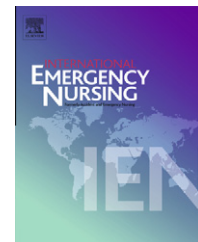




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# Managing patient flow with triage streaming to identify patients for Dutch emergency nurse practitioners

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## KEYWORDS

Triage;  
Validation;  
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## Abstract

**Introduction:** We developed a stream system to the current triangle system in order to manage patient flow at the emergency department and to clarify ENP role boundaries.

**Methods:** Data on admission and death rates – indicating injury severity – and data on length of stay – indicating resource utilisation – were collected from 48,397 patients triaged in the Netherlands in 2009.

**Results:** A total of 24,294 (50.2%) patients were triaged as ‘suitable for treatment by an ENP’ (ENP-stream). Remaining patients were triaged ‘medium care’ or ‘high care’. In the medium and high care groups, significantly more admissions took place (6100, 25.3%) and significantly more patients died (31, 0.1%) compared to the patient group in the ENP-stream (admissions: 840, 3.5%,  $p < 0.001$  and deaths 0, 0.0%,  $p < 0.001$ ). The ENP-streaming is an accurate predictor

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of not needing to be admitted (PPV = 97%) and of ED survival (PPV = 100%). Mean length of stay was significantly shorter for patients in the ENP-stream compared to the other patients (back transformed values: 74 vs. 147 min,  $p < 0.001$ ).

*Conclusion:* This study showed excellent correlation between the ENP-streaming and patients' injury severity and resource utilisation, suggesting high internal validity of our triage streaming system. It clarifies the ENP role, minimising the subjectivity of patient allocation.

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## Introduction

Because more and more people seek help at emergency departments, it is important to treat patients according to need, instead of according to order of arrival (Göransson et al., 2005; Olofsson et al., 2009). Triage has been defined as a dynamic decision-making process that prioritises a person's need for medical care on arrival at an emergency department (Gerdtz and Bucknall, 2001). The goals of triage include: to rapidly identify patients with urgent, life threatening conditions, to decrease congestion in emergency treatment areas, and to determine the most appropriate treatment area for patients presenting to the emergency department (Beveridge et al., 1998).

In many European hospitals, the Manchester Triage System (MTS), an algorithmic aid to the process of triage, is used (Mackway-Jones et al., 1997). The MTS utilises a series of flowcharts (based on main complaint) that lead the triage nurse to a logical choice of triage category. It is inevitable that this will direct resources away from less urgent cases (Windle and Mackway-Jones, 2003), leading to longer waiting times for those patients who can wait safely. To prevent long waits for this category of patients, the Medical Center Haaglanden (MCH) retrained seven emergency nurses into emergency nurse practitioners (ENPs). These ENPs are now managing the less urgent patients, namely patients with minor injuries and minor illnesses. A separate three room Nurse Practitioner Unit (NPU) was built. The NPU operates between 7.30 am and 11 pm. In every day- and evening shift one ENP works at the NPU, treating 15–20 patients per shift. An experienced emergency physician is available for consultation.

In the Netherlands, ENPs are registered emergency nurses with a masters' degree in advanced nursing practice. They are autonomous practitioners skilled in diagnosing and managing patients in a defined scope of practice. The ENPs used to select patients, waiting to be seen and of which they presumed to fall within their scope of practice, from the waiting room. However, often the triage level (combined with patients' complaint as documented by the registration), was not specific enough to recognise suitability for ENP treatment, causing delays because of lengthy treatments by doctors, or waiting for an inpatient bed, while occupying a NPU room.

To identify patients suitable for treatment by an ENP, the triage categories are of little use. Our local protocols allow ENPs to diagnose and treat patients with a wide range of defined minor injuries and illnesses (e.g. simple fractures, wounds requiring suturing, burns, foreign objects in skin or body cavity, blunt limb trauma, infections of eye, ear or throat and many more) in triage categories 2–5.

It was not sufficient to simply assign all blue (triage category 5) and green (triage category 4) patients to the ENP. ENPs are able to treat certain categories of patients in triage category 2 (orange) and 3 (yellow) as well, while some patients in categories 4 and 5 should be treated by a physician. E.g., our ENPs can treat patients with a dislocation of the shoulder that were triaged in category 2 because of the pain. However, they are not sufficiently trained to treat asthmatic children in category 4.

In various countries, ENPs play an important role in emergency care. However, each nurse and department has designed the ENP's interference slightly different. There is a lack of consensus about role boundaries, titles, clinical accountability and educational requirements (Griffin and Melby, 2006; Fisher et al., 2006; Wilson and Bunnell, 2007). In an attempt to clarify ENP role boundaries and, at the same time, manage patient streaming, the MCH developed a stream system to the MTS, to identify patients suitable for treatment by ENPs (van der Linden et al., 2011). We defined suitability for ENP treatment based on our local treatment protocols. The MTS flowcharts consist of several "discriminators" that allows the triage nurse to allocate patients to one of the five clinical categories of the MTS (blue-red). Newly developed was a streaming element attached to each discriminator, indicating one out of three ED streams: (1) patients suitable for treatment by the trauma team, coronary care team, or stroke team (high care), (2) patients suitable for treatment by one of the physicians (medium care) and (3) patients suitable for treatment by an ENP (ENP-stream). The triage nurse selects one of the computerised MTS-flowcharts from a standardized complaint list. Then all relevant discriminators are displayed and the triage nurse chooses the discriminator that fits the patients' condition best. Once the triage nurse assigns the MTS level based on the discriminator, the electronic system adds a mark indicating one of the three streams. E.g. for a patient with a swelling of her ankle, the triage nurse chooses the MTS flowchart 'limb problems', and selects the discriminator 'swelling'. After selecting the discriminator, the electronic system adds 'Nurse Practitioner Unit' to the name of the patient in the computer screen (Fig. 1). No changes were made in the registration and triage processes, therefore there was no need for additional training.

The purpose of this study is to validate the ENP-stream against ED patients' injury severity and resource utilisation.

## Validation of triage tools

The aim of triage is to sort patients according to clinical urgency. The aim of the ENP-stream is to identify patients suitable for treatment by an ENP at triage. In order to validate this ENP-stream, we would have to measure the stratification

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