User-centred design for optimum development and deployment of an e-Health intervention

Julia Knight, David Wong
The Problem

- **20,000** preventable deaths each year
- May be prevented by earlier intervention
- Early Warning Scores
<table>
<thead>
<tr>
<th>Frequency of observations</th>
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<tbody>
<tr>
<td>Data</td>
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<tr>
<td>Time</td>
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| SpO2 score     | 0 |
| Resp score     | 1 |
| Temp score     | 1 |
| GCS score      | 0 |

Total: 2
Towards Electronic Systems

Where are they?
The SEND Design Process

- Analyse current clinical process
- Assess market-leading systems

Initial prototyping

- Develop initial specification
- Develop User stories

Pilot testing (2 Wards)

- Measurement and mitigation of errors
- Amend User Stories

Redesign

- Develop evidence base for e-observations
- Barriers and enablers of successful intervention
Fast Data Entry

Vital sign data should be documented at least as fast as on paper.
Easy Data Review

The Right Data shared with the Right People
Patient Safety

Positive Patient ID via wristband barcodes
Ward Review
SEND displays lists of patients in each ward
Automatic Feedback
SEND displays near real-time information on observation timeliness and completion for each ward
Structured implementation strategy

- 5 weeks
- Critical mass training
- Making change with clinical staff
900,000+
Vital Signs Recorded Using SEND
1 hospital
3 more planned

1200+ Observation Sets Per Day

1000+ users
Nurses, Doctors and other Allied Health Professionals
One of the most amazing things that I have had the pleasure in being involved in

- Senior Nurse, Churchill Hospital OUH NHS Trust
There is a large gap between the postulated and empirically demonstrated benefits of e-Health technologies.

-Black et al. The Impact of e-Health on the Quality and Safety of Health Care: A Systematic Overview
iSEND

- Robust prospective design
- Step wedge
- Qualitative and quantitative endpoints
- Economic analysis
Technology Implementation Study (TIE)

Time-and-Motion Study

3-minute time saving per Observation Set

77.8 System Useability Score - High Useability
e-Health Innovation
Trend Information

"Uncomplicated" patients (160): discharged home within 30 days

"Abnormal" patients (23): (re-)admitted to ICU or died on the ward
Trend Information

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Cohort and Personalised Models
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Acknowledgment

◎ Oxford Biomedical Research Centre
◎ Safer Hospital Safer Wards