FW-HTF-R: Biometrics and AI to Support Expert Nurse Decision-Making (Grant #: SES-2129097)

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In healthcare, failure to rescue and recognize deteriorating patients can directly impact their outcomes. Nurses are on the front lines of patient care, and their ability to synthesize information rapidly and make appropriate decisions about deteriorating patients is critical. **The goals of this project are to:**

1. Develop real-time biometrics that can assess the cognitive state of workers during healthcare work
2. Study expert nurse behaviors to learn efficient decision-making (DM) patterns
3. Imitation (computer) learning of expert behavior will be used to train the guides.

Accomplishments to date:

Expert Nurse DM (prelim work)

DM qualitatively modeled via expert nurses (n=10) resulted in 4 themes:

- Holistic patient assessment
- Developing relationships with patients and families
- Reducing cognitive workload
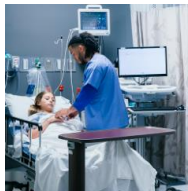
All images from google

Anton, N., Hornbeck, T., Modlin, S., Haque, M. M., Crites, M., & Yu, D. (2021). Identifying factors that nurses consider in the decision-making process related to patient care during the COVID-19 pandemic. *Plos one*, 16(7), e0254077.

Nurse DM Sensing Features

- Sensing features (eye-tracking) revealed that overly focusing on certain stimuli (vitals, speaking with patient) are related with poorer clinical judgement and may represent poor recognition of data. (working paper)
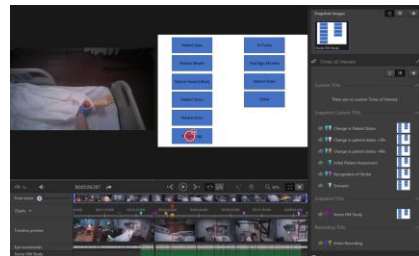
AR Usability

- Using the System Usability Scale, expert nurses rated the usability of AR as moderate
- Desire to use AR frequently
- Functions well-integrated
- Quick learning curve

All images from google

Anton, N. E., Zhou, G., Hornbeck, T. M., & Yu, D. (2022, March). Nurse Perceptions of the Usability of Augmented Reality to Support Clinical Decision Making: Results of a Pilot Study. In *2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)* (pp. 517-520). IEEE.

Enhance Novice Nurse DM (on-going)

- Pilot randomized-controlled trial with students to test effectiveness of AR to enhance DM
- Nasa-TLX (workload) scores indicate students using AR (59.8±17.7) experienced lower workload than controls (72±13.4)