Evaluation of a new triage scale on patients’ classification in a teaching emergency department

Atrial fibrillation: a practical review and approach

Catastrophic hemorrhage control

Syndrome de Boerhaave

Syndrome de Brugada: intérêt de l’ECG systématique et répété

Contusion pulmonaire par balle de gros calibre

Intoxication par les antidépresseurs non-tricycliques
EVALUATION OF A NEW TRIAGE SCALE ON PATIENTS’ CLASSIFICATION IN A TEACHING EMERGENCY DEPARTMENT: A RETROSPECTIVE STUDY


Key words: emergency, emergency severity index version 4, triage scale

ABSTRACT

Background: Triage is a sorting of patients specific to the emergency department. Its objective is to optimize patient waiting time according to patient pathology or condition severity. The main scale used in France for triage is the French Emergency Nurses Classification (Classification Infirmière des Malades aux Urgences, CIMU). Currently, in our emergency department, triage nurses use the CIMU. As part of departmental reorganization, the triage scale was to be changed from the CIMU to the Emergency Severity Index (ESI).

The main objective of this study was to evaluate whether the use of the new triage scale significantly modified patient care track orientation.

Methods: This was a single center, retrospective, observational study using medical file data collected over seven consecutive days chosen randomly. All patients in the emergency department during this period were included. Patient care track decisions were based on actual CIMU and proposed ESI version 4 results were noted for each patient: intensive care (IC), long track (L), and fast track (F). Patient care track decisions and scale results were compared using Pearson Chi² tests.

Results: 1,181 patients were included. Results for the CIMU and the ESI respectively were: IC 94 (8%), L 485 (41%), F 583 (49%), and others 19 (2%), versus IC 86 (7%), L 242 (21%), and F 853 (72%). Patient care track decisions differed between the two scales (p < 0.001).

Conclusion: This study demonstrates that the use of ESI significantly changes patient care track decisions and therefore also patient care area assignments. The use of the ESI V4 scale will result in a more even distribution of patients between medical areas.

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INTRODUCTION

Triage is a method to screen and consider the priority of the patients in the emergency room to be visited by emergency physicians and to start the proper management appropriate to patient pathology severity. Triage is a sorting of patients specific to the emergency department (ED). The aim of triage is to optimize patient waiting time according to their clinical severity [1;2]. Triage is the backbone of patient care management in the ED, and an incorrect triage can be a source of morbidity and mortality [3]. This complex process is based on different scores or scales that vary by country [4-8].

In France, the French Society of Emergency Medicine recommends a validated, reliable and reproducible triage scale with five levels [9]. The principal scale used in France is the Classification Infirmière des Malades aux Urgences (CIMU) (Table 1). The CIMU is a scale with five stages of increasing severity and complexity developed by a French team whose most recent version dates from 2007 [6]. It is based on triage performed by specially trained nurses. Their roles and responsibilities are based on frequently reassessed recommendations [10-12]. This scale has the advantage of being very precise, focusing on vital parameters organ by organ and puts varying weight on different elements of patient assessments (for example, the presence of pain and confusion among others). However, it is complex to use. Furthermore, experience shows that nurses in charge of triage overstate the severity of patients when using the CIMU [13].

Other international scales are also used, such as the Manchester Triage Scale [14]. However, this scale has one significant limitation: nurses using the scale run the risk of being influenced by the diagnosis mentioned before sorting [15]. In Canada, the adopted triage scale is the “Canadian Emergency Department Triage and Acuity Scale” (CTAS) [4]. The major problem with this scale is the inter-observer variability. In the literature, the inter-observer correlation coefficient varies from 0.44 to 0.73 depending on the study [16;17].

The Emergency Severity Index (ESI) is the most frequently used scale in the world. It was created and developed by the Agency for Healthcare Research and Quality in the United States in 1999 [18]. This scale is validated for screening elderly patients [19] and children [20]. The ESI ranks patients from level 1 (severe and unstable patient requiring immediate care) to level 5 (stable patient not requiring neither immediate care nor complementary exams) (Figure 1).

In our ED, patients can be oriented to a fast track, a long track and an intensive care track. The intensive care track is for patients who need an urgent diagnosis or care, the long track is for patients who need some but not immediate care with need some special complementary exams (radiology, labs test), and the fast track is for patients who need a medical examination with a standard radiology but without any complex or time consuming complementary exams as blood exams or CT scan. Currently, on average, 41% of the patients at Lariboisière hospital are sorted in the long track. This combined with the constant increase in the number of consultations has caused an increase in waiting times. As mortality after emergency consultation is correlated with the waiting time [21], our department was looking for ways to shorten the waiting time. One of the elements which have been proposed to shorten the waiting time was to change the triage scale. Our hypothesis was that changing the triage scale may reduce the number of patients sorted in the long track.

The main objective of this study was to assess the impact of the ESI (version 4) on the care track distribution of patients according to severity.

MATERIALS AND METHODS

We performed an observational retrospective monocentric study in the ED of a teaching hospital in Paris, France. The primary endpoint was the variation in the number of patients in each care track, according to two triage scales.

<table>
<thead>
<tr>
<th>CIMU level</th>
<th>Description</th>
<th>Urgency to treat</th>
<th>Action</th>
<th>Time</th>
<th>Care management track</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vital distress</td>
<td>Immediate</td>
<td>Support for vital functions</td>
<td>Physician and nurse immediately</td>
<td>Intensive care</td>
</tr>
<tr>
<td>2</td>
<td>Clear organ lesion or traumatic lesion (unstable patient)</td>
<td>In the hour</td>
<td>Treatment of vital function or traumatic lesion</td>
<td>Physician &lt; 20 min Nurse &lt; 1 min</td>
<td>Intensive care or long track</td>
</tr>
<tr>
<td>3</td>
<td>Clear organ lesion or traumatic lesion (stable patient)</td>
<td>In 24 hours</td>
<td>Prognosis evaluation, diagnosis and treatment</td>
<td>Physician &lt; 90 min</td>
<td>Long track</td>
</tr>
<tr>
<td>4</td>
<td>Organ functional damage or stable lesion</td>
<td>None</td>
<td>Restricted diagnosis and therapeutic procedure</td>
<td>Physician &lt; 120 min</td>
<td>Long track or fast track</td>
</tr>
<tr>
<td>5</td>
<td>No clear organ functional damage or lesion</td>
<td>None</td>
<td>No diagnosis or therapeutic procedure</td>
<td>Physician &lt; 240 min</td>
<td>Fast track</td>
</tr>
</tbody>
</table>

Table 1: The French Emergency Nurses Classification (Classification Infirmière des Malades aux Urgences, CIMU)
A. Immediate life-saving intervention required: immediate care.
B. High risk situation:
   - defined by a lack of bed for a patient
   - severe pain or distress
C. Resources: among:
   - radiology
   - labs tests
   - treatment
   - specialty consultation
D. Evaluation the danger zone vital signs:

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate</th>
<th>Respiration Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 months</td>
<td>&gt; 180 min⁻¹</td>
<td>&gt; 50</td>
</tr>
<tr>
<td>3 months - 3 years</td>
<td>&gt; 160 min⁻¹</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>3 years - 8 years</td>
<td>&gt; 140 min⁻¹</td>
<td>&gt; 30</td>
</tr>
<tr>
<td>&gt; 8 years</td>
<td>&gt; 100 min⁻¹</td>
<td>&gt; 20</td>
</tr>
</tbody>
</table>

Or SaO₂ < 92%

Figure 1: The Emergency Severity Index (ESI) version 4

Ethics

No approval was necessary from the ethic committee of the hospital to perform this study according to French law, articles R1121-2 and L 5311-1.

Inclusion or non inclusion criterion

Patients included were those admitted to the ED in our hospital in Paris, France, during a defined period of seven consecutive days (Sunday, January 26, 2014 0:00 am to Saturday, February 1, 2014 11:59 pm). There were no non inclusion criteria.

Emergency department organization

Our ED has three sectors defined by care management: the fast track, where patients are followed by a general emergency room doctor; the long track, where patients are followed by two
doctors (one dedicated to medical pathology and one dedicated to traumatology); and finally, the intensive care track, where patients are followed by a doctor specialized in intensive care. In our ED, patient triage is performed by triage nurses according to the CIMU scale. This scale allows us to screen patients according to the severity of their health condition (from most severe to least severe). Level 1: intensive care, level 2: intensive care or long track (medicine or traumatology), level 3: long track, level 4: long or fast track and level 5: fast track.

Data extraction
Two independent emergency doctors ON and DSC extracted all pertinent data from the emergency department computerized files. These data included information on:
1- patient real triage: Fast track [F], long track [L] or intensive care [IC];
2- severity according the CIMU triage scale (sorted from 1 to 5);
3- the patient’s hospital department orientation (medicine, traumatology or intensive care).

All data were recorded on a computer system using Microsoft Excel® 2012.

Both doctors independently read the medical file and then made a decision for which track the patient should be orientated according to the new scale (ESI):
level 1: unstable patient;
level 2: potentially unstable patient;
level 3: patient requiring medical consultation and at least two additional elements (including biology, radiology or nursing) and/or potential hospitalization;
level 4: patient requiring medical consultation and only one additional element and no probable hospitalization;
level 5: patient requiring a general practice consultation without additional element or patient orientate to another specialist.

New patient level 1 and 2 would be orientated to the intensive care (IC2), level 3 to the long track (L2) and level 4 and 5 to the fast track (F2). If there was no information in the medical file, investigators searched for results of blood tests or radiology. In case of disagreement, a third author (PP) helped the doctors arrive at a consensus. Doctors were not blinded to the hypothesis.

Statistical analysis
Pearson Chi² and Fisher tests were performed to compare the distribution of patient condition severity and the patient care track orientation according to the different scales. All statistical analyses were performed using SAS© 9.3 software.

RESULTS
A total of 1,181 patients were included during the week of the study. All patients had complete medical files.

Concerning the modification of patient care track decisions according severity using the CIMU and the ESI, we found that patient care track decisions significantly differed for patients sorted levels 3, 4 and 5 (p = 0.02, p < 0.01 and p < 0.01 respectively). Rating of patient severity as level 1 or 2 did not significantly differ according to the two scales (p = 1 and p = 0.06 respectively). Table 2 shows the variation in doctors’ decisions according to patient care track and patient condition severity.

<table>
<thead>
<tr>
<th>Track</th>
<th>All patients</th>
<th>Traumatology</th>
<th>Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CIMU n (%)</td>
<td>ESI n (%)</td>
<td>CIMU n (%)</td>
</tr>
<tr>
<td>Fast track</td>
<td>583 (49.4)</td>
<td>853 (72.2)</td>
<td>200 (54.8)</td>
</tr>
<tr>
<td>Long track</td>
<td>485 (41)</td>
<td>242 (20.5)</td>
<td>165 (45.2)</td>
</tr>
<tr>
<td>Intensive care</td>
<td>94 (8)</td>
<td>86 (7.3)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of 1,181 patients included according to care management track, condition severity and hospital department orientation in accordance with Classification Infirmière des Malades aux Urgences (CIMU) scale or Emergency Severity Index (ESI) version 4.
We found a significant difference in the percentage of patients oriented to medicine and in traumatology departments (p<0.001 and p<0.001, CIMU and ESI respectively). In particular, when using the ESI, we observed that fewer patients were sorted to long track: 50% fewer (41% versus 20.5%). Using the ESI resulted in an increased percentage of patients sorted to the fast track: 46% more (49.4% versus 72.2%). There was no significant modification of the proportion of patients in the intensive care. Table 3 shows the variation in patients’ distribution according to each care track.

DISCUSSION

Our objectives were to show a modification of patient classification according to patient condition severity and the oriented care track when using the ESI instead of the CIMU. This retrospective study was performed by two independent doctors. They did not require a third author for consensus. We demonstrated that if we used the ESI, most patients are sorted to the fast track and the percentage of patient sorted in long track decreased significantly. Concerning patient condition severity, the number of patients sorted in level 5 (least severe) increased significantly.

There is a growing number of new scales for ED triage. The goal of these new scales is to respond to a continued increase in the number of emergency room visits by patients [23;24]. However, because of different health systems, as well as different populations in different countries, these scales are not easily transferable from one country to another or even from one region to another [24].

Regarding our patient distribution with the CIMU, our distribution was substantially similar to the one described by Taboulet et al. [6]. However, our patient classification with the ESI is different from patient classification from other studies [25]. In fact, in our service, lots of patients come for a simple consultation. This may be due to the fact that the majority of our patients do not have a general practitioner and visit the ED for a simple consultation.

Some studies have evaluated the impact of changing the triage scale on the emergency team in terms of organization, satisfaction, etc. These studies showed that the principal problem with the implementation of a new scale is the lack of experience of triage nurses. For that, the use of a new scale involves the establishment of a continuing education program for the medical team and nurses [26;27]. According to a study by Singer et al. [28], despite the lack of such a continuing education program when implementing the new scale, more than half of the EDs using the ESI were very satisfied. But to our knowledge, no other study has investigated the impact of the use of ESI instead of CIMU on patient classification.

Otherwise, we have demonstrated that with the ESI version 4, a majority of trauma patients (83.6%) are triaged in fast track. Therefore, the existence of a specific area of traumatology may not be justified anymore with the future implementation of ESI. This is related to the benign character of most trauma related injuries treated in the ED.

### Table 3: Variation in the proportion of 1,181 patients according to the care track using the Emergency Severity Index (ESI) version 4

<table>
<thead>
<tr>
<th>Track</th>
<th>All patients</th>
<th>Traumatology</th>
<th>Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Track</td>
<td>+ 46</td>
<td>+ 52</td>
<td>+ 46</td>
</tr>
<tr>
<td>Long Track</td>
<td>- 50</td>
<td>- 65</td>
<td>- 40</td>
</tr>
<tr>
<td>Intensive care</td>
<td>- 8</td>
<td>+ 0.8</td>
<td>- 12</td>
</tr>
</tbody>
</table>

This study has allowed us to highlight that the use of the ESI triage scale may reduce congestion of the long track. In fact, with the CIMU, we can see that patient sorted as level 3 waited more time than patients sorted as level 4 or 5. In our service, patients sorted as level 3 waited on average the same amount of time as a patient sorted as level 5 (104 minutes versus 105 minutes respectively in 2013). This fact was observed in several ED which used the CIMU scale [29]. Using the ESI permitted the best patient repartition and it appears that this will allow a more efficient allocation of patients. This should in turn reduce the waiting time and thus morbidity and mortality [22]. We think that using the ESI we can reduce patient waiting times by around 15%.

LIMITATIONS

Our study has several limitations. First of all, it is a retrospective study. Thus, it would require a prospective evaluation to assess its feasibility and to confirm the results. Moreover, the virtual sorting with ESI was performed by doctors and not by nurses. This could influence the results. Finally, this is a virtual sorting, only based on medical reports and not live patient assessments.

We know that experience and pressure medical professionals face in the moment a patient presents to the emergency department plays an important role in the triage of emergency patients.

CONCLUSION

This study highlights that the use of the ESI triage scale may allow a significant change of patient care track classification. The impact of changing the triage scale in our emergency department in France from the CIMU to the ESI V4 could result in a more equal distribution of patients between medical areas, a better flow management and probably a decrease in the time patients spend in the emergency department for emergencies. This hypothesis will be confirmed in a future prospective study.

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REFERENCES


