Whiteboard Icons to Support the Blood-Test Process in an Emergency Department: An Observational Study of Temporal Patterns

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The setting

- Work practices in an ED in Region Zealand

- 21 patient rooms, fast-track area, 2 acute areas, 1 long-term area

- ED responsible for coordinating work – physicians from other departments responsible for treatment

- Have been using electronic whiteboards for a couple of years
Background

• Failure to follow up on test results is a substantial problem which impacts on patient safety (Callen et al, 2011)

• Acknowledging tests: A formal requirement (The Danish Quality Model for Hospitals)

• Physicians have long been able to view blood-test results in a laboratory system – since Oct 2011 also to acknowledge electronically

• Latest initiative to support follow-up and acknowledgement: Icons on the electronic whiteboards

• Assumption: Physicians attend to the changing color of the icons on the whiteboard (decrease in time, increase in number)
Methods

Ethnographic observations (shadowing):
• 3 junior physicians (residents)
• 3 attending physicians
• 2 nurses
19 hours in total

Interviews:
• 2 nurses
• 2 laboratory technicians
• 2 physicians from the Surgical Department
• 1 coordinating nurse
• 1 triage nurse
• 1 secretary

Focus: the work with blood tests and how the icons on the electronic whiteboard supported this work
**Electronic Whiteboard System**

![Image of an electronic whiteboard system](image)

<table>
<thead>
<tr>
<th></th>
<th>Ordered</th>
<th>Analysis in progress</th>
<th>Results ready</th>
<th>Results acknowledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blod tests</td>
<td>![3D icon]</td>
<td>![0/12 icon]</td>
<td>![10/10 icon]</td>
<td>![10/10 icon]</td>
</tr>
</tbody>
</table>

- Red icons flashes if results are alarming.
4 Steps in Patient Trajectory

1. **Triage**
   - Acuteness, resources

2. **Admission**
   - Nurse orders blood tests in lab.sys.

3. **Initial examination**
   - Junior physician: patient record, initial results

4. **Examination**
   - Senior physician: plan; discharge or transferal
Main Findings

• Important to two central temporal patterns:
  1. Diagnosing/treating individual patients
  2. Securing flow of patients through the ED

• How do the icons support these patterns?
Physicians

during time-outs; coordinate with other clinicians

• Frequently disrupted: are not ‘looking for additional disruptions’ in their work

patients (laboratory system)

physicians in treating the individual patient

Icons play a minor role in supporting the physicians in treating the individual patient
<table>
<thead>
<tr>
<th>Test</th>
<th>Status</th>
<th>Tid</th>
<th>Info</th>
<th>Fjerne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triglycerid</td>
<td>P udenfor referanse interval, måleverdi 3,7 mmol/l, referanseintervall 0,45-2,6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td>P udenfor referanse interval, måleverdi 47 g/l, referanseintervall 36-45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glukose</td>
<td>P normal, måleverdi 7,1 mmol/l, referanseintervall 2,9-8,3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Koagulationsfaktor II+VII+X [INR]</td>
<td>P normal, måleverdi 0,9, referanseintervall 0,8-1,2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibrin D-Dimer</td>
<td>P normal, måleverdi 0,15 FEU mg/L, referanseintervall &lt;0,50</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Kalium</td>
<td>P normal, måleverdi 4,2 mmol/l, referanseintervall 3,5-4,6</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Hæmoglobbin</td>
<td>B normal, måleverdi 8,9 mmol/l, referanseintervall 8,3-10,5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trombocytter</td>
<td>B normal, måleverdi 234 \times 10^{9}/L, referanseintervall 145-390</td>
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</tbody>
</table>
Nurses

• Go searching for the ‘responsible physician’
• Motivation: draw physicians’ attention to ‘yellow’ patients, waiting to be transferred or discharged (‘so that I can get my room back’)

Icons support the nurses in securing the flow
Who is the ‘responsible physician’?

• Not always displayed on the electronic whiteboard
• Main reason: Junior physicians removed names from whiteboard, when they completed initial examination (‘told to do so’)
• Problem: In case of flashing icons – whom to notify? A challenge for the nurses to find responsible physician
Acknowledging blood test results

• Organization of the work: physicians from different departments have different practices
• Acknowledgement frequently temporally dissociated from use/evaluation (junior physicians and time-outs)
• If acknowledgement becomes an activity in itself → greater risk of being a formal add-on with little clinical value
Suggestions for improvements

acknowledging test results and when

• System:

– Critical results conveyed directly to the responsible physician (for example on a smartphone)
Thank you for your attention

Acknowledgements:
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