Communication Strategies From High-reliability Organizations

Translation is Hard Work

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Surgeon information transfer and communication: factors affecting quality and efficiency of inpatient care are an exciting and timely contribution to the literature. Their findings and recommendations are consistent with recent work in human factors engineering, in particular "reduce, reveal, and focus" heuristics for coordination design. Perhaps more importantly, the methodology is a rare example of a systematic, empirically grounded attempt to "translate" communication strategies used in high-reliability organizations to a specific healthcare setting.

Reduce, Reveal, and Focus Heuristics for Coordination Design

In human factors engineering, the basic unit of analysis is composed of *practitioners* supported by *tools* meeting the demands of a particular *setting*.[1] The primary functions of this unit are analysis and (re)planning. As these functions are necessarily distributed across human and machine agents, communication is required to coordinate. This coordination is delineated by organizational roles, procedures to synchronize activities and mediate access to shared resources, and social rules (norms).

The findings and recommendations in this paper resonate with 3 heuristics for designing effective coordination: reduce, reveal, and focus.[2,3]

The first heuristic is to *reduce* complexity. For example, the findings indicated that shift change handoffs, patient location changes, and multiple providers from different specialties increased complexity. Strategies could be used to minimize these, when it is possible to do so without incurring high costs on tradeoff dimensions such as profitability. For example, "bumpable" patients in the Intensive Care Unit could be proactively moved prior to the earliest possible completion of a particular operation to eliminate unnecessary transitions when a patient must wait for an available bed.[4]

The second heuristic is to *reveal* hidden (private) events and activities. When work is rendered observable, costly coordinative meetings can be replaced with indirect, lightweight, peripheral ("out of the corner of the eye") coordination, which reduces the need for direct communication. Traditionally, this heuristic has been implemented through the design of specialized tools, although environmental design and communication technologies have also been explored. The traditional approach is to have software with an overview "at a glance" visual display of the current status of a work process in parallel with a detailed view. By placing the display in a shared physical space, it serves as a "common ground" that enables gesturing to efficiently signal movement between pre-identified discussion topics.[5]

Although designing "at a glance" displays is a challenging process and the final visualizations can appear unique, common themes are to highlight:

- Differences from typical assessments and plans (eg, surgeon not informed of a patient's overnight death before talking with family),

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- Activities of other agents (eg, confusion regarding which specialty should order an x-ray),
- Stances of stakeholders toward key decisions (eg, the "aside" notes regarding family dynamics likely include this information), and
- Constraints and side effects for contingency plans (eg, impacts of a delayed operation on treatment plan).

The third heuristic is to *focus* attention. One of the key findings regarded the diversion of surgeon attention due to an assumption of patient stability. It is arguably desirable for attention to be directed toward the most unstable patients. Nevertheless, there will be cases where stability assessments are inaccurate or events occur that render a patient unstable. Similar dilemmas exist in other industries. The primary solution is to enable peripheral detection of unexpected events and actions while performing primary tasks. For example, as noted in the paper, a surgeon's patients can be physically grouped in one place (eg, Intensive Care Unit, surgical ward) to support the ability to track the status of seemingly stable patients while simultaneously caring for unstable patients. In this situation, there are naturally existing auditory cues in the physical environment that allow a surgeon to indirectly develop "situation awareness."[6] Although there are distinct advantages to peripheral monitoring via audio data since the visual perceptual channel tends to be overloaded, similar benefits can be realized with visual displays. These displays generally reduce search and navigation costs by employing advanced visualization techniques.[7]

Translation Is Not Direct Copying

The employed methodology is one of few significant attempts to translate, in a systematic fashion, human factors knowledge to improve communication processes in health care. In principle, strategies and technologies used in high-reliability organizations should be useful in jumpstarting efforts to re-engineer care processes. In this paper, 19 communication strategies used in space shuttle mission control, nuclear power, ambulance dispatching, and railroad dispatching[8] were used as a starting point for framing research questions. Subsequently, data were collected in the target setting (surgery) and insights were reported as targeted design principles.

An alternative approach would be to directly copy the published strategies. This approach would not discover domain differences that might create unintended consequences. In this paper, some critical domain differences were found, and it is possible that other methodologies, particularly direct observation, might reveal others. For example, training of resident physicians is apparently conducted quite differently than training of mission controllers, nuclear power plant operators, and ambulance and railroad dispatchers. Although there a number of differences, one example is that mission controllers have extensive training during high-fidelity simulations before supporting actual missions.

In addition, different communication technologies impact the ability to adopt communication strategies. For example, the "voice loops" audio technology[9,10] enables mission controllers to continuously communicate on a second-by-second basis despite being physically separated into front and back control rooms. A positive, likely unintended, side effect of using this technology is that people can easily "listen in" on others' communications. With this capability, controllers can verify that a communication was received, understood correctly, and acted upon, which is not always easy or even possible with a faxed communication.

By systematically collecting data, analyzing patterns, and iteratively tailoring intervention strategies based on guiding principles, another benefit is revealed. This paper suggests functional alternatives to the published strategies that might be easier to implement for a number of reasons, most notably cost. For example, rather than implementing voice loops to facilitate contacting someone when their personal information is not known, only their organizational role, instead a team (service) pager, is proposed for the first call resident.

What is perhaps most striking is the extent of this effort: translation is clearly hard work. The results provide an important foundation for future multidisciplinary research but also raise many questions about how to continue to make progress.

Next Steps: Long-Term Multidisciplinary Collaboration

As we move forward, there is an emerging consensus that long-term partnerships of surgical and human factors experts have the potential to identify opportunities to make revolutionary improvements in processes and outcomes. For example, prospective observational studies can be conducted to understand the technical details of how distributed work is currently orchestrated. Design heuristics and principles, combined with a calibrated understanding of a particular setting, can be synthesized from relevant literatures to help identify highly promising leverage points in which to invest. Scenario-based envisioning methods can be used to predict impacts of proposed interventions given differences in tradeoff functions for particular settings.

To realize this potential, continuous, predictable funding is needed to support a "critical mass" of expertise not traditionally found in health care. The next rational step in this line of research is not national dissemination of any particular communication strategy. It is likely going to be unsettling and disappointing for some to realize that the efforts to do successful translation from other fields requires a great deal more time, effort, and funding than currently budgeted.

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