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Distributing Cognition

How Hand-Off Communication Actually Works

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Introduction: Transitions between shifts in the intensive care unit (ICU) create potential gaps in the continuity of care[1] and practitioners necessarily rely on distributed cognition to prevent gap formation during work-cycle shift changes. The complexity and uncertainty of each ICU patient's condition require efficient communication between practitioners during transfers between departments or when cycling work through shifts.

Methods: This study observed twelve unit-level exchanges among six clinicians handing off a 33-bed PICU and step-down unit, then examined them using conversation analysis.[2]

Results: Our research [3,4] has shown that pediatric ICU fellows use sign-outs that demonstrate high context sensitivity, compact reference, gestures, and stylized expressions.[5] Clinicians use variations of monologue and dialogue to transfer information at a high level. Both forms demonstrate the same variable, emotion-laden, dynamic, and complex traits as the work domain that they are used to manage.[6] We find that sign outs account for both what is known and what is not known about a patient's condition, and to assess expectations for the oncoming shift. Uncertainty about patient condition influences handoff content and form. Clinicians change the amount time that they allocate to handoffs based on other aspects of work load, such as rounds or procedures. Clinicians apportion time to discuss individual patients according to the perceived severity and stability of each patient's condition.

Discussion: Expertise in hand-off communications depends on the ability to prioritize relevant information and transfer insights effectively. Relevant, efficient hand-offs significantly affect the ability of anesthesiologists and residents to provide care at the unit level, within and between departments, and across specialties such as intensivists, nurse anesthetists, and anesthesia technicians. Even though they affect patient care quality and continuity, sign outs are not taught but are instead learned on the job. Formal study of, and training in, the conduct of sign outs may benefit both care providers and patients alike.

1. Cook, Render, Woods: Gaps in the Continuity of Care, *BMJ* 2000
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3. Brandwijk, M., Nemeth, C., O'Connor, M., Kahana, M. and Cook, R. Distributing Cognition: ICU Handoffs Conform to Grice's Maxims. *SCCM*. San Antonio. 2003, January.
4. Kowalsky, J., Nemeth, C., Brandwijk, M., and Cook, R.I. Understanding Sign Outs: Conversation Analysis Reveals ICU Handoff Content and Form. *Critical Care Med*. 32:12. A29
5. Grice, H.P. *Studies in the Way of Words*, Harvard 1991.
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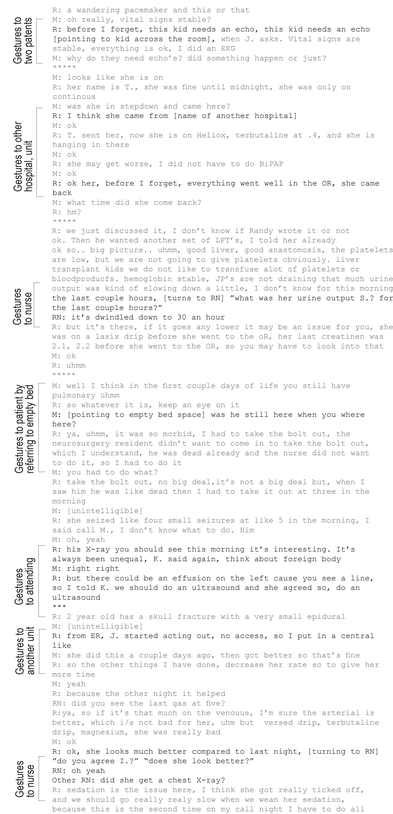
What We Did: Discourse Analysis

Our research analyzed between-shift hand-offs that were conducted among five intensivist fellows over one month in a major urban hospital pediatric intensive care unit (PICU), starting with transcripts of nine enchanges.

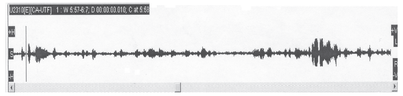
H: first hour I was here she was having seizures every five to ten minutes And so we reloaded her with ten of Phenobarb again. Otherwise everything has been the same
R: Okay
H: And since that load
R: Did you have to go up on the Propofol
H: No
R: Okay
H: She didn't want to

The research team reviewed transcripts to learn how clinicians use compact reference to manage quantity, use gestures to convey information efficiently, use stylized protocols and expressions to maximize accuracy, and protect truth through high sensitivity to the patient context.



What We Did: Conversation Analysis

Conversation analysis software produced graphic representations of voice recordingsthat revealed duration, overlaps, and pauses.

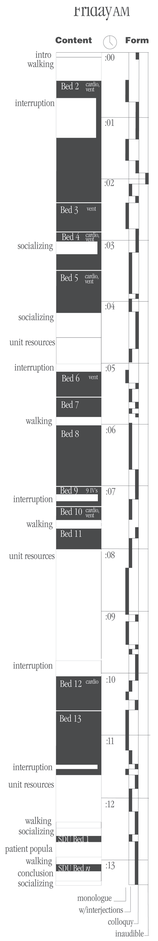


Transcripts were then converted to reflect these features.

H: first hour I was here she was having seizures every five (to ten) minutes And so we reloaded her with ten of Phenobarb again (1.0) Otherwise everything has been [the same]
R: [Okay]
H: [And since that load]
R: [Did you have to go up o]n the Propofol
H: No
R: [Okay]
H: [She d]idn't want to

Results of conversation analysis were converted to time line diagrams, as shown at right. Hand-offs were described by the *content* of what was discussed (including patients as well as six other topics) and by the *form* of the talk (shown by the series of narrower bars at right).

The presumed, or canonical, form of a hand-off is the geographic strategy, in which clinicians begin their patient discussion at Bed One. They then proceed around the unit in a precise order, moving from bed to bed in a methodic manner. Each patient is discussed in turn as the clinicians stand at the bedside of that patient. The clinicians can see the next bed and anticipate what is to follow. The total progress can be assessed by their physical location in the unit. By knowing what has been completed and what lies ahead, the hand-off pace can be altered as needed. The key feature of this geographic hand-off strategy is a soft time constraint. Other strategies we discovered demonstrate a) ability to edit hand-offs to accommodate time constraints (such as the start of rounds), and prioritizing (when a single patient's condition demands attention to reduce uncertainty about what do do on the oncoming shift).



What We Learned

Content The proportion of time spent on patients compared to other content varies among the hand-offs. Some hand-offs are almost exclusively patient- related while others incorporate considerable amounts of other topics. The percentage of a hand-off spent on discussion of individual patients ranges from just over half of the sign-out (56%) to nearly all of it (97%). Our conversation analysis accounted for six additional types of content: introduction, walking, interruption, unit resources, patient population, and socializing.

Form Subjects employed three forms of talk. two types of soliloquies and one type of colloquy. In a *soliloquy,* one person does all of the speaking as in a monologue. A *colloquy* is a reciprocal transfer of information involving two or more persons, as in a dialogue. Colloquy includes question-answer series, testing-confirmation series, exchange of ideas, and problem-solving.

Strategies and Patterns Hand-offs demonstrate different strategies, content, and form that the intensivists employed to fit constraints such as available time

What This Means

The conventional view holds that hand-offs are data focused, simply structured, uniform in content, and follow a single form.

By contrast, our data show that hand-offs focus on what is uncertain, that they are complex and flexible in their structure, necessarily variable in their content, and take multiple forms. This is because patient progress is not a direct course of improvement, is complex, and is unpredictable.

How This Affects Patient Care

Formulaic approaches to handling sign outs are a poor match to deal with the uncertainty and complexity of the critical care environment

Clinicians create hand-offs that are unique in content and form in order to manage PICU circumstances
Attempts to improve continuity of care must reflect this.

Development of training programs for residents can improve their ability to perform this vital task.

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