

Can DiCoT Improve Infection Control? A Distributed Cognition Study of Information Flow in Intensive Care



Mustafa Hussain
Florida Polytechnic University
mhussain@flpoly.org



Nadir Weibel
UC San Diego
weibel@ucsd.edu

Overview

Isolation gear protects nurses, visitors, and patients from Hospital-Acquired Infections (HAIs).



Sometimes, hospital staff do not know that a patient is isolated. We found out why using Distributed Cognition for Teamwork (DiCoT). Then we applied its principles to create an initial solution concept. In future work, we will investigate this further, with additional design iterations.

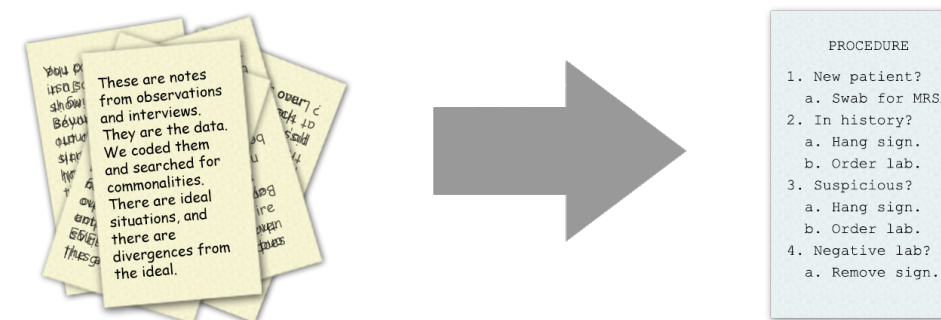
Design Ethnography

We used Contextual Inquiry and semistructured interviews to reveal both tacit and explicit knowledge.

1 Large hospital	18 Beds in ICU	6 Nurses
		3 PCAs
		2 Pharmacists
		2 Physicians
10 Visits to ICU during 4 months	16 Hours of observations	1 Respiratory Therapist
		1 Unit Manager

DiCoT Analysis

We extracted commonalities to reveal an ideal process and systemic shortcomings.



DiCoT Principles

We focused mainly on Information Flow and Artifact models, and the most relevant principles:

Naturalness: Representation should match represented.

Horizon of Observation determines situation awareness.

Create Scaffolding to alleviate memory demands.

Information Movement: Information flows in many ways. The medium determines how it may be processed.

Behavioral Trigger Factors reduce the need for a plan.

Separate information channels and overlap responsibilities for robust **Error Checking**.

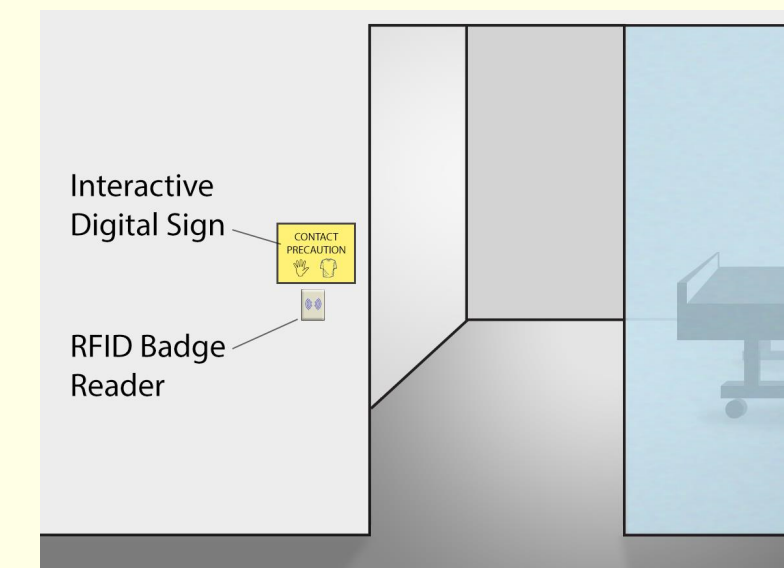
Results

There are barriers to isolation status propagation, sometimes exposing staff to a contagion for an hour.

How the System Works	Problems
Signs trigger nurses to wear gear. Computers display isolations, but this is not in Horizon of Observation.	If sign is absent, staff do not know about isolation.
If a new patient wears a mask, they must be on isolation. This scaffolding triggers the team to hang a sign.	Gloves and gowns are not worn during transport, so there is no scaffolding for Contact Isolation!
PCAs are frequently interrupted, and they are in charge of hanging signs.	Buffering principle says that requests to hang signs could get lost.

Solution Concept

Below: Staff members will use the device to display or remove an isolation sign. Interactions with the sign also update the EHR (Electronic Health Record). This way, when the patient moves to another unit, their isolation status is more likely to follow them.



Right: PCAs hang signs, while nurses sign isolation orders. This solution preserves that role-to-task mapping. A PCA badges in and selects the status. When a nurse "signs" the isolation order with their badge, the device records the signature in the EHR. Unlike a paper sign, the device resists visitor tampering, since it is unlocked with a badge.

Selected References

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