More than Looks Alone: Cognitive Support in an Emergency Department Information System

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INTRODUCTION

- Emergency departments (ED) are best described as high-acuity, information intensive, communication dependent environments.¹ ²
- We propose that information display systems designed with applied cognitive principles will improve team situational awareness (SA) and, ultimately, ED workflow
- Our objectives are (a) determine the information needs of ED providers, (b) build a Work Domain Ontology including these information goals, needs, and constraints, (c) create a simulated data set of patients to populate the dashboard, (d) iteratively design and evaluate the dashboard, and (e) experimentally investigate the impact of our display on ED work

BACKGROUND

- Visual displays have been shown to improve situational awareness³ and high team SA improves team performance⁴
- Work-centered design using the TURF⁵ framework and Work-Domain Ontology enables the design and evaluation of products for usability.⁵ ⁶

METHOD

- To understand clinical information needs we carried out focus group discussions, observed shifts in ED, distributed surveys and analyzed existing commercial products
- We formalized the knowledge representation gathered using a Work-Domain Ontology including tasks and information required in clinical practice
- A discrete event simulation was used to generate a simulated patient data set.

DASHBOARD DEVELOPMENT

- Using the TURF framework (including understanding Tasks, Users, Representation, and Functions)
- Implementation of three-tier web application, consisting of a representation, service and database layer.
- Flexible enough to exchange data source, once meta-data specified in service layer.
- GUI requests read-only data frequently to keep the information timely
- Dashboard augments current systems but enables additional perspective on data

DASHBOARD PROTOTYPES

ITERATIVE DESIGN AND EVALUATION

- Evaluate optimal visualization by information type in situ and in vivo
- Usability assessment of dashboard
- Observational and experimental studies exploring workflow and decision making changes

SUMMARY OF CONCLUSIONS

- Results indicate potential for integration of clinical information needs utilizing TURF framework in the creation of a cognitively inspired dashboard display
- We believe optimized information display presented just in time to ED providers decreases errors and improves patient safety

REFERENCES


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