The Accuracy of Pediatric Nursing Triage and Its Effectiveness in Reducing the Febrile Convulsion Rate in the Waiting Room

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Abstract : **Triage has become an integral part of risk management for patients at the Pediatric OPD. After 12 months of its institution, we evaluate the accuracy of nursing triage and its impact on reducing the rate of Febrile Convulsions (FC) occuring in the waiting room at the Pediatric OPD.**

Method : **We reviewed the medical records of patients seen in the Pediatric Outpatient Department on 7 random days over a 3-month period. The triage status of the patients was noted and compared to their clinical discharge status. Patients were considered to have'true urgent' discharge status if, during their stay in the OPD, they received emergency interventions such as intravenous hydration, oxygen, or if they were admitted for treatment. The results were entered into contingency table. Records of patients who received treatment for febrile convulsion in the treatment room during the 24-month period from January 2000 to December 2001 were also reviewed. Patients were assigned into the pre or post-triage groups according to if they were seen prior or subsequent to the institution of Modified Triage Systems (MTS) on May 1, 2001. The episode of FC was considered to have occurred at home if it was noted in the chart or if it was noted that patient had already begun convulsing at the time the patient arrived at the hospital. The difference in febrile convulsion rate occuring in the OPD before and after MTS was instituted was analyzed using a 2 tailed t-test.**

Results : **There were 806 triage records reviewed. Nursing triage's sensitivity at predicting immediate medical interventions or admissions was 0.79 and specificity was 0.98, with a positive predictive value of 0.67 and a negative predictive value of 0.99. The rate of febrile convulsion occuring in the OPD after the instituion of MTS was found to be significantly less than that occuring before institution of MTS ($p = < 0.001$).**

Conclusion : **The evaluation of our MTS shows that we are able to predict non-urgent triage cases with good accuracy. And the intervention brought on by the triage system helped to decrease the incidence of febrile convulsion seen in the waiting room at the Pediatric OPD.**

เรื่องย่อ : ความเที่ยงตรงของการคัดกรองผู้ป่วยเด็กโดยพยาบาลตามความรีบด่วนและผลของการคัดกรองในการลดอัตราการเกิดไข้ชักระหว่างรอตรวจ

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ระบบการคัดกรองผู้ป่วยเด็กตามความรีบด่วน (ทรีอาช) ได้กลายเป็นส่วนสำคัญในการลดความเสี่ยงของผู้ป่วยที่มาตรวจที่หน่วยตรวจโรคนอก ภาควิชากุมารเวชศาสตร์ ภายใน 1 ปีที่ผ่านมาหลังจากการเริ่มระบบนี้ หน่วยตรวจโรคนอกได้ทำการประเมินการปฏิบัติงานของระบบ และผลกระทบต่ออัตราการเกิดไข้ชักระหว่างรอตรวจ

การดำเนินงานนั้นได้มีการสำรวจเวชระเบียนของผู้ป่วยที่มาตรวจที่หน่วยตรวจโรคนอก โดยสุ่มระยะเวลา 7 วันในช่วง 3 เดือน ผลการคัดกรองที่ถูกบันทึกไว้ได้ถูกนำมาเปรียบเทียบกับผลของการผ่านการตรวจจริงจากการบันทึกในเวชระเบียน ผู้ป่วยจะถูกแยกเป็น "ด่วนจริง" ถ้ามีการบันทึกว่าผู้ป่วยได้รับการรักษา เช่นให้น้ำเกลือ, พ่นยา, ให้อ๊อกซิเจน หรือถูกรับเข้าไปเป็นผู้ป่วยในเพื่อทำการรักษา และจะถูกแยกเป็น "ไม่ด่วนจริง" ถ้าไม่ได้รับการรักษาเหล่านี้ ผลจากการสำรวจได้ถูกเก็บใน Contingency table

มีการสำรวจเวชระเบียนของผู้ป่วยที่ได้รับการรักษาอาการไข้ชักในห้องให้การรักษา ที่หน่วยตรวจโรคนอก ภาควิชากุมารเวชศาสตร์ ตั้งแต่เดือนมกราคม 2543 - เดือนธันวาคม 2544 โดยแบ่งเป็นกลุ่ม "ก่อนมีการคัดกรอง" ถ้ามารับการรักษาก่อนวันที่ 1 พฤษภาคม 2544 และ "หลังการคัดกรอง" ถ้ามารับบริการหลังจากนั้นผู้ป่วยจะถูกแบ่งเป็นกลุ่มที่ชักที่บ้าน ถ้ามีการบันทึกในเวชระเบียนว่าผู้ป่วยเริ่มชักก่อนมาถึงโรงพยาบาล และชักระหว่างรอตรวจ ถ้าผู้ป่วยมีอาการชักหลังจากได้มาที่หน่วยตรวจโรคนอกแล้ว วิเคราะห์หาความแตกต่างของอัตราการชักระหว่างรอตรวจก่อนและหลังมีระบบคัดกรองโดยใช้ 2- tailed t- test

ผลการดำเนินการจากการสำรวจเวชระเบียน 806 ฉบับพบว่า การคัดกรองโดยพยาบาลมีความจำเพาะ 0.98 ความไว 0.79 positive predictive value 0.67 และ negative predictive value 0.99 ความแตกต่างของอัตราการชักระหว่างรอตรวจก่อนและหลังการมีระบบคัดกรองมีนัยสำคัญทางสถิติ ($p = < 0.001$)

โดยสรุปการประเมินระบบคัดกรองของภาควิชากุมารเวชศาสตร์ พบว่า ขั้นตอนการคัดกรองซึ่งรวมการลดไข้ผู้ป่วยเด็กอย่างมีรูปแบบ สามารถจำแนกผู้ป่วยที่ไม่มีความรีบด่วน ในทางการแพทย์ได้อย่างมีประสิทธิภาพ และสามารถลดอัตราการเกิดไข้ชักระหว่างรอตรวจได้

INTRODUCTION

Acute febrile illness is the most common chief complaint seen in the Pediatric Outpatient Department. At Siriraj Hospital, an estimated 37,503 patients were seen on a walk-in basis during the year 2000, with one of the most common chief complaints being that of fever. Couple this with an average waiting time of 60-80 minutes per patient, it is hardly surprising that an estimated 15-20 patients suffer febrile convulsion episodes while in the Pediatric OPD waiting room each year, resulting in unnecessary hospitalization and work ups that could other wise have been avoided. Since the year 2000, efforts have been made to institute a screening and early intervention system, called triage, where by patients are initially evaluated and early initial treatments such as cooling measures and antipyretics are given by the nursing staff. In addition, those patients who meet the criteria for urgent triage are expedited through the system, so that they are given priority for physician evaluation.

In May 2001, a fully functioning MTS was placed into effect that included:- screening of the children's chief complaints, prioritizing their signs and symptoms through the use of a MTC developed by the Department of Pediatrics, and the administration of cooling measures and antipyretic medication according to the guidelines set out by the Pediatric OPD. After a 12 month period, clinical applicability of this MTS as reflected by the accuracy of nursing triage performance and its impact on the rate of febrile convulsions in the waiting room needs evaluation.

MATERIALS AND METHODS

Purpose

To evaluate the accuracy of nursing triage performance according to the MTC and to compare the rate of febrile convulsion occurring in the Pediatric Outpatient Department waiting room before and after the institution of MTS.

Methods

The accuracy of triage performance was evaluated by reviewing the medical records of children receiving care in the Pediatric OPD on 7 random days over a 3-month period. The patients' triage status at the time of registration was noted and compared to the clinical status at the time of discharge from the OPD. Patients' triage status was either 'urgent' or 'non-urgent', according to the MTC. Their clinical discharge status was identified as 'true urgent' if, while in the OPD, the patient received; (1) intravenous fluids (2) oxygen therapy (3) nebulized medication for symptoms of wheezing or signs of retractions as noted in the medical records (4) diagnoses of dehydration, pneumonia or sepsis and were admitted. Data were entered using a contingency table to calculate the sensitivity and specificity of triage performance.

Children who were noted at triage to have a body temperature of $\geq$ 39 degree celcius by tempanic measurement, using Suretemp®, had cooling measures instituted. The intervention included tepid spongeing for 20 minutes in children $\leq$ 4 years of age, and administration of paracetamol according to the weight-appropriate dosage schedule. Those older than 4 years received paracetamol only. Parents of all children who received paracetamol were asked to make sure that they had not received paracetamol within the past 4 hours.

The impact of MTS on the febrile convulsion rate was evaluated by reviewing medical records of all children being treated for febrile convulsions in the treatment room in the OPD between the months of January 2000 to December 2001. Children who were seen with other diagnoses were excluded from the study. Children were classified as having seizures either at home or in the OPD, according to their medical records. The number of seizures occurring in the OPD during the period of January 2000 to April 2001 was compared to those occurring during May 2001 to December 2001 using a standard non-parametric 2-tailed t-test.

RESULTS

A total of 806 triage records of pediatric patients were reviewed. 'Urgent' triage accounted for 6.5% of all children seen during that time, while patients with 'true urgent' status at the time of discharge from the OPD accounted for 5.6% of the records being reviewed. Of these, 79% of patients who were triaged as 'urgent' actually had 'true urgent' discharge status, while 67% of the 45 patients with 'true urgent' discharge status had their conditions detected as 'urgent' at the time of triage. A summary of the findings is in Table 1. Among the 754 cases of non urgent triage, there were 10 cases (< 1%) that was considered as 'mistriage' because patients actually had 'true urgent' discharge status.

Table 1. The accuracy of nursing triage performance in comparison to clinical discharge status

		Clinical Discharge Status		Total
		True urgent	True non-urgent	
Triage Status	Urgent	35	17	52
	Non-urgent	10	744	754
Total		45	761	806
	Sensitivity		0.79	
	Specificity		0.98	
Positive predictive value			0.67	
Negative predictive value			0.99	

During the 24 months period from January 2000 to December 2001, there were 55 patients who were seen in the treatment room at the Pediatric OPD with a diagnosis of febrile convulsion. There were 36 cases of febrile convulsion during the period of January 2000 to April 2001, prior to the initiation of the MTS. Eleven patients (30.6%) were recorded as having seizures while in the OPD. During the subsequent 8 months after MTS was instituted, there were 19 cases of febrile convulsion seen in the treatment room. Of these, only 1 case (5.3 %) occurred while the patient was in the OPD. There was no statistically Significant difference between the mean age of children whose febrile convulsion occurred at home (1.744 ± 1.119 years) and those whose febrile convulsion occurred in the OPD (1.472 ± 0.491 years; $p = 0.895$). A Summary of this data is found in Table 2.

Table 2. The effect of MTS on the rate of febrile convulsion in the OPD.

	Pre MTS (Jan 00 - Apr 01)		**Post MTS (May 01 - Dec 01)**	
	Total FC treated*	*FC* in the OPD*	*Total FC* treated*	*FC* in the OPD*
Number of patients	36	11	19	1
Average age (Years)	Children with FC* at home = 1.744 ± 1.119			*P = 0.895*
	Children with FC* in OPD = 1.472 ± 0.491			
Percent of FC at OPD		30.6		5.3
			P = < 0.001	

DISCUSSION

Triage has proven to be an invaluable tool in the management of patient's potential complications in an outpatient setting. Accurate triage performance by the nursing staff has been associated with reduced waiting time, increased patient satisfaction, while affording minimal delays in the treatment of other non-urgent patients in the outpatient setting[1]. And while there are a number of standard triage protocols in published literature, the establishment of a triage system in our Pediatric OPD presents a new challenge. Like most urgent care settings, patients in our OPD often come in on a walk-in basis, with no prior appointments. However, the mere number of patients being seen makes using standard triage protocol impractical and even more time-consuming (Figure 1[1]). Thus, the Division of Ambulatory Pediatrics, together with the Department of Nursing at Siriraj Hospital, developed a Modified Triage Criteria (MTC). The MTC, which is adopted from the triage protocol used by WHO field workers, utilizes 2 simple algorithms derived from common illnesses seen in the OPD, such as fevers, respiratory distress, and diarrhea. In conjunction with the knowledge of common urgent diagnoses in our pediatric population, these algorithms are directed at predicting urgent conditions such as the Shock Syndrome associated with Dengue Hemorrhagic Fever, sepsis and dehydration.

As demonstrated, our MTC has the desired outcome of predicting those that do not need urgent triage. However, the sensitivity of 0.79 seen in this study was somewhat lower than expected. In reviewing the literature, Tamburlini et al. reported the percent of patients triaged as urgent according to the APLS-based triage protocol was 16.5% with a sensitivity of 0.85 when the discharge status was used as the gold standard for triage assignment accuracy[2].

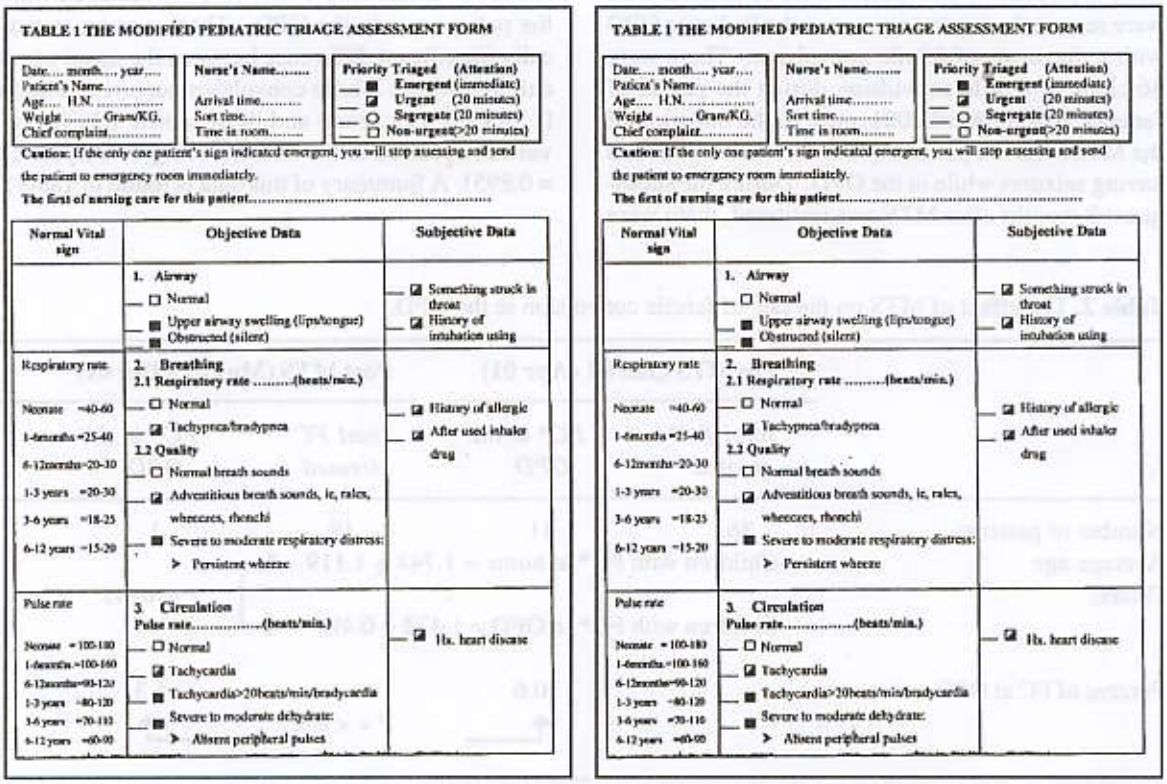


TABLE 1 THE MODIFIED PEDIATRIC TRIAGE ASSESSMENT FORM

Date.... month.... year....
Patient's Name.....
Age.... H.N. .....
Weight ..... Gram/KG.
Chief complaint.....

Nurse's Name.....
Arrival time.....
Sort time.....
Time in room.....

Priority Triaged (Attention)
— ■ Emergent (immediate)
— ☑ Urgent (20 minutes)
— ○ Segregate (20 minutes)
— □ Non-urgent(>20 minutes)

Caution: If the only one patient's sign indicated emergent, you will stop assessing and send the patient to emergency room immediately.

The first of nursing care for this patient.....

Normal Vital sign	Objective Data	Subjective Data
	1. Airway — □ Normal — ■ Upper airway swelling (lips/tongue) — ■ Obstructed (silent)	— ☑ Something struck in throat — ☑ History of intubation using
Respiratory rate Neonate =40-60 1-6months =25-40 6-12months=20-30 1-3 years =20-30 3-6 years =18-25 6-12 years =15-20	2. Breathing 2.1 Respiratory rate .....(beats/min.) — □ Normal — ☑ Tachypnea/bradypnea 2.2 Quality — □ Normal breath sounds — ☑ Adventitious breath sounds, ie, rales, wheezes, rhonchi — ■ Severe to moderate respiratory distress: ➢ Persistent wheeze	— ☑ History of allergic — ☑ After used inhaler drug
Pulse rate Neonate =100-180 1-6months =100-160 6-12months=90-120 1-3 years =80-120 3-6 years =70-110 6-12 years =60-90	3. Circulation Pulse rate.....(beats/min.) — □ Normal — ☑ Tachycardia — ■ Tachycardia>20beats/min/bradycardia — ■ Severe to moderate dehydrate: ➢ Absent peripheral pulses	— ☑ Hx. heart disease

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Figure 1-1 and 1-2. Modified Triage Assessment Form

Other reviews have yielded similar results[1-5]. The proportion of our patients assigned into the 'urgent' triage category was consistently lower than other studies. This is most likely due to the limitations of our triage method where by we rely heavily on objective patient inspection with, vital signs measurements done only on an as-needed basis. Moreover, when reviewing studies where physician visualization or 'quick look' was performed for questionable cases as an adjunct to nursing evaluation, the sensitivity of triage category assignment compared to triage discharge status improved significantly.[6-9]

The incorporation of a fever-reduction protocol as part of the Modified Triage System yielded remarkable results in terms of its impact on febrile convulsion rate of patients waiting to be seen in the Pediatric OPD. This is consistent with the knowledge that proper and timely initiation of cooling measures and appropriate antipyretic administration have significantly contributed to the effective treatment of febrile convulsion[10-13]. Our decision to allocate the administration of antipyretic medication to the triage nurses without needing a physician's order stemmed from both a practical, as well as strategic, perspective. Data from literatures suggested that, with proper training and protocol, triage nurses are capable of giving correct interventions to patients being seen as an emergency[7, 9,12,14-17].

CONCLUSION

Our MTS is in constant need of revisions and evaluation. The balance between using a tool that will recognize the majority of ill children early in the process, and at the same time, allowing fewer ill children to go through the system is a discriminating and sometimes delicate one. The lower percentage of 'urgent' triage assignment may be a result of too stringent a triage criteria, as well as the inability of less-experienced triage nurses to recognize children that are in that gray zone between 'urgent' and 'non urgent'. The improvement of the triage algorithm that includes objective scoring of children according to specific findings upon their triage will allow nursing assessment to be more universal and diminish interpersonal variations which limit of our present triage system.

Finally, in the era of medicine where restraints are placed upon all to perform with fewer resources and the quality of care is as important as the quantity of care, maximizing the potential of healthcare workers and allowing them to perform according to their area of experience and expertise is the key to continuous improvement of our healthcare delivery system as a whole.

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