性£e值爲0.32。對於不同類別的疾病族群其差異性很大，對於危急的病患，檢傷分類的一致性比非急症者來的好。

結 論： 檢傷分類對急診是相當重要的，它可作爲醫護人員在急診處理病患優先順序的指標。本研究顯示醫師所做之檢傷等級判斷一致性不高。詳細的病歷記錄及持續的合作改進對提高護理人員與醫師對檢傷分類認知的一致性是有需要的。

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關鍵字： 檢傷分類，護士醫師認知一致性，急診室。

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