Warning scores in the Netherlands:
NEWS and Views

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• Dutch National Patient Safety Programme (VMS Veiligheidsprogramma)
  - Implementation
  - Results

• Rapid response systems in the Netherlands

• News and views?
USA 2000 Institute of Medicine Report

Top 10 causes of death

- Sepsis 100,000 - 200,000
- Medical errors 44,000 – 96,000
- Breast ca 42,000
- HIV 16,000

To Err Is Human, Building a Safer Health System, LT Kohn, JM Corrigan, and MS Donaldson, Editors
Committee on Quality of Health Care in America, Institute of Medicine 2000
Safety first!!
Patient safety in hospitals NL

- Implementation of certified safety system
- Board of directors are responsible for safety
- Insurance companies should take safety into account in contracting hospitals
- Government should facilitate implementation of safety programs
National reviews of records 2007:

- 7926 records (2004)
- 21 Hospitals / 18 ‘triggers’ / 744 AE`s
- Admissions 2004 (1,300,000)
- Unintended damage: 75,000 pat (5.7%)
- Preventable: 30,000 pat (2.3%)
- 8% deaths
- Extension LOS 10 days
- Extra costs: € 167,000,000
- 1735 avoidable deaths (CI: 1482 tot 2032)
National Patient Safety Programme ‘Prevent harm, work safely’
(2008 – 2012)

- 1. Prevention of postoperative infection
- 3. Early recognition and treatment of deteriorat iong patients
- 4. Use of medication reconciliation bundles
- 5. Vulnerable elderly.
- 6. Optimal care for AMI.
- 7. Early recognition and treatment of pain
- 8. Prevention of high risk medication related incidents
- 10. Prevention of contrast induced renal failure
The ProCESS Trial — A New Era of Sepsis Management

• Guideline Bundles Adherence and Mortality in Severe Sepsis and Septic Shock: Critical care medicine
  Equivalent to 5.8% adjusted absolute mortality reduction over 3.5 years

• Safety has improved significantly in 2013
Rapid response systems in the Netherlands

Figure 2. Rapid response system components
**Results:** Two hundred four patients were included. In the 48 hours before the event, a total of 2688 measurements of one or more vital signs were taken. Overall, 81% of the patients had an MEWS value of 3 or more at least once during the 48 hours before their event. Recordings of vital signs were mostly incomplete. Even when the MEWS was 3 or more, respiratory rate, diuresis, and oxygen saturation were documented in only 30% to 66% of assessments.
How nurses and physicians judge their own quality of care for deteriorating patients on medical wards: Self-assessment of quality of care is suboptimal

Table 3. Perception of cooperation, communication and coordination of care

Table 5. Presence of delay and degree of avoidability compared with expert opinion: Predictive capabilities and inter-rater comparability between care-providers (event-shift) and expert panel.

<table>
<thead>
<tr>
<th>Expert versus</th>
<th>Positive Predictive Value (95% CI)</th>
<th>Positive Predictive Value (95% CI)</th>
<th>( \kappa ) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>62 (36 - 82)</td>
<td>37 (22 - 56)</td>
<td>-0.01 (-0.30 - 0.27)</td>
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<tr>
<td>Resident</td>
<td>63 (31 - 86)</td>
<td>38 (23 - 56)</td>
<td>0.00 (-0.28 - 0.28)</td>
</tr>
<tr>
<td>Specialist</td>
<td>67 (30 - 90)</td>
<td>38 (23 - 55)</td>
<td>0.02 (-0.25 - 0.29)</td>
</tr>
</tbody>
</table>

Comparative analysis is performed in which the expert opinion was set as “reference standard.” Positive predictive values represent the “true-positive ratio” in which the experts and care-providers concurred in the presence of delay regarding the recognition of the patients. Negative predictive values represent the “true negative ratio” in which the experts and care-providers concurred in the absence of delayed recognition, and thus timely recognition.

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<table>
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<tbody>
<tr>
<td>Nurse</td>
<td>7.5 (7.0 - 8.0)</td>
</tr>
<tr>
<td>Resident</td>
<td>8.0 (7.0 - 8.5)</td>
</tr>
<tr>
<td>Specialist</td>
<td>8.0 (7.7 - 9.0)</td>
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SAMsterDAM conference 1 & 2 may 2014

Presence of delay and avoidability!!!
Standardized measurement of the Modified Early Warning Score results in enhanced implementation of a Rapid Response System: a quasi-experimental study

Resuscitation

Results: MEWS calculations from vital signs occurred in 70% (2513) on the protocolized wards versus 2% (65) in the control group. Compliance to the protocolized regime was presents in 68% (819). Compliance in the control group was present in 4% (47) of the measurements. There were 90 calls to primary physicians on the protocolized and 9 calls on the control wards. Additionally on protocolized wards, there were twice as much RRT calls per admission.
Main outcomes and measures: The primary outcome was the incidence of the composite endpoint of either cardiopulmonary arrest, unplanned ICU admission, and death. Secondary outcomes were the individual components of the primary endpoint.

Design, setting and participants: Pragmatic Dutch multi-center before-after trial including 12 hospitals (2 surgical and 2 non-surgical wards) with patients 18 years or older between April 2009 and November 2011.

Results: In total 166,569 patients were included in the study representing 1,031,172 hospital admission days.
Cost and Outcome of Medical Emergency Teams (COMET) Study.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>MEWS/ SBAR</th>
<th>RRT implementation</th>
<th>RRT</th>
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</thead>
<tbody>
<tr>
<td>Time</td>
<td>5 months</td>
<td>7 months</td>
<td>12 months</td>
<td>5 months</td>
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The table above shows the time periods when different interventions were implemented. The bar chart represents the number of composite endpoints per 1000 admissions with 95% CI bars for different study periods.
<table>
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<tr>
<th>Table 2. Secondary outcomes per 1,000 admissions</th>
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<tr>
<td></td>
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<tr>
<td>Before</td>
</tr>
<tr>
<td>1.94 (1.43-2.46)</td>
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<td>1.93 (1.50-2.35)</td>
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<td>1.54 (1.25-1.83)</td>
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<td>1.22 (0.82-1.61)</td>
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<tr>
<td>Cardiopulmonary Arrest, n/1,000 (95%CI)</td>
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<td>ICU admission*, n/1,000 (95%CI)</td>
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<td>Death, n/1,000 (95%CI)</td>
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<tr>
<td>Before</td>
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<td>19.8 (18.1-21.6)</td>
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<td>19.6 (18.1-21.0)</td>
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<tr>
<td>19.5 (18.3-20.6)</td>
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<tr>
<td>17.1 (15.5-18.6)</td>
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<td>MEWS</td>
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<td>20.4 (18.7-22.0)</td>
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<td>22.5 (21.0-23.9)</td>
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<tr>
<td>20.5 (19.5-21.6)</td>
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<tr>
<td>17.7 (16.2-19.2)</td>
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<tr>
<td>RRT implementation</td>
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<tr>
<td>RRT</td>
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</table>

*Including multiple unplanned ICU admissions per patient.
Resuscitation

Review article

The impact of the use of the Early Warning Score (EWS) on patient outcomes: A systematic review∗

N. Alam a,b, E.L. Hobbelink a, A.J. van Tienhoven a, P.M. van de Ven c, E.P. Jansma d, P.W.B. Nanayakkara a,b,*

All seven selected articles reported trials examining the endpoints before and after implementation of EWS with a total of 486,237 patients. Three studies investigated the impact of the EWS with an already existing CCOS,7,10,24 whereas two other studies8,22 introduced the EWS, parallel with a new CCOS. Peris et al.23 and Meester et al. (2012) were the only studies who solely focused on the impact of the EWS without an official CCOS (Table 1).
Main results: Seven studies met the inclusion criteria. The results of our included studies were mixed, with a positive trend towards better clinical outcomes following the introduction of the EWS chart, sometimes coupled with an outreach service.

Conclusion: The EWS itself is a simple and easy to use tool at the bedside, which may be of help in recognizing patients with potential for acute deterioration. Coupled with an outreach service, it may be used to timely initiate adequate treatment upon recognition, which may influence the clinical outcomes positively. However, the use of adapted forms of the EWS together with different thresholds, poor or inadequate methodology makes it difficult in drawing comparisons. A general conclusion can thus not be generated from the lack of use of a single standardized score and the use of different populations. In future large multi-centre trials using one standardized score are needed also in order to facilitate comparison.
Patient population

- A total of 300 patients were assessed for eligibility
- 274 patients at moment of entry to the ED
- For 247 patients, the NEWS was calculated an hour later
- 133 patients could be followed up to calculate the NEWS at discharge from the ED (admitted to the ward or discharge)
Frequency distribution of the NEWS at T0

National early warning score (NEWS)

number of patients

0 1 2 3 4 5 6 7 8 9 10 11

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### NEWS at T0 (n=274) | LOS in days - mean (CI)
---|---
0 (n=60) | 1.77 (0.71-2.82)
Aggregate 1-4 (n=161) | 3.91 (2.64 - 5.17)
Aggregate 5-6 (n=21) | 5.43 (2.06-8.80)
Aggregate ≥7 (n=30) | 10.07 (5.12-15.01)

### NEWS at T0 (n=274) | deceased patients/total patients (%)
---|---
0 | 0/60 (0%)
Aggregate 1-4 | 4/163 (2.5%)
Aggregate 5-6 | 1/21 (4.8%)
Aggregate ≥7 | 6/30 (20.0%)
Total | 11/274

### NEWS at T0 (n=274) | Admitted patients / Total patients (%)
---|---
0 | 20/60 (33.3%)
Aggregate 1-4 | 73/163(44.8%)
Aggregate 5-6 | 14/21 (66.7%)
Aggregate ≥7 | 23/30 (76.7%)
Total | 130/272
PHANTASi Trial
Prehospital Antibiotics against Sepsis
Conclusions!!

- Patient safety has improved significantly between 2008 and 2013
- Although many hospitals have implemented RRS there was very little attention paid to the afferent limb
- Implementing NEWS according to uniform protocols in ED`s and AAU`s?
- Warning scores in prehospitaal setting?