Systematic triage in the emergency department using the Australian National Triage Scale: a pilot project

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The objective of this study was to evaluate the validity in Belgium of the National Triage Scale for judgement of the urgency of a patient’s condition and making a case-mix description of the patient profiles in the different urgency categories. The study is of a descriptive retrospective and descriptive correlational design and was carried out in the emergency department at the University Hospital Gasthuisberg in Leuven, Belgium. The urgency of patients arriving at the emergency department was evaluated during one randomly selected shift a day over 12 weeks in 1997 by one of the four triage-educated nurses, using an instrument based on the National Triage Scale. Patient identification and outcome parameters were retrieved from the existing computer system. The data were mainly analysed using the Ridit analysis. Overall 3650 patients were evaluated: Category 1, 4.19%; Category 2, 24.44%; Category 3, 39.32%; Category 4, 27.97%; Category 5, 4.08%. Any similarity between sentinel diagnoses as well as between the admission percentages in this pilot study and the reference from Australia was noted. Different aspects influenced the triage nurses while determining the degree of urgency. Urgency categories profiles revealed a significant effect of age. Higher categories of urgency resulted in a higher degree of admission. It is concluded that a resemblance between the pilot study and the reference confirms the predictive validity of the scale used. Patient profiles in the different urgency categories give a description of the emergency department population.

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PROBLEM SETTING

The emergency department has to ensure constant access to healthcare for a varying number of patients with a wide variety of serious and less serious conditions. Over the past few years, the number of patients in the emergency department has increased leading to problems of overcrowding. The danger that patients with a non-urgent pathology are overlooked due to the concentration of efforts on patients with urgent conditions, and the risk that patients with an urgent pathology are sent to the waiting room instead of receiving instant medical care, is a reality. As a consequence long queuing times in often uncomfortable conditions are a commonly formulated complaint.

A possible solution for this problem is to set up an objective priority determination when patients arrive at the emergency department. Such priority determination can be based on an urgency judgement of the patient’s condition, usually at the level of the nursing staff. To this end a National Triage Scale was developed in Australia. Because up to now systematic triage is not a common practice in Belgium, the predictive validity is explored by a pilot study in the emergency department at the University Hospital Gasthuisberg in Leuven.

Another possibility for improving patient care in the emergency department could be to develop different service points. It may be questioned, however, whether the degree of urgency is a valid criterion to refer patients to different treatment areas. This is evaluated by providing a case-mix description of the patient profiles in the different urgency categories using a variety of parameters.

METHODOLOGY

A pilot study in the emergency department at the University Hospital Gasthuisberg in Leuven involved 3650 patients. During one randomly selected shift a day (morning 07.00–15.00 hours, evening 15.00–22.00 hours...
hours, night 22.00–07.00 hours) over 12 weeks, one complete month has been evaluated (39% of the patients during the morning shift, 45% during the evening shift and 19% during the night shift). Four triage nurses, with some years of emergency experience and 20 hours of triage education, alternatively made an evaluation of the patient’s condition on arrival.

The National Triage Scale is an ordinal scale with five different degrees of urgency, developed in Australia by Dr J. Jelinek as part of an instrument to describe the emergency department population. This instrument was made as a simplification of the method of payment based on ICD coding, and is based on the earlier existing Ipswich Triage Scale. Together with admission rate and age, urgency gives a good instrument predicting therapy-time, workload and outcome (Fig. 1).

The following interpretation was proposed to the triage nurses:

**Category 1**: patients in the process of dying, e.g. patients suffering multitrauma; shocked; unconscious; convulsing; in extreme dyspnoea; or in cardiorespiratory arrest.

**Category 2**: patients that need early attention to avoid evolution to category 1, e.g. chest pain suggestive for myocardial ischaemia, pulmonary embolism or aortic dissection; severe abdominal pain suggestive of ruptured aortic aneurysm; severe dyspnoea; altered consciousness; fever, rash, headache suggestive of sepsis or meningitis; very severe pain; severe skeletal trauma such as femoral fracture.

**Category 3**: patients that require to be seen within 30 minutes because of the urgency of the clinical picture, e.g. severe pain of any cause; symptoms of significant infections; moderate injury; head injury with transient loss of consciousness.

**Category 4**: patients whose medical problem does not impose a time limit for care, e.g. corneal foreign body; minor trauma; migraine headache; earache.

**Category 5**: patients who a priori should have looked for medical care in another facility (family physician, outpatient department), e.g. chronic lower back pain; menstrual disorder; most skin conditions; minor dressings; clinico-administrative.

For the pilot study a form was developed, including the National Triage Scale and factors that could influence the triage nurse in determining the triage category. Patient identification was retrieved from the existing computer system. Outcome parameters such as admission rates and sentinel diagnoses were used to estimate the predictive validity. The feasibility of the pilot study has been evaluated. Parameters such as age, arrival pattern, nature of complaint, referral, discharge pattern, length of stay were used for the case-mix description. Mobility and dependence of care were noted for the evaluation of the structural needs. Because there was no further impact of the evaluation on the emergency reception, waiting times were not evaluated.

A descriptive retrospective design was used to estimate the predictive validity of the National Triage Scale and a descriptive correlational design to describe the case-mix. The data were mainly analysed using the Ridit (Relative to an Identified Distribution) analysis. Ridit represents a probability measure relative to any reference distribution, where the Ridit of the reference group itself is, by definition, 0.5.

**RESULTS**

**Case mix**

The number of patients in each category gives a case mix of the population (Fig. 2).

**Consistency**

Inter-rater reliability of the National Triage Scale was statistically significant for two of the four triage nurses. The number of patients evaluated by each triage nurse was quite different (Fig. 3).

**Validity**

Resemblance between the sentinel diagnoses: unstable angina \((Z = 0.994; \ p > 0.05)\) and abdominal pain \((Z = 1.225; \ p > 0.05)\), as well as resemblance...
Fig. 2. Number of patients in each emergency category.

between the admission percentages in this pilot study and the reference from Australia (Z = 0.827; p > 0.05) is noted (Table 1).

**Factors for triage decision**

Different aspects influenced the triage nurses while determining the degree of urgency. The presenting complaint(s) of the patients as well as clinical factors such as pain (1365 cases), distress (397 cases), colour (346 cases), respiration (235 cases) and swelling of the limbs (205 cases) were used most often. Technical assessments such as sphygmomanometer (seven cases) and thermometer (one case) were barely taken into account. According to Australian guidelines children and elderly should be scored more urgently. In this pilot study, age was taken into account in only 24% of the relevant patient population.

**Detailed case mix**

Analysis of the profiles of the urgency categories revealed a significant effect of age. In the group of under five-year-olds for instance a large proportion (46%, Categories 1 and 2) was judged urgent. In the group of patients between 15 and 45 years old (the majority of our patient population, 44%) patients tended to be classified more often as non-urgent (48%, Categories 4 and 5). From the age of 25, there was a constant slight increase in urgency grading with age (Kruskall–Wallis = 530.5; p = 0.000) (Fig. 4).

The arrival pattern of the patients affected the urgency grading process. Patients arriving at night are perceived as being more urgent (Ridit score: morning = 0.481, evening = 0.508, night = 0.524). When patient autonomy—determined by dependence on mental and physical care, but mainly by mobility—decreased, patients were usually classified as more urgent (Ridit score: mobility: lying = 0.738, sitting (wheelchair) = 0.462, walking = 0.405).

It appeared also that referral by a general practitioner and certainly by a specialist resulted in the classification into a higher category of urgency (Ridit score: own initiative = 0.440; general practitioner = 0.573; specialist = 0.639). Patients who arrived by private car (Ridit score: 0.449) were scored as being less urgent than patients arriving by ambulance (Ridit score: 0.646) (t (df = 3576) = 2319; p = 0.0000). The nature of the presenting complaint correlated with the degree of urgency: sickness was rated more urgent than accident in 57% of cases (t (df = 3648) = 529.83; p = 0.000). Patients judged urgent remained longer in the emergency department (Fig. 5).

Higher categories of urgency resulted in a higher
Table 1. Observed and expected admission rates

<table>
<thead>
<tr>
<th>Category</th>
<th>Admission Rate</th>
<th>Number</th>
<th>Reference Australia by Spread</th>
<th>Number*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>84.72%</td>
<td>122</td>
<td>85% (90–75%)</td>
<td>122.4</td>
</tr>
<tr>
<td>Category 2</td>
<td>70.74%</td>
<td>631</td>
<td>70% (60–70%)</td>
<td>624.4</td>
</tr>
<tr>
<td>Category 3</td>
<td>47.53%</td>
<td>682</td>
<td>50% (50–60%)</td>
<td>717.4</td>
</tr>
<tr>
<td>Category 4</td>
<td>16.85%</td>
<td>172</td>
<td>20% (20–30%)</td>
<td>204.2</td>
</tr>
<tr>
<td>Category 5</td>
<td>16.78%</td>
<td>24</td>
<td>10% (5–10%)</td>
<td>14.9</td>
</tr>
</tbody>
</table>

*Expected number of admission for each category (Category 1: 85% of 153 evaluated patients = 122.4).

degree of admission \( t (df = 3640) = 643.45; p = 0.000 \).

**DISCUSSION**

The pilot study including 3650 patients gives a relevant random sample. Inter-rater reliability differences can be explained by the large variability in the number of patients to be categorized by each triage nurse and differences in time (morning, evening or night) of the triage. The lack of strict guidelines and the subjectivity of the instrument raise questions about inter-rater reliability of the NTS. An evaluation after 3 years’ use in Australia says that the variance between individual assessors is generally insufficient to result in adverse outcomes for individuals.15,17

Resemblance between the sentinel as well as resem-

![Fig. 4. Distribution of age by emergency category.](image1)

![Fig. 5. Length of stay in the emergency department.](image2)
Blance between the admission percentages confirms the predictive validity of the scale used. Higher/lower admission rates than expected in some categories can be explained by the prospective use of the scale whereas admission is evaluated retrospectively. Because the triage had no further impact on the reception of the patients in the emergency department, only the case mix with all its aspects can give a direction on how to organize personal and material potential in the function of the admission of the population. A description of emergency department population is seen as a significant by-product of the triage.\textsuperscript{17}

The aspects, which influenced the triage nurse to determine the emergency category, may offer means for the development of a better and more useful triage instrument. In contrast with the USA, technical assessments are evaluated as impractical and do not offer extra assistance. The difference in medicolegal practice between Belgium and the USA may explain this preference.

**CONCLUSION**

It may be concluded that the determination of the degree of urgency depends on many factors. The use of triage as a basis for developing a fast track requires further specification of a patient’s profiles to specify the staff and material needed for each track. Implementation of this project certainly requires continued research. One of the problems to be investigated is whether the cost of a triage nurse, and possible architectural changes within the department, outweigh the evolving results of reduced queuing times, improved patient satisfaction and quality assurance.

**Recent evolutions**

This study took place in the academic year 1998–99 as part of the requirements to obtain the degree of Nursing Licence in Hospital Sciences. During the past year some evolutions on this subject were noted.

- Literature data show that the inter-rater reliability is inconsistent, underlining the need for education and guidelines. Some authors warn against using the National Triage Scale as an instrument on which to base funding, others confirm this but say that the combination with age, discharge diagnosis and destination can effectively predict the cost of care.\textsuperscript{17–20}
- The Belgian Law (KB 27 April 1998) has set guidelines for the recognition of the emergency departments; triage can fit this.
- This study has been taken into consideration for a re-engineering project in the emergency department in the University Hospital Gasthuisberg Leuven. There is an option of rebuilding the emergency department into three tracks (Category 1, Categories 2 + 3, Categories 4 + 5) and to install a triage nurse to evaluate the urgency and the needs of the arriving patients. It is important to consider that, apart from urgency level, there are other elements determining optimal organization of the patient flow in the emergency department.

**REFERENCES**