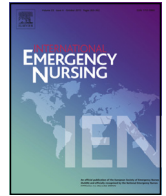




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Emergency department triage performance timing. A regional multicenter descriptive study in Italy

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ABSTRACT

Objectives: We explored the time employed by nurses to perform the ED triage process in the clinical setting. Moreover, we assessed the influences on triage timing performance exerted by variables related to nurses, local EDs' features, and by interruptions.

Methods: This is a multicenter prospective descriptive-exploratory study performed in 11 EDs of the Tuscany region (Italy), using a 5 tier triage system. The sample was made up of 1/3 of nurses working in each ED. Sampling was performed by a stratified proportional randomization (length of service classes: <5 years; 5–10 years; >10 years). Triage nurses were observed during their triage work-shift.

Results: In 2014, 120 nurses were observed, during 1114 triage processes. The timings of triage phases were: waiting time to triage, median 2.55 min (IQR 1.28–5.03 min; range 0.1–56.25 min); triage duration, median 2.58 min (IQR 1.36–4.35 min; range 0.07–50 min). 400 interruptions were recorded (35.9%). In 9.9% there were 2 interruptions at least. There were significant differences in the medians of triage duration among the years of nurses' triage experience ($P < 0.001$). The presence of interruption was significantly associated with the increasing of the time intervals in all the triage phases ($P < 0.0001$). Finally, we recorded significant differences in all the triage time phases between the EDs.

Conclusion: We found that the nurses triage time performances are similar to other triage systems in the world.

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1. Introduction

Emergency Department (ED) triage is a powerful tool for clinical risk management (Aacharya et al., 2011). In fact, it allows a fast identification and prioritization of people's health problems, through a systematic approach and standardized criteria. Using triage assessments ED nurses

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can assign the access priority for doctor's examination to patients with higher acuity and immediate risk of vital functions' deterioration.

The triage process is composed of some distinct phases: patient's arrival in ED; identification and registration; triage assessment with priority level assignment; management of waiting time to assessment by a doctor and re-evaluation.

The triage process and management can be seriously influenced by structural, logistical, organizational and clinical variables, e.g. triage area design and environment (Broadbent et al., 2014), nonurban location/suburban location of hospital (Afilalo et al., 2004), level of hospital (Chen et al., 2010), or pediatric patients (Seiger et al., 2011). Moreover, the performance of triage can depend on nurses education, expertise (Chen et al., 2010), triage experience (Göransson et al., 2006), and factual knowledge (Considine et al., 2007). Lastly triage can be affected by challenging communication problems between nurses and patients, lack of privacy, noise (Broadbent et al., 2014), and interruptions (Johnson et al., 2014).

Since the EDs are affected by overcrowding and simultaneous arrivals of a large number of patients (Chan et al., 2015), triage must be an accurate but fast process (Azeredo et al., 2015). It's acknowledged that the study of time intervals is an effective method to assess the triage performance quality and the areas of patient care delay (Kyriacou et al., 1999).

Currently, there are some important networks involved in the production of standardized definitions of EDs' workflows, highlighting adequate safety timing thresholds for triage process (e.g. arrival time to triage time ≤ 5 min) (Studer Group, 2012; Welch et al., 2011).

Frequent interruptions during triage decisional processes are reported in literature. Johnson et al. (2014) found a mean of 7 interruptions per hour. Sudden arrivals of patients and multiple requests are common situations causing a temporary triage work interruption (Chung, 2005). Some nurses state that interruptions exert an influence on their decision-making process and on the loss of important information (Chung, 2005).

Currently, in Italy the triage method employed in the EDs is essentially similar to the Manchester Triage System (Azeredo et al., 2015). Since there are no published studies about the timing of triage phases and performances in Italy, we evaluated the time employed by nurses to perform the ED triage process in the clinical settings. These results constitute the basis to produce a set of triage timing standards to be implemented in Tuscan EDs because of the shortage of international and national references. Moreover, we searched for the influences on triage timing performance exerted by variables related to nurses and local EDs' features, and by the workflow interruptions (Clifford-Brown et al., 2010).

2. Methods

We designed a multicenter prospective descriptive-exploratory study performed in 11 out of 37 EDs of Tuscany, a central Italian region with 3.751 millions of citizens. Currently in Tuscany there are 3 "Hub" center University Hospitals and 34 "Spoke" Hospitals making up the territorial emergency healthcare network. All the EDs of Tuscan Regional Healthcare System adopt a 5 tier triage scale, according to regional laws (Tuscany Region, 2010) (Table 1).

All emergency department nurses adequately trained to perform triage by the Tuscany Triage Group were eligible for inclusion in our study.

The sample was made up of one third of the 361 nurses working in the EDs participating to this study, because of a lack in resources (time and observers) and funding. Sampling was performed by a stratified proportional randomization of nurses on the basis of 3 length of service classes (<5 years; 5–10 years; >10 years).

Table 1

Triage level assignments of patients during the study period.

Triage level	Time to physician assessment	Assignations, no. (%)	χ^2 test
1/Red – Emergency	Immediate	13 (1.2)	$P < 0.0001$
2/Yellow – Urgent	Fast	292 (26.2)	
3/Green – Slightly Urgent	<60 min	520 (46.7)	
4/Blue – Not Urgent	<180 min	248 (22.3)	
5/White – Ambulatory	<240 min	35 (3.1)	
Complaints			
Missing data		6 (0.5)	
Total		1114 (100)	

Taking in account α error of 0.05 and β error of 0.20, we calculated a sample size of at least 470 triage cases to detect differences of at least 30 seconds in triage process performances.

The study was performed during the first 5 months of 2014. Every nurse included in the study was observed during the triage work-shift, only once, from 10.00 AM to 12.00 AM, from Monday until Friday. The choice to limit the observation periods to these intervals of hours and days of week was made in attempt to maximize the number of triage data collection, with the lack of available resources to perform this research.

The observers were nurses who are members of the Tuscany Triage Group, working in the same EDs of the studied nurses. Tuscany Triage Group provides triage education for all the regional EDs. Its members share the same triage methodology and are competent in the ED patients' workflow. The observers were specifically trained in using a specific datasheet and a stopwatch to record some demographic variables, the timing of triage phases, and the number of interruptions (Table 2). During the study period, the observer recorded only one triage process at a time, from the patient's arrival in ED until the end of triage level assignment by the triage nurse. All EDs studied follow the same triage time-frame sequence: patient's arrival, registration, beginning of triage decision-making, triage level assignment.

Data were collected using a Microsoft Excel 2010® datasheet (Microsoft, 1 Microsoft Way, Redmond, WA 98052, USA). Statistical analysis was performed using Statistical Package for the Social

Table 2

Study variables recorded.

Nurses demographic variable
Gender
Age
ED length of service
Triage experience (in years)
Last year of training/education in triage
ID number of ED triage/patient sheet
Adult/pediatric patient (cut off 14 years old)
Optical bar code readers for Identification Data on Italian National Healthcare Service cards
Use of computerized regional triage algorithm
Triage time-frame variables (directly observed, and calculated)
t1 (arr.–reg.) – from patient's arrival in ED to registration
t2 (reg.–in triage) – from patient's registration to beginning of triage decision making
t3 (in triage–out triage) – from beginning of triage decision making to triage level assignment
t4 (reg.–out triage) – from patient's registration to triage level assignment
t5 (arr.–out triage) – from patient's arrival in ED to triage level assignment
t6 (arr.–in triage) – from patient's arrival in ED to beginning of triage decision making
Triage level
Number of interruptions
Definition of interruption: "every kind of event diverting the nurse from the performance of triage." Interruptions were arbitrarily recorded only if longer than 40 seconds

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