Crisis Teams

The interaction aspects of crisis computing—supporting highly trained teams as they respond to emergencies—have been underexplored in the user interface community. In medicine, operating rooms are information-dense with many sensors and output displays. This represents an extreme point in the space of interaction contexts, with a high complexity in teams and tasks.

Medical Design Insights

While paper checklists are valuable, they are static, slow to access, and show both too much and too little information.

Dynamic Checklists: iCogAid

In response, we introduce the Dynamic Procedure Aids approach. Dynamic Procedure Aids address four key problems in checklist usage:

**Ready access to the aids**

Rapid assimilation of their content

Professional acceptance of use in medical procedures

Limited attention available to their users

Observation in Stanford’s Medical Simulator Facility (50+ hours) informed the design process. We observed cognitive failures in remembering procedures, drug timing & dose counts, fixation and tunnel vision in a diagnosis, incorrect equipment configurations.

**Cognitive Aids for treatment and diagnosis in the real world**

1. Handwritten paper taped to the wall 2. Stanford AIM lab cognitive aid and 3. a dynamic, interactive cognitive aid prototype.

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**Simulation & Evaluation**

We designed a narrative simulation approach with two adjacent monitors: one (laptop) for the scenario and one (large screen) for the dynamic checklists. To induce additional load, participants had to complete a color-matching dual task, requiring them to shift attention back and forth. In the paper condition, laminated aids were given to the participants to place on a tray connected to the dual task station.

Rapid Assimilation

We are currently prototyping head-mounted displays that investigate ways of cueing action and adapting existing cognitive aids. These displays may be able to better capture attention during emergencies, although provide challenges to supporting a consistent, shared mental model across a team.

Heatmaps of visual search on aids. (left) Dynamic Procedure Aids averaged 5.7 second response times. (right) existing aids from Gawande et al. averaged 9.8 seconds.