Reassembling the Patient in Nursing Workflow

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Abstract
A field investigation may often serve multiple purposes, placing a significant burden on social theory to aid understanding of critical issues, their appropriate resolutions, and to contribute to design decisions. As a theoretical lens for sociotechnical work, activity theory provides an ecologically-validated social theory frame for studying technology mediation and information use for care practices in complex workflow contexts. An activity view studies work behaviors that can inform design decisions for healthcare informatics; to do this we must understand sources of information uses that justify design claims, which involves workflow critique. This paper presents a research program that adopted activity theory in nursing and clinical work studies and critiques the contradiction between workflow and patient-centred care evident in the ethnographic study.

Introduction
This brief paper presents a theoretical frame adapted for ethnographic research in clinical informatics design, based on activity theory analyses [1] of information practices. The ultimate purpose of the ethnographies was to inform the design of evidence-based information resources for point of care decision making. Activity system analysis enables a researcher to traverse levels of data and task, while maintaining a common focus on a focal activity, in this case, nursing care workflow.

This paper attests to the value of activity theory in both research and design contexts. While some of the author’s research [3,4] is published, design outcomes remain proprietary. The workshop affords exchange of research learning from these applications of activity theory in information service design contexts. While other theoretical frames offer similar social interpretive keys for understanding sociotechnical systems, activity theory better fits workflow studies in particular as:

- Activity theory (AT) was developed specifically for work studies in context, and evaluates actions as cognitive tasks, based on knowledge and context.
- AT integrates a model of adaptive learning in the work activity context.
- Activity theory enables the researcher to model complex work arrangements as cognitive practices.
- AT enables design, by locating points to intervene for change or to reinforce desired social behavior.

**Nursing Workflow as an Activity System**

Activity theory supports research into enterprise level system design, as the scope and boundaries are enlarged beyond the user to collect data and evaluate at multiple units of analysis. In nursing, the socially-reproduced routines surrounding informatics are critical factors in informatics adoption, where user experience, usability and content utility can be merely instrumental factors. A highly usable product remains unused if its fit to actual empirical workflow is poor, a well-known problem in electronic medical records studies [2].

The unit of analysis of a sociotechnical system is defined as activity, represented by actions of both individuals (nurses) and work teams. An activity is identified by a common outcome of intentional actions. Collective activity of nursing teams (or interprofessional teams) is a well-structured, goal-oriented practice that affords a close study of “workflow” in situ. In our studies the actions associated with nursing information practices were analyzed, using workflow as an (etic) categorical reference model. Several of our research goals were suited for activity system analysis:

- Understanding the information needs and critical information tasks of healthcare professionals
- Evaluating and designing information artefacts for clinical practice
- Designing point of care resources for medical students or residents (all separate studies) and content formats and interactions for practice
- Understanding the actual uses and workarounds for ICT systems
- Understanding the functions of workflow in technologically-mediated professional work

**Theorizing Activity**

An activity system represents a complete unit of analysis of an individual role within a collective performing a continuous activity toward an objective. Activity is defined by its objective; with a patient care workflow study we might associate a routine such as “admission” as a specific activity. Admitting a patient is composed of multiple tasks (actions), composed of further operations, performed sub-attentively. The activity system is hierarchical, not structurally but rather cognitively. Differing roles learn and conduct actions (and operations) differently, according to learning and development.

The Engeström [1] activity system model is a common reference for visually describing the relationships of individual and team work practices, and their use of information technologies and artifacts. The classical model is modified in Figure 1 to illustrate the double-mediating functions of Instruments (the tools of work - information, computer systems, documents) and Team (the organization of locally-responsive work units). This inclusion clarifies the mode of directed work in professional teams, as is the case in nursing. Subject and Team share a direct patient outcome; Community (e.g. "of practice") does not share the same object or outcome, even if relevant information is shared. (Abstract length prevents full description of the model).
Activity theory (AT) provides explanatory structure for information-mediated cognitive work, and guidance for developmental issues of technology and innovation, showing technology transformation of activity in use over time. As presented in earlier studies [3,4] AT can be formulated to include cognitive work / work domain analyses by extending the hierarchy of the action-activity unit as a sub-activity within in a larger organizational containing system. In the present case this would be a nursing department or a service.

**Nursing Workflow As Activity**

From a workflow design perspective, activity theory aligns unit of analysis and unit of work. In a nursing information ethnography, 17 workflow functions were established a priori. An activity analysis reduced these to 8 canonical activities, selected based on their continuous performance in a clinical setting (Table 1).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Information task / need</th>
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<tr>
<td>2. Documentation</td>
<td>Prompts inquiries &amp; plans based on entries in patient records &amp; other documents.</td>
</tr>
<tr>
<td>3. Transfers &amp; Discharge</td>
<td>Negotiate discharge or transfer (where data shared by nurses at two locations.)</td>
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<tr>
<td>4. Complex care</td>
<td>Care as object, context for expert action. anticipating surgery, medications, etc.</td>
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<tr>
<td></td>
<td>Procedures as skilled action, informed by practice.</td>
</tr>
<tr>
<td>6. Committee service</td>
<td>Representing nursing in inter-professional projects. Organizational objectives,</td>
</tr>
<tr>
<td></td>
<td>triggering needs for research, evaluation, evidence collection.</td>
</tr>
<tr>
<td>8. Clinical Education</td>
<td>Teaching nurses about diseases, procedures, risks, patient care. discharge. Nurses also teach patients about their conditions.</td>
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Table 1: Activities in Nursing Workflow
Each activity registers a specific outcome, mediated by distinct information tasks. The workflow model shows well-defined clinical work and associated information needs, mediated by different systems or forms in each activity. These forms help to distinguish regular workflow modes from exception practices.

The majority of a nurse’s actions are directly disposed to patient care, and are mediated by cognitive and material instruments toward care demands, not workflow. An AT orientation searches for mediations toward outcomes (the object of care, or e.g. discharge in a workflow scenario), indicated by arrows (Fig. 1).

**Whither the Patient, a Workflow Object?**
Nursing activity analysis shows structured “workflow” is found in actual observations as scheduling, or patient flow. In staff nursing, work tasks and information needs are triggered by patient status, not “steps” in workflow: Admission, care planning, preparing and administering medication, documenting, procedures, discharging - all center around a patient’s individual needs. While these patient needs are coordinated in aggregate in the clinic, they are represented administratively as accountable statuses in systems that record data for workflow management (EMR systems, CPOE, bed scheduling).

A central concern is recognized that in both workflow and activity analysis, the “patient” has become an object of process. The patient as unique person in care is at risk of information loss in workflow systems and in the abstractions of activity theory. When “patient discharge” becomes a shared object of workflow and analysis, the individual attentions of patient-centred care risk being overlooked.

Clinical practice is complex, dynamic and unscripted in its everyday practice. Yet technology discourses (and system development and implementation projects) require standard models from which to assign data to patients, patients to “clinical pathways,” and staff to units of performance. Workflow is about managing what is measured. But innovations have little chance of interrupting practice and workflows if they cannot resolve the contradictions between these concerns. Patient-centred care (PCC) re-introduces some historical notions of care that have been in decline since automated healthcare management. PCC intervenes in workflow to an unknowable extent - what does it mean to the patient to “involve the patient in care to the extent he or she desires?” PCC values, if acted upon, insert a normative demand which may disrupt the automation of workflow-based accounting. This alternative mode of care argues against the technological efficiency of “care delivery,” and redefine our understanding of a patient’s experience in ways we do not yet measure or perhaps even question.

**References**

