

A traditional Balinese outrigger boat, known as a Flo III, is shown on a river. The boat is white with a blue frame and has 'FLO III' written on its side. It is positioned on a sandy bank with a dense line of green mangrove trees in the background. The foreground is partially obscured by the dark, thatched roof of a building, suggesting the boat is docked or near a structure. The sky is clear and blue.

**The
Manchester Triage System
in paediatric emergency care**

Mirjam van Veen



About the author

Mirjam van Veen was born on 28th April 1978 in Nieuwegein. She finished high school (Atheneum) at the Oosterlicht college in 1996. She moved to Maastricht to study Health Science at the University of Maastricht, and finished her first and second year. Secondly, she obtained her medical degree at the Erasmus University in Rotterdam between 1998-2004. In this period she became interested in paediatrics and followed internships in paediatrics at the Akdeniz University hospital of Antalya, Turkey and the Centre Hospitalier Louis Domergue Trinité in Martinique.

She worked as a resident in paediatrics in 2005 at the St. Antonius Hospital in Nieuwegein. Between 2006 and 2009 she performed her PhD on the 'Manchester Triage System in paediatric emergency care' under supervision of Prof. Dr. Henriëtte A Moll and Prof. Dr. Ewout W. Steyerberg at the department of general paediatrics at the Erasmus MC-Sophia children's hospital Rotterdam. Furthermore, she initiated and performed a study on the validity of the Netherlands Triage System, under supervision of Prof. Dr. Henriëtte A. Moll and Dr. Paul Giesen (Scientific Institute for Quality of Healthcare, Radboud University Nijmegen).

She obtained her Master of Sciences Clinical Epidemiology in 2008 at the Netherlands Institute of health Sciences (NIHES) and won the NIHES Award 2008 for first author of the best research paper. In 2009 she started as a resident paediatrics at the Erasmus MC-Sophia Children's hospital (Head Dr. M. de Hoog and Prof. Dr. A.J. van der Heijden) and the Maastad Hospital, Rotterdam (Head Dr. C.R. Lincke) and expects to finish her training paediatrics in 2014. Mirjam lives in Rotterdam and likes to bike, to run, to travel and to play the violin.

UITNODIGING

U bent van harte welkom bij de
openbare verdediging
van mijn proefschrift

The Manchester Triage System in paediatric emergency care

Op 16 april 2010
11:30 uur

in de Senaatszaal, gebouw A
Complex Woudestein
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Stellingen behorend bij het proefschrift:

'The Manchester Triage System in paediatric emergency care'

1. Het Manchester Triage Systeem heeft een matige validiteit bij kinderen. (dit proefschrift)
2. Een referentiestandaard voor urgentie gebaseerd op vitale kenmerken, werkdiagnose, diagnostiek en behandeling tijdens het spoedeisende hulp consult, is de best beschikbare maat voor de werkelijke urgentie. (dit proefschrift)
3. Om kinderen met koorts te triëren bepaalt niet alleen lichaamstemperatuur, maar de combinatie van lichaamstemperatuur met leeftijd en presenterend probleem, de urgentie. (dit proefschrift)
4. Specifieke aanpassingen in het Manchester Triage Systeem, voor verschillende leeftijdsgroepen bij kinderen, verbeteren de specificiteit terwijl de sensitiviteit onveranderd blijft. (dit proefschrift)
5. Kinderen met een lage urgentie in het Manchester Triage Systeem kunnen veilig naar de huisartsenpost verwezen worden, tenzij zij jonger dan 1 jaar zijn en klachten hebben van benauwdheid, gastrointestinale klachten of koorts zonder specifieke symptomen. (dit proefschrift)
6. The introduction of the Emergency Triage Assessment and Treatment (ETAT) guidelines with dedicated accident and emergency care staff reduces mortality in developing countries. (Molyneux, *Trans R Soc Trop Med Hyg* 2009, 103(1):11-5)
7. Obesity in children is associated with an increased rate of death during early adulthood. (Franks et al. *N Engl J Med* 2010, 362(6): 485-493)
8. It is no longer excusable for missing values and the reason they arose, to be swept away under the carpet, nor for potentially misleading and inefficient analysis of complete cases to be considered adequate. (Sterne et al. *BMJ* 2009, 338: b2393)
9. The effects of antivirals on reducing the course of illness or preventing complications in children with H1N1 infections are not known but, based on available evidence, are limited. (Shun-Shin et al. *BMJ* 2009, 339:b3172)
10. Parental concern and clinical instinct "that something is wrong" are strong predictors of serious infection in children presenting at emergency care settings. (Van den Bruel et al. *Lancet* 2010, in press)
11. What you don't know you can feel it somehow. (Beautiful Day, U2, 2000)

Mirjam van Veen
Rotterdam, 16 april 2010

The Manchester Triage System

in paediatric emergency care

Mirjam van Veen

The Manchester Triage System
in paediatric emergency care
Thesis, Erasmus Universiteit Rotterdam, The Netherlands.

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Mirjam van Veen

The Manchester Triage System

in paediatric emergency care

Het Manchester Triage Systeem op de spoedeisende hulp bij kinderen

Proefschrift

ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de
rector magnificus

Prof.dr. H.G. Schmidt

en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op
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door

Mirjam van Veen

geboren te Nieuwegein



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Aims and outline



AIMS

1. To provide an overview of the current literature on triage systems for children at the emergency department
2. To evaluate the reliability and validity of the Manchester Triage System (MTS) for children and to identify specific discriminators for which validity is less optimal
3. To improve the predictive value of the MTS in children, for true urgency defined by a reference standard and to validate the modified MTS in a new population
4. To evaluate effects on safety, cost and compliance when low urgent children, who attend the emergency department are referred to the general practice cooperative

OUTLINE

In the first part of the thesis performance of the Manchester Triage System in paediatric emergency care was evaluated.

In **chapter 1** we reviewed the literature to evaluate reliability and validity of triage systems in paediatric emergency care. The Manchester Triage System was used to triage patients when presenting at the emergency department of a general teaching hospital and the emergency department of a university paediatric hospital. The system's reliability was evaluated in **chapter 2**. Its validity and specific patients groups for which validity was not optimal were discussed in **chapter 3**. **Chapter 4** evaluates patient problems for which the MTS performs severe under-triage. The second part focuses on improvements of the MTS. **Chapter 5** focuses on the value of temperature as discriminator in triage systems. The MTS was modified for patient groups with a low validity and the effect of the modification on the reliability and validity are studied in **chapter 6**.

In the third part of this thesis we assess the ability of the MTS to safely identify low urgent patients. In **chapter 7** determinants of hospitalisation for low urgent patients were evaluated. **Chapter 8** reports about compliance and effect on costs when low urgent children, when presenting to the ED are referred to the general practitioner cooperative.

Chapter 9 provides a summary of the findings and the future prospects.

