

The use of triage in Danish emergency departments

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ABSTRACT

INTRODUCTION: The emergency departments (EDs) handle approximately 1,000,000 contacts annually. Danish health care is undergoing reorganization that involves the creation of fewer and larger EDs to handle these contacts. There is therefore a need to prioritize the use of resources to optimize treatment. We thus wanted to investigate if Danish EDs are using triage systems and, if so, which systems they are using.

MATERIAL AND METHODS: We performed a cross-sectional study on triage at all EDs in the 20 Danish hospitals that have been designated for emergency care.

RESULTS: The response rate was 100% (n = 20). We found that triage was used at 75% (n = 15) of the EDs. Adaptive process triage (ADAPT) was the most frequently used validated triage system (25% (n = 5)), while 40% (n = 8) used non-validated systems. Triage was performed by nurses at 73% (n = 11) of the EDs using triage.

CONCLUSION: Triage systems were used in 75% of Danish EDs. ADAPT was the primary triage system in 25% of the EDs, while 40% used non-validated triage systems. An improvement in the quality of health care in Danish EDs may possibly be achieved by implementing validated triage, i.e. ADAPT.

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Danish emergency departments (EDs) handle approximately 1,000,000 patients annually [1]. The need to prioritize these patients is stressed by the considerable demand for emergency care, frequent ED overcrowding and limited resources. Accordingly, there is a need for a tool that prioritizes those patients who are in most need of immediate care due to the severity and urgency of their condition [2]. Triage is a tool used for preliminary clinical assessment to determine which patients should be given priority. This is done by assessing the severity and urgency of their condition. Triage allows resources to be allocated to where they are most needed [3]. Triage scales usually consist of three to five categories and patients are allocated to these categories using a predefined algorithm that draws on history, observations and vital parameters (**Figure 1**). Some of the most commonly used triage systems are the Australian Triage Scale (ATS), the Manchester Triage System (MTS), the Emergency Severity Index (ESI) and the Canadian Emergency Department Triage and Acuity Scale (CTAS) [4].

A study published in 2008 showed that only very few medical admission units in Denmark used triage and none used any of the internationally recognized and validated triage systems [5]. Danish healthcare is currently undergoing reorganization. This involves closing smaller hospitals (and their EDs) and allocating patients to fewer, big hospitals with larger EDs [6]. This vastly increases the number of visits at each ED and makes efficiency and prioritization more important than ever. However, the use of triage scales or systems in Danish EDs has never been examined.

The objective of the present study was to examine whether Danish EDs used triage systems and, if so, which system they used and who performed the triage.

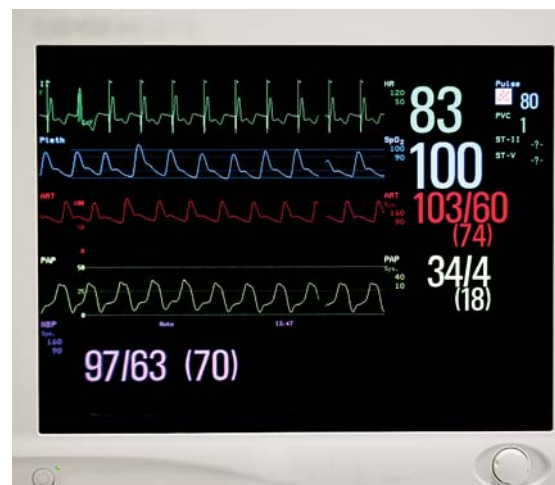
MATERIAL AND METHODS

The study was designed as a cross-sectional study of all EDs in the 20 Danish hospitals which are designated for emergency care. Between June and August of 2010, we contacted the Head of Department of each ED by e-mail. If they agreed to participate, a questionnaire was e-mailed to them. Non-respondents were contacted again by e-mail (after two weeks) and by telephone (after an additional two weeks). To increase the response rate, we gave respondents an incentive by entering them into a prize draw for a gift certificate of 500 DKK. The questionnaire contained questions on triage and the use of teams in emergency situations (e.g. trauma or cardiac arrests). Only the results regarding triage are presented here.

ORIGINAL ARTICLE

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Monitor with vital signs: electrocardiography, pulse oximetry and blood pressure.

The initial version of the questionnaire was reviewed by four independent physicians (who were not serving as heads of department) working at four different EDs. Their comments were used to revise the questionnaire. The revised version was distributed to four highly experienced nurses working at the ED at Esbjerg Hospital. Their responses were used to test agreement between the answers and to make sure that answers represented the true practice in the ED as this was already known to us.

Trial registration: not relevant.

FIGURE 1

Adaptive process triage (ADAPT), Herlev version, applied on a case to illustrate the triage process.

For each of the five vital parameters (blood pressure, pulse, oxygen saturation, temperature and respiration rate) all patients are assigned to a colour category representing treatment acuity for that parameter. The most urgent colour assigned to a patient is the one representing the patient's acuity. However, subsequently the triage nurse is allowed to change the final colour on the basis of the patient's medical history.

ADAPT colour category	Treatment acuity	Seen by a physician in
Red	Immediately	Immediately
Orange	Urgent	15 minutes
Yellow	Less urgent	60 minutes
Green	No rush	3 hours

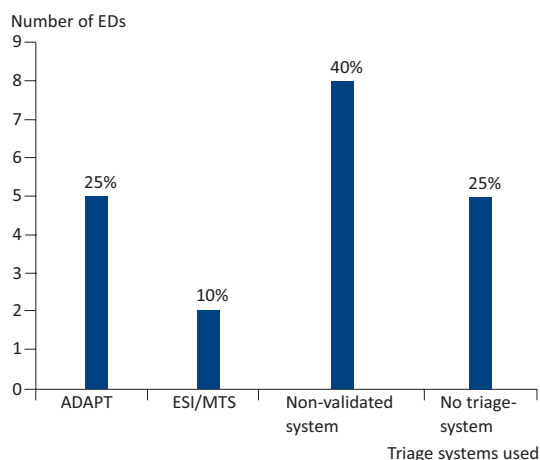
Case: A 60 year-old man with hypertension but no prior hospitalizations is referred to the emergency department by a general practitioner who suspects pneumonia. He has been treated with penicillin for four days with no effect and his primary complaints are dyspnoea and fatigue.

Vital parameters: blood pressure: 110/75 mmHg; pulse: 124; oxygen saturation: 93%; respiration rate: 26; temperature: 38.5 °C.

Applying ADAPT to this patient results in an orange colour (because of his high pulse) and he is thus considered *urgent* and needs to see a physician in 15 minutes.

FIGURE 2

The use of triage and the triage systems being used.



ADAPT = adaptive process triage; EDs = emergency departments; ESI = emergency severity index; MTS = Manchester triage system

RESULTS

We received answers from all 20 EDs. 95% (n = 19) answered all questions. All questionnaires were answered by a head of department.

The use of triage

We found that triage was used at 75% (n = 15) of the EDs; among these only 53% (n = 8/15) triaged all patients. In 60% (n = 9/15) of the hospitals using triage, the triage system had been introduced in 2009 or 2010.

Adaptive process triage (ADAPT) was the most frequently used validated triage system (25% (n = 5)), while 40% (n = 8) used triage systems developed locally (e.g. by physicians or nurses at the hospital in question), see **Figure 2**.

Performing triage

Triage was performed by a nurse in 73% (n = 11) of the EDs, a nurse or a physician in 13% (n = 2), and in 13% (n = 2) by a triage team consisting of a physician and nurse. Among the five hospitals that did not use triage, a nurse still prioritized the patients in three, and a nurse and/or physician in one. One respondent did not answer this question. In 87% (n = 13) of the EDs using triage, there was a defined timeframe for when a patient had to be seen by a physician. This timeframe was determined by the triage score.

DISCUSSION

The majority of EDs in Denmark are using a triage system. ADAPT is the most commonly used triage system (25% of the EDs). About half of the EDs rely on non-validated, often "homemade" triage systems.

It is surprising that not all EDs are using triage and that many different triage systems were used. In addition, several systems had been introduced recently and without a validation and evaluation period. Triage is widely regarded as the best method for prioritization of patients in EDs. Accurate triage is fundamental for providing efficient and high-quality emergency healthcare, while an incorrect triage score results in a waste of resources and excessive patient waiting times [7].

We found that in 60% of the EDs using triage, the system had been introduced in 2009-2010. Thus, triage is a relatively recent method in Danish EDs. It is important that a new triage system is thoroughly tested before its introduction. Validation is a highly important part of such a test [8].

The advantage of using a validated triage system is that prioritization rests on an evidence-based system rather than on the astuteness of the nurse. Decisions are reproducible (high inter-rater reliability) and the triage score has a direct consequence (e.g. see a physician immediately). Triage systems lead to a larger degree of

standardization in decisions which has been shown to improve the allocation of resources, reduce waiting time for critically ill patients and improve treatment [9, 10].

Implementation of a non-validated triage system may be compared to the introducing a new treatment for a disease that is not based on clinical studies. Validation of a triage system ensures that the system is clinically useful and shows if its use in the ED setting is viable. Validation of a triage system also ensures that the system can identify patients needing immediate care. Thus, a non-validated system may do more harm than good. None of the validated triage systems used in Danish EDs have been subject to published validation studies featuring their use in Denmark. They have both been developed and validated abroad (e.g. USA and UK) or they have been locally developed (but not validated) in Denmark. This may be a problem because the patients in Danish EDs may not be comparable to those attending EDs in other countries due to differences in emergency care provided in primary healthcare.

The triage system most frequently used in Danish EDs, ADAPT, was developed by Letvall et al and first introduced in Denmark in 2009 [11]. Nordberg et al [12] found that ADAPT was a good predictor for admission to a general ward or intensive care unit, but no further evaluations have been performed. ADAPT was developed on the basis of the Medical Emergency Triage and Treatment System (METTS), and unlike ADAPT, METTS has been validated and found to have a high sensitivity and specificity for the detection of critically ill patients [13, 14]. Additionally, the number of cardiac arrests and respiratory failures decreased significantly after the introduction of METTS at one ED [14]. However, triage is not a static process as the patient's condition can change after arrival. Any safe and effective triage system should take this need for repeated evaluation into account.

Most triage systems rely on experienced nurses to undertake triage. In line herewith, we found that in 73% (n = 11/15) of the EDs, nurses were performing the triage. Several studies have demonstrated reduced waiting times for medical assessment and discharge when a physician or a triage team (nurse and physician) performs the triage, but there is no evidence that physicians are better at performing triage than nurses [15, 16]. Education of triage nurses has been shown to improve patient satisfaction, but not to reduce variability [16]. In 13% (n = 2) of the EDs, triage was performed by a triage team. Whether this is more cost-effective has not been demonstrated.

Limitations of the study

The design was cross-sectional and several of the hospitals not using triage at the time answered that a triage

system may be introduced at a later time. We used a non-validated questionnaire; however, we did test it before its distribution. Furthermore, we achieved a 100% response rate.

CONCLUSION

Triage systems were used in 75% of Danish EDs. ADAPT was used in 25% of the hospitals, while 40% used non-validated triage systems. Our study points to possible improvement in quality of healthcare in Danish EDs. We recommend that all EDs use triage systems as this may potentially improve care while making resource allocation more efficient. Also, locally developed triage systems that are not systematically validated should be avoided. As ADAPT is the most commonly used triage system, it, too, should be validated according to scientific practice.

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CONFLICTS OF INTEREST: none

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