A descriptive study of registered nurses' application of the triage scale RETTS©; a Swedish reliability study

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ABSTRACT

Background: From a patient safety perspective, it is of great importance that decision support systems such as triage scales are evidence based. In the most recent national survey, the majority of Swedish Emergency Departments (EDs) apply the Swedish triage scale known as the Medical Emergency Triage Treatment Scale (METTS), subsequently renamed the Rapid Emergency Triage Treatment Scale (RETTS©). Despite national widespread implementation, there has been limited research on METTS/RETTS©.
Aim: To determine the reliability of application by registered nurses of the RETTS© triage scale in two Swedish emergency departments.
Methods: In this prospective, cross-sectional study at two EDs, 46 written patient scenarios were triaged by 28 registered nurses (RNs). Data were analysed with descriptive statistics and Fleiss kappa (κ).
Results: The RNs allocated 1281 final triage levels. There was concordance in seven (15%) of the scenarios, and dispersion over two or more triage levels in 39 (85%). Dispersion across the stable/unstable patient boundary was found in 21 (46%) scenarios. Fleiss κ was 0.562, i.e. moderate agreement.
Conclusion: The inability of the triage scale to distinguish between stable/unstable patients can lead to serious consequences from a patient safety perspective. No general pattern regarding concordance or dispersion was found.

1. Introduction

Since the 1970s there have been increasing numbers of patients in Emergency Departments (EDs) worldwide [1]. In order to allocate limited resources as efficiently as possible, triage has become a commonly used working tool. ED triage aims to ensure that patients receive treatment in a timely manner and in the order of priority of their clinical urgency to ensure continuous patient safety [2–4]. Nevertheless, the study of Calder et al. identifies triage as the most error-prone area of the ED, which possibly impacts patient outcome [5]. Since the late 1980s, several triage scales have been developed and studied globally, the Australasian Triage Scale (ATS) in Australia [6], the Canadian Triage and Acuity Scale (CTAS) in Canada [7,8], the Manchester Triage Scale (MTS) in UK [9] and the Emergency Severity Index (ESI) in the USA [10] being the best known [2]. In the late 1990s and early 2000s, around 50% of the EDs in Sweden performed triage with registered nurses (RNs). However, there was a lack of consensus regarding triage scales, and several types of scales including three, four and five-level triage scales were used across

the country [11,12]. The most recent national survey of Swedish ED triage found that 97% of the EDs use a triage scale of some kind, mostly (n = 48, 65%) the Swedish triage scale, the Medical Emergency Triage Treatment Scale (METTS), the predecessor of the Rapid Emergency Triage Treatment Scale, RETTS© [13,14]. RETTS© is a five-level triage scale based on cut-off levels for vital signs (VS) and 59 chief complaint algorithms known as emergency symptoms and signs (ESS) for emergency care. Each ESS includes one or more chief complaints and is classified according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision Version for 2007 (ICD-10). A logistic process is attached to each algorithm. RETTS© contains modules for adults (RETTS-A©), paediatric (retts-p©), trauma (RETTS-T©) and psychiatry [14] (Figs. 1 and 2).

Studies published on RETTS/METTS have focused primarily on reliability, with two studies and one report investigating adult versions of RETTS© [15–17] and two investigating paediatric versions [18,19]. In 2006, a study by Widgren & Jourak showed good concordance with uncorrected κ from 0.761 to 0.903 when one emergency physician and

RED, unstable patient, life threat – *immediate assessment*
- Obstructed airway
- Stridor
- Sat <90% with oxygen treatment
- Breathing frequency >30 or <8
- Regular pulse >130 or unregular >150
- Systolic blood pressure <90 mm Hg
- Unconsciousness
- Ongoing seizures

ORANGE, unstable patient, potentially life-threatened – *emergency care immediately*
- Sat <90% without oxygen treatment
- Breathing frequency >25
- Pulse >120 or <40
- Alertness, RLS 2-3 (RLS is the Swedish Reaction Level Scale 85, and RLS 2-3 is comparable with GCS 8-12)
- Temperature >41°, < 35°

YELLOW, stable patient without ongoing life-threat but in need of *emergency care*,
- Sat 90-95% without oxygen treatment
- Pulse >110 or <50
- Acutely disoriented
- Temperature >38,5°

GREEN, stable patient, no life-threat but in need of *care within reasonable* time
- Sat >95% without oxygen treatment
- Breathing frequency 8-25
- Pulse 50-110
- Alert
- Temperature 35°-38,5°

BLUE, stable patient with restricted need of emergency care, can be taken care of on another care level if this can be provided
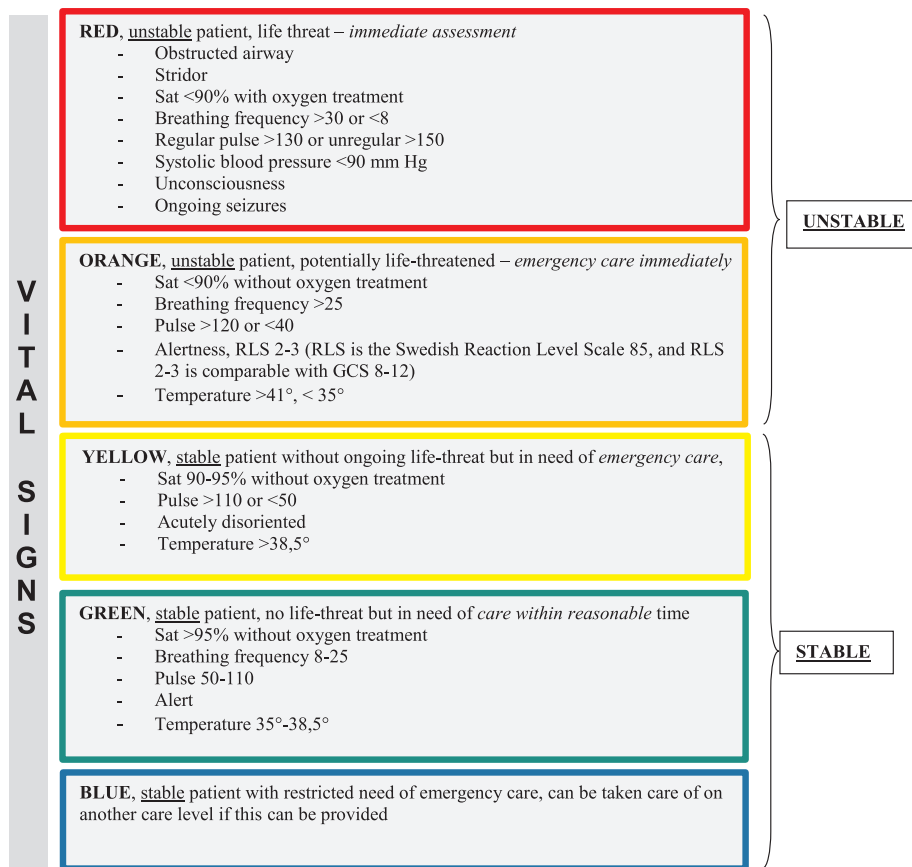
VITAL SIGNS

UNSTABLE

STABLE

Fig. 1. Cut-off levels due to vital signs (VS), according to RETTS©, example *Chestpain, algorithm No. 5,* free translation after description in Widgren (2012).
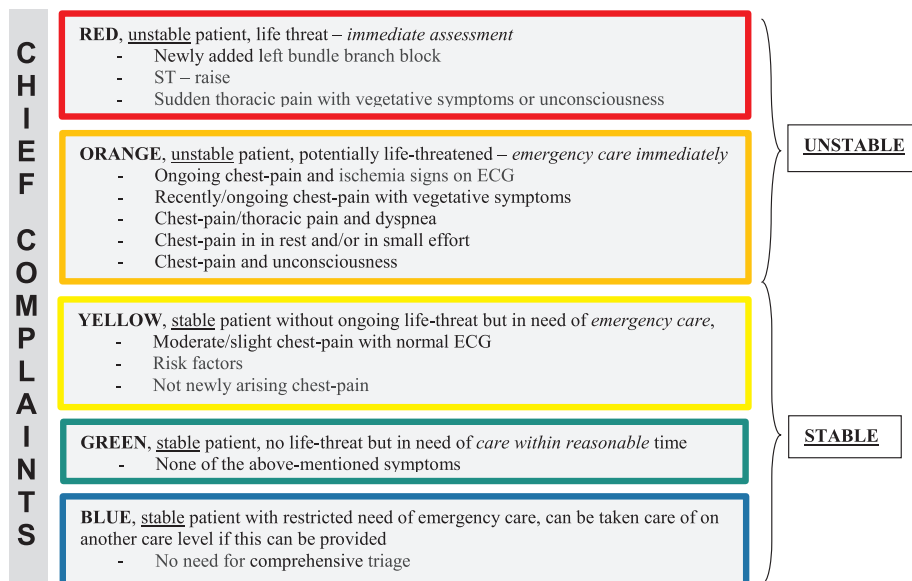
RED, unstable patient, life threat – *immediate assessment*
- Newly added left bundle branch block
- ST – raise
- Sudden thoracic pain with vegetative symptoms or unconsciousness

ORANGE, unstable patient, potentially life-threatened – *emergency care immediately*
- Ongoing chest-pain and ischemia signs on ECG
- Recently/ongoing chest-pain with vegetative symptoms
- Chest-pain/thoracic pain and dyspnea
- Chest-pain in in rest and/or in small effort
- Chest-pain and unconsciousness

YELLOW, stable patient without ongoing life-threat but in need of *emergency care*,
- Moderate/slight chest-pain with normal ECG
- Risk factors
- Not newly arising chest-pain

GREEN, stable patient, no life-threat but in need of *care within reasonable* time
- None of the above-mentioned symptoms

BLUE, stable patient with restricted need of emergency care, can be taken care of on another care level if this can be provided
- No need for comprehensive triage

CHIEF COMPLAINTS

UNSTABLE

STABLE

Fig. 2. Cut-off levels due to chief complaints (ESS) according to RETTS©, example *Chest-pain, algorithm no 5,* free translation after description in Widgren (2012).

two RNs allocated triage levels to 132 real-life patients [15]. Inter-rater agreement regarding a version of RETTS© known as the Rapid Emergency Triage and Treatment System – Hospital Unit West (RETTS-HEV) in Denmark was studied in 2012. A total of 146 real-life patients were triaged by an ED staff nurse and a study nurse, blinded simultaneously. The result showed good inter-rater agreement overall, with Fleiss κ 0.60. For patients in need of immediate treatment, i.e. triage level red, there was high agreement, κ 0.83 [16]. In a Swedish report, the overall inter-rater reliability was found to be lower, with κ 0.455 in group 1 (n = 79 RNs) and κ 0.558 in group 2 (n = 42 RNs). Both groups allocated triage levels with RETTS© to 20 written patient scenarios each

[17]. The paediatric version, *retts-p©,* was found to have good to very good inter- and intra-reliability with quadratic κ_w = 0.86 and 0.92 in a Swedish study performed in 2010, when 20 RNs allocated triage levels to 40 retrospectively assessed written case reports [18]. Henning et al. [19] confirmed the findings of Westergren et al. [18] with high inter-rater reliability (ICC 0.762) when 20 RNs triaged 180 real-life patients together with four research RNs in a Norwegian study. Compared to the gold standard, 85.1% of the RNs allocated a "correct" triage level with a total of 603 ratings [19].

Additionally, two studies [15,20] have been published on the validity of the adult version of RETTS©. A Swedish study from 2006