

Key Research: Drews and Doig (2013) - Evaluation of a configural vital sign display for intensive care unit nurses.

Method / Design

A Configural Vital Sign (CVS) display developed based on studies of the cognitive work of ICU nurses.

An independent measures design with the CVS display condition vs control traditional display.

Design of CVS / Procedure

The CVS display: Selection of variables to be included in the CVS display was based on ICU standard of care and included systolic, diastolic and mean arterial blood pressure, heart rate and blood oxygen saturation. The goal of the CVS was to facilitate detection of abnormal trends in vital signs data.

Based on interviews with nurses and data visualisation experts – the design requirements for the CVS included trend data, variability data reflecting changes in patient's vital signs, reduction of visual clutter and colour coding and geometric shapes to convey vital sign changes.

Current State Object (CSO) represented the current patient state by its shape and spatial location in a space of vital signs values. The size of the shapes and their relative position within the CSO demonstrate key information about the patients current state and its extent of variability. Different colours were used to represent blood oxygen saturation.

Traditional display: simplified version of an ICU display that consisted of the "numerical data" section of the CVS display as a primary display. On request participants had access to trend information (not on main screen like CVS).

Four patient 'hypothetical' scenarios were developed to test speed and accuracy of accessing patient data using either of the display units. Scenarios were the same for all participants but their presentation order was randomised. Scenarios were based on: Early sepsis, septic shock, pulmonary embolus and a control stable scenario.

Simulation took place at the University of Utah with a 20 minute training in the display unit. Participants were given five minutes to complete each scenario.

Primary measures included the response time to come to an assessment and accuracy of data interpretation.

Participants and Sampling

42 Intensive Care Unit (ICU) nurses with a minimum 1 years experience interpreted hypothetical patient data. 21 nurses assigned to each condition. 69% of nurses were female with an age range of 25-64

Results

Participants in the CVS display condition identified the patient's state more rapidly than the control condition using the traditional display. This was found to be a 30% improvement in response time to the CVS display.

Nurses using the CVS display also correctly identified the patient's condition more frequently than the control condition. Statistically significant differences were found for two out of the four scenarios.

Nurses rated the CVS display as having a lower mental demand than the traditional display.

Conclusions

Providing patient information in a CVS display that uses techniques of graphical display, colour coding and geometric shapes, improves speed and accuracy of data interpretation in the nurses who use it. The introduction of such displays into clinical monitoring thus has potential to improve patient safety.

Key Issues relevant to study

Ethics (positive)

Ecological Validity and mundane realism

Counter – balancing and methodological issues

Usefulness