The Effectiveness of Pediatric Triage Training Course for Emergency Room Nurses at Siriraj Hospital

Chayanuj Chaiyaratana, M.Sc.*
Chulathida Chomchai, M.D.**

Abstract : **The recognition of an acutely ill child is considered to be of vital importance in an emergency situation. Fast and timely intervention can prevent significant morbidity from occurring. The skill of assessing ill children in order to identify those that need immediate attention is often the task of experienced pediatric nurses. However, when availability of such personnel is limited, simplified triage criteria may be taught to novice nurses in order that they can quickly and efficiently identify those patients needing urgent care.**

Method : **We conducted a pilot triage training project with 30 volunteer, non-pediatric nurses and assessed the effectiveness of the training course through the use of a pre and post-Pediatric Triage Knowledge Test (PTKT), as well as by the accuracy of the participants' triage performance on 439 pediatric patients.**

Results : **The participants, on average, showed significant improvement on the Pediatric Triage Knowledge Assessment Test ($p = 0.01$; paired t-test), as well as being able to perform accurate triage after training on 88.3% of patients. Moreover, the existence of triage significantly reduced the waiting time of urgent patients by a total of 7 minutes ($p = 0.05$; t-test), while the waiting time for non-urgent patients was not affected.**

Conclusion: **The pilot triage training project effectively increased non-pediatric nurses' knowledge of pediatric triage and their performance of triage, and is associated with a significant reduction in the waiting time of urgent pediatric patients in the Emergency Department at Siriraj Hospital.**

เรื่องย่อ : ประสิทธิภาพของการฝึกอบรมพยาบาลในการจำแนกประเภทของผู้ป่วยเด็ก

ชยนุช ไชยรัตนะ พย.ม.*, จุฬิดา โฉมฉาย พ.บ.**

**หน่วยตรวจโรคกุมารเวชศาสตร์, ฝ่ายงานการพยาบาลตรวจรักษาผู้ป่วยนอก, โรงพยาบาลศิริราช, **ภาควิชากุมารเวชศาสตร์, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพมหานคร 10700.*

สารศิริราช 2544; 53: 741-749.

**Nursing Department, Siriraj Hospital, Bangkok, Thailand. **Division of Ambulatory Pediatrics, Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.*

การจำแนกผู้ป่วยเด็กตามความเร่งด่วนที่ต้องได้รับการรักษาเป็นหัวใจของการบริหารจัดการที่เหมาะสมสำหรับผู้ป่วยภาวะฉุกเฉิน ทั้งนี้ปฏิบัติการในการรักษาที่รวดเร็วและถูกต้อง จะเป็นการป้องกันไม่ให้เกิดภาวะทุพพลภาพขึ้น พยาบาลผู้มากด้วยประสบการณ์ในการดูแลผู้ป่วยเด็ก จะสามารถแยกแยะผู้ป่วยเด็กตามความเร่งด่วนจากภาวะฉุกเฉินออกจากภาวะที่รอได้ อย่างไรก็ตามในสถานการณ์ที่เรามีบุคลากรที่มีประสบการณ์เฉพาะสูงในการดูแลผู้ป่วยเด็กไม่พอเพียงในการปฏิบัติงาน การฝึกอบรมให้บุคลากรทางการแพทย์ซึ่งมีประสบการณ์น้อยให้สามารถประยุกต์เอาแบบแผนมาตรฐานในการจำแนกผู้ป่วยเด็กตามความรีบด่วน จะส่งผลให้บุคลากรเหล่านี้สามารถที่จะจำแนกผู้ป่วยเด็กตามความเร่งด่วน อย่างมีประสิทธิภาพและรวดเร็ว อีกทั้งยังสามารถบ่งบอกกลุ่มผู้ป่วยเด็กที่ต้องการปฏิบัติต่ออย่างทันที

วิธีการศึกษา ผู้ศึกษาได้คัดเลือกพยาบาลอาสาสมัคร 30 คน ที่ตามปกติไม่ได้ปฏิบัติงานดูแลผู้ป่วยเด็กมารับการอบรมในโครงการการฝึกอบรมการจำแนกประเภทผู้ป่วยเด็ก แนะนำการใช้แบบฟอร์มการจำแนกผู้ป่วยเด็ก ซึ่งดัดแปลงจากเครื่องมือของ Rowe 1992 พยาบาลผู้เข้าร่วมการฝึกอบรมจะได้รับการทดสอบความรู้ด้านการจำแนกประเภทผู้ป่วยเด็กก่อนอบรม และภายหลังการอบรม 2 สัปดาห์ โดยใช้แบบทดสอบความรู้ด้านการจำแนกประเภทผู้ป่วยเด็ก (PTKT) และทำทดสอบประสิทธิภาพการจำแนกผู้ป่วยเด็กในกลุ่มตัวอย่างจริง 439 คน ตามวิธีที่ได้รับการอบรม

ผลการวิจัยพบว่า ค่าเฉลี่ยคะแนนความรู้ของพยาบาลภายหลังได้รับการฝึกอบรมนี้สูงกว่าก่อนได้รับการอบรมอย่างมีนัยสำคัญ พยาบาลมีความแม่นยำในการจำแนกประเภทผู้ป่วยเด็กร้อยละ 88.3 และค่าเฉลี่ยของระยะเวลาในการรอตรวจของผู้ป่วยเด็กจะลดลงอย่างมีนัยสำคัญหลังจากพยาบาลผ่านโครงการนี้

โดยสรุปโครงการเบื้องต้นในการจำแนกผู้ป่วยเด็กตามความรีบด่วน ณ ห้องฉุกเฉิน รพ.ศิริราช มีประสิทธิภาพในการเพิ่มพูนความรู้ความสามารถของพยาบาลที่ไม่ได้ให้การดูแลเด็กเป็นประจำ ในเรื่องการจำแนกผู้ป่วยเด็กตามความเร่งด่วน และยังส่งผลลดเวลาที่ผู้ป่วยต้องเสียไปในการรอคอยตรวจ ในผู้ป่วยที่เร่งด่วนจริงที่ห้องฉุกเฉิน / ผู้ป่วยนอก โรงพยาบาลศิริราช

INTRODUCTION

The Emergency room at Siriraj Hospital is considered to be one of the busiest places in the hospital. Walk-in patients have to go through numerous steps before they are actually seen by physician or nurses. Furthermore, there is no delineation between pediatric and adult patients within the emergency room, thus making the initial recognition and management of acutely ill children a very difficult task. In such an environment, triage---the term used to describe the process of screening patients according to the severity and urgency of their clinical symptoms---is a vitally important tool in both improving the care and decreasing the morbidity and mortality of pediatric patients in an emergency room and walk-in setting. Since children are physiologically very different from adults, findings such as vital signs, symptoms and signs are also unique to this group of patients. Therefore, the task of triage should be performed by nursing personnel who is well acquainted with the subtle and not so subtle findings of illness in pediatric patients.

Unfortunately, the emergency room at Siriraj Hospital is not always staffed with pediatric nurses, thus making the task of effective and accurate triage more difficult. The solution is to formulate a training course whereby nurses can be trained to recognize acute illness in children and familiarize themselves with the kinds of disease processes children commonly present with.

Purpose

The purpose of this study is to evaluate the effects of a triage-training course on the ability of non-pediatric (novice) nurses to perform triage on pediatric patients, as well as the effects of triage on patient waiting time in an emergency room setting.

MATERIALS AND METHODS

Sampling

The nurses were recruited from a pool of staff emergency room nurses at Siriraj Hospital. Inclusion criteria were; nurses of female sex, ages between 22 and 50 years, have worked for more than 1 year in the emergency room at Siriraj Hospital, and willingness to participate in the study. The inclusion criteria for patients entering the study were; patient attending the emergency department during the hours of 4pm-8pm, ages between birth and 12 years, and parental consent to participate.

Data collection

Data collection can be divided into the pre- and post-training period. The pre-training period signifies the time before the institution of the pilot triage training and triage system, where as the post training period signifies the time after which triage training for all nurses has been done and a pilot triage system instituted in the emergency room.

Pre-training period

During the pre-training period, demographic data was collected from the nurses and included duration and location of nursing practice, as well as any prior experiences with pediatric patients. In addition, a pretest assessing the basic knowledge of pediatric triage was administered to all participants. The nurses were then asked to perform triage assessment on pediatric patients entering the emergency room, using only their own basic knowledge. At this time, demographic data regarding pediatric patients being seen in the emergency room was also collected, as well as the type of triage category assigned to each patient by the nurses, and the waiting time of each patient from the time triage had been performed to the time the patient was finally seen by a physician.

The Triage Training Course

Once all pretest data had been collected, an intervention was made in the form of a triage-training course. The course objectives were to train novice emergency room nurses to do the following

1. Understand the basic concepts and principals of pediatric triage
2. Assess pediatric patients using a Modified Pediatric Triage Assessment Form (MPTAF)
3. Initiate appropriate nursing care as indicated by the patient's triage category. Accordingly, pediatric triage category used in this study were;

a. Emergency signifies patients who have immediate, life threatening conditions who need medical attention immediately

b. Urgent or segregated conditions signifies patients with major medical illnesses or highly communicable diseases that will need medical attention within 20 minutes

c. Non urgent signifies patients with minor illnesses that will require medical attention after 20 minutes

The triage-training course administered to the nurses comprised both didactic and clinical sessions and had been developed from the guideline by Murphy in 1997[1-5]. A panel of reviewers that included nursing instructors, pediatricians, and one pediatric nurse examined the subject material covered and helped to develop a course that is specifically geared to target the pediatric population of Siriraj Hospital. The course had both didactic and clinical components. The didactic session is divided into areas summarized in table 1 and clinical training is summarized in table 2.

Post-training period

Two weeks after the completion of the pediatric triage-training course, the participating nurses were asked to take a posttest. The nurses were then also asked to evaluate and categorize pediatric patients using the skills they have learned over the prior 2 weeks and the MTAF. The time course for each patient, starting from the initiation of triage, until the time the patient was evaluated by a physician was collected. The investigator judged the accuracy of triage performance according to the published guideline[1].

Table 1. Pediatric triage training course: didactic session.

Subject	Time (minutes)
1. Orientation	5
2. Pediatric patient interview techniques	5
3. Concept of triage	10
4. Triage initial assessment	10
5. Data collection	5
6. Method of using the modified PTAF*	5
7. Pediatric triage guideline for altered respiratory & hydration status	5
Total	45

*Pediatric Triage Assessment Form

Table 2. Pediatric triage training course: clinical session.

Subject	Time (minutes)
1. Technical skills	10
a. Inspection	
b. Percussion	
c. Palpation	
d. Auscultation: by using the cassette tape of lung sounds	
2. Cognitive skills	20
a. History taking	
b. Priority setting	
c. Recording in the modified PTAF	
d. Triage decisions using the pediatric triage guideline for altered respiratory & hydration states	
Total	30

Note : The entire training course took 1 hour and 15 minutes.

RESULTS

There were a total of 30 nurses who participated in the triage-training course. Approximately 2/3 of nurses had between 1-6 years experience working in the emergency department. All nurses had at least a bachelor's degree and 80% of them were normally assigned to non-pediatric working areas. Table 3 summarizes the characteristics of the nurses in the study.

Table 4 shows that the accuracy of pediatric triage had no statistically significant correlation to any particular nursing characteristic. There was no difference in triage accuracy in relations to age, duration of clinical practice, current working area, educational degree, or any prior training in pediatrics.

Table 5 shows that there was a statistically significant difference in mean Pediatric Triage Knowledge Test scores within the same group of nurses pre and post pediatric triage training course (paired t-test: $t = -7.938$, $p = < .01$). The mean pre-training score of 4.3 (± 1.53) was compared to the post-training mean score of 7.17 (± 1.42). This indi-

Table 3. Summary of the characteristics of participating nurses. N = 30

Characteristics	Number of nurses		Percent of total
Age (years)			
20 - 25	8		26.7
26 - 30	9		30
31 - 35	2		6.6
36 - 40	6		20
> 40	5		16.7
(Mean ± SD.)	32.33 ± 8.43	Min. 23	Max. 49
Years of clinical experience			
1 - 3	10		33.3
4 - 6	9		30
> 6	11		36.7
(Mean ± SD.)	8.00 ± 7.52	Min. 1	Max. 25
Current working area			
Pediatric or Emergency Department	6		20
Other Departments	24		80
Educational degrees			
Bachelor degree	24		80
Master degree	6		20
Prior training with pediatric patients			
Yes	5		16.7
No	25		83.3

cated that the pediatric triage knowledge training was significantly associated with improvement in pediatric triage knowledge.

There were a total of 439 children who participated in the study, 199 in the pre-training group and 240 in the post-training group. The patients did not differ significantly in age distribution, sex, or waiting time in the ER (Tables 6, 7). There was no statiscally significant difference in the age of patients, or the mean waiting time of pediatric patients between the pre-training and post-training group. Mean age of pediatric patients did not differ between the pre-training group of 42.08 ± 39.89 months and post-training group of 45.36 ± 39.35 months or 3 years and 9 months. In addition, the mean waiting time of pediatric patients did not differ significantly between the pre-training group 22.26 ± 15.37 minutes and post-training group of 19.38 ± 17.12 minutes.

Table 7 shows the length of patient waiting time for the pre- and post- training group. There was no over all difference between the two groups of patients. However, table 8 shows that once only the patients in the urgent groups were analyzed, there was a statistically significant difference between the waiting time in the urgent patients in the pre-training group of 20.85 minutes and the post-training group of 14.32. On the other hand, there was no significant difference between the time that non-urgent patients were seen prior to pediatric triage training as compared to post-training.

Table 4. Comparison of differences in the accuracy of pediatric triage and the characteristic of participating nurses analyzed by x^2

Nurses characteristics	The accuracy of pediatric triage				x^2
	Incorrect		Correct		
	Number	%	Number	%	
Age (years)					0.123
< 30	18	12.2	129	87.8	
> 30	10	10.8	83	89.2	
Duration of clinical practice					
Practice (years)					0.474
1 - 3	11	13.1	73	86.9	
4 - 6	8	9.8	74	90.2	
> 6	9	12.2	65	87.8	
Current working area					1.337
Pediatric or Emergency Department	4	7.3	51	92.7	
Other Departments	24	13	161	87	
Educational degree					1.968
Bachelor degree	25	13.2	165	86.8	
Master degree	3	6	47	94	
Prior pediatric training program					0.745
Yes	6	15.8	32	84.2	
No	22	10.9	180	89.1	

Table 5. Comparison of mean pediatric triage knowledge scores of nurses before and after attending pediatric training course. [Analyzed by paired t-test (n = 30)]

	Pediatric triage knowledge test score						
	Number of nurses	%	$\bar{X}$	SD.	Min.	Max.	t
Before training (pretest)	30	100	4.3	1.53	1	7	-7.938**
After training (posttest)	30	100	7.17	1.42	5	10	

**p-value <.01 *p-value <.05

Table 6. Pediatric patient characteristics.

Characteristic of pediatric	Pre-training		Post-training	
	Number	%	Number	%
Age (years)	199	100	240	100
0 - 1	53	26.6	47	19.6
>1 - 3	55	27.6	77	32.1
>3 - 6	43	21.6	56	23.3
>6 - 12	48	24.2	60	25
Gender				
Male	104	52.3		
Female	95	47.7	125	52.1

Table 7. Comparison of waiting time of all patients between the pre- and post- training group.

	= tra						t
	Before triage training			After triage training			
	N	Mean	SD.	N	Mean	SD.	
Waiting time (minutes)	199	22.26	15.37	240	19.38	17.12	-1.839

Table 8. Comparison of pre- and post- training waiting time among the urgent and non-urgent patients.

Triage type	The length of pediatric waiting time						t
	Pre-triage group (minutes)			Post-triage group (minutes)			
	N	Mean	SD.	N	Mean	SD.	
Urgent	46	20.85	12.87	93	14.32	13.03	-2.790**
Non-urgent	53	22.69	16.07	147	22.46	18.53	-0.115

**p-value <.01

DISCUSSION

Pediatric triage management is being increasingly recognized as a practice that has great impact upon the morbidity and mortality of pediatric patients in an emergency setting. The World Health Organization, together with Unicef, has promoted the effort to teach simplified pediatric triage assessment skills to healthcare workers in order to better identify and manage acutely ill children in underdeveloped and developing countries. Such guidelines are often simple, easy to understand, and mostly target younger children with common, yet life-threatening illnesses, such as cholera or malaria[3].

Pediatric triage practice is a major part of risk management in the Emergency Department. Triage of pediatric patients is of particular importance due to the fact that clinical status of ill children can rapidly deteriorate, resulting in major complications such as seizure or apnea. In an emergency department where pediatric patients are not segregated from adults and nursing staff are not specifically trained or experienced in recognizing and caring for ill children, triage training can provide the basis for initial managements of such seemingly unavoidable complications[2,4-7]. As seen in several studies, the use of triage criteria by health care personnel that are well trained can result in the identification of the majority of pediatric patients needing urgent and emergency medical intervention[7-9].

As evidenced by our study, a brief training session lasting only 75 minutes can result in significant improvement in pediatric triage knowledge, despite a 2 weeks lapse between training and testing. Moreover, the study shows that characteristics such as years in practice, level of training or prior experience with pediatric patients may not play a significant role in the accuracy of triage performance. This is due to the fact that the level of pediatric nursing knowledge or experience needed to perform accurate triage may not be as important as the kind of training and practice the nurses themselves receive regarding the triage criteria being used in that particular setting. With the use of a well-defined algorithm that is adapted to the situation at hand during triage, even a healthcare worker with minimal clinical knowledge can identify the majority of patients needing immediate care[10,11].

The issue of waiting time with and without triage is an important concern, especially in the era of hospital accreditation and quality assurance. As seen in our study, over all waiting time of urgent patients seems to decrease when triage is conducted and patients are assigned a definite category of "urgent". On the contrary, waiting time of non-urgent patients does not seem to be affected by the use of triage. Although statistically significant, the shortened time of seven minutes may have little impact upon the overall care the patients may receive during the visit. The more important issue is patient satisfaction that comes from the perception that their children are seen with the speed and attention that is appropriate and acceptable for the already anxious parents[10].

Such a pilot project leads us to believe in the effectiveness of this clinical teaching tool and specific guidelines for the initial evaluation of the pediatric patients. Further development of this strategy will then focus upon the adaptation of current triage criteria to fit the clinical situation in our pediatric outpatient department. Furthermore, the refined triage tool when also serves as a focus for the effort to teach other non-pediatric nurses, through formal seminars and practical sessions, the skills and understanding required to appropriately screen and manage the pediatric patients at Siriraj Hospital's Emergency Department in the future.

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