

Sometimes useful, sometimes an impediment: Intensive care workers' attitudes toward advanced technologies

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Introduction & Background

One stream of our project uses qualitative methods to study worker experiences, concerns, and preferences about technology in an academic intensive care unit (ICU). ICUs are complex sociotechnical systems where people and machines diagnose patient problems, devise solutions, implement them, and use feedback to adjust. Cases can be ambiguous, complex, and stressful. ICU mortality rates are around 10%, and major morbidity is high. Workers are highly educated and generally well compensated; but burnout is an issue, especially since COVID-19.

Multiple technologies have been proposed and introduced to improve outcomes and reduce labor cost. Our research examines effects and response to technologies, focusing on treatment and feedback workflows.

Methods

- 100+ hours of ICU observation
- Survey: 300 responses
- 20 qualitative semi-structured interviews. 5 physicians, 4 bedside nurses, 4 manager/administrators, 7 others.
- 4 independent ICU units, 1 hospital

Tentative findings: Technology in ICUs

Situation

- Information overload
 - 1000s of data points/patient-day
- People as data interpreters
 - Filter, integrate
 - De-noise, trend, compare
 - Detect key signals
- New tech = islands
 - More data load
 - Adds to work, cognitive loads

Concerns

- Autonomy and privacy
- People as information integrators
- Disruption, alarm fatigue
- Fear of missing patient deterioration
- Technology data flows overwhelm

Desires

- Monitor patients
- Automate documentation
- Help with procedures
- Decision support, not replace people

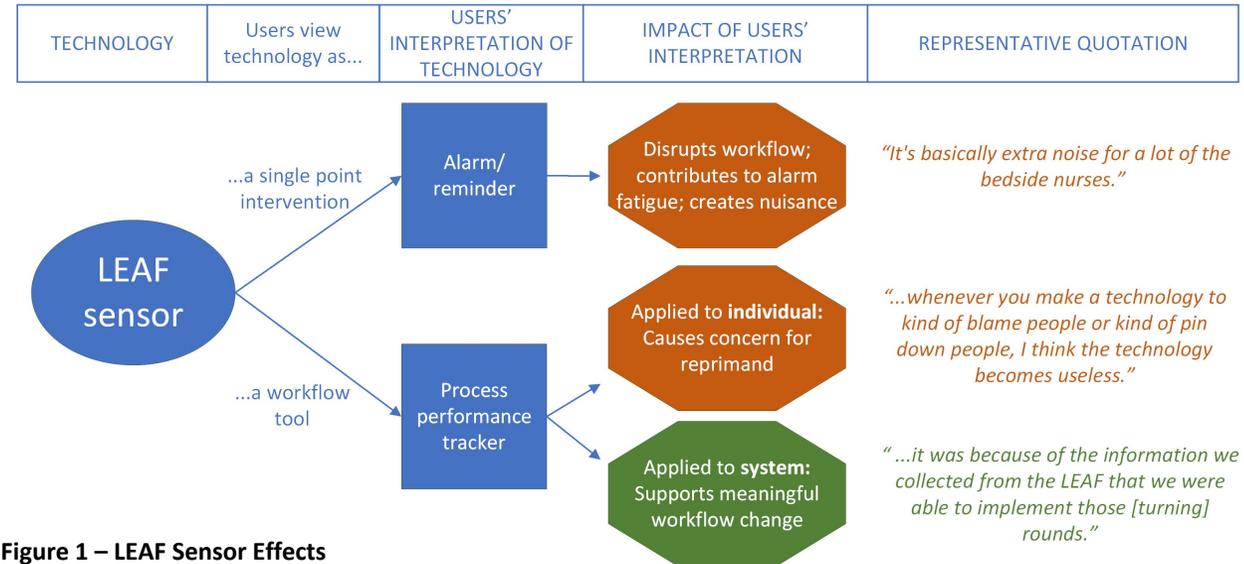


Figure 1 – LEAF Sensor Effects

Example: LEAF Sensors for HAPIs

Hospital acquired pressure injuries (HAPIs) are a dangerous side effect of patient immobility, e.g. in comatose patients. They are preventable by turning patients regularly. LEAF sensors monitor the angle and time of each turn. When a turn is overdue or insufficient, they produce an alarm in the room. The LEAF system also generates a central report.

Emerging themes from the first round of interviews:

1. Technology should help people do the job, not just monitor or remind them.
2. Technology that meets needs of a *problem*, but not the needs of *users*, may interfere with other processes.

Initial Conclusions - LEAF

New technologies may have highly variable outcomes depending on their implementation. One technology may impact work in both disruptive (orange) and supportive (green) ways (Figure 1).

The study around LEAF is ongoing. For more details, please see:

<https://med.stanford.edu/cerc/research/organizational-innovation/human-technology-frontiers/Leaf.html>