Role of Healthcare Information Technology in Handoffs

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Abstract. Handoffs—transfer of patient care from one clinician or service to another—are well known patient safety dangers. Healthcare Information Technology (HIT) as an intervening and powerful force in handoffs has received comparatively little attention. The role of HIT in concert with paper documentation has received even less attention. We analyze handoffs in relation to electronic records and hybrid systems (both paper and HIT) to identify sources of error and miscommunication. We propose a typology of handoffs and illustrate several of them.

Keywords: Handoffs, Handovers, Care Coordination, Healthcare IT

Introduction

In the inpatient setting, handoffs occur several times a day for each patient. Handoff communication failures are a known and frequent source of errors.[1-5] These errors occur in almost all medical settings, e.g., emergency departments, among units in a hospital, between hospitals and nursing homes. Yet, the role of healthcare information technology (HIT) in handoffs has received little attention, especially in light of HIT’s growing role in all medical settings and its potential to enhance handoff safety. Equally important, the potential usefulness of HIT in handoffs when combining paper and HIT has received even less attention—even though several HIT programs print out paper handoff forms from programs within the EHRs themselves.[4]

In our observations, EHRs and other digital media are inconsistently incorporated in handoffs even when the hospital is fully wired. Moreover, clinicians’ use of HIT during handoffs is frequently an afterthought or a supplement that can distract as well as illuminate—a reality affecting both departing and incoming clinicians. Oral communication and paper remain the media of choice, and even paper is not systematically employed. Integration of paper and HIT is less common and is even less well thought out when it does occur. Hospitals and other medical settings lack a coherent strategy for handoff processes that use HIT and/or HIT with paper documents.

In this paper, we examine handoffs that often incorporate HIT (usually EHRs)—or—more commonly, handoffs that fail to incorporate HIT or incorporate HIT in haphazard fashion. Until recently, HIT/EHRs were seldom a part of the handoff process. But with the growing availability of HITs, ignoring its information in the handoff is a potentially significant loss of patient safety and clinical efficacy. Equally disconcerting

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is allowing the HIT to structure the handoff process haphazardly—perhaps missing needed emphases while mechanically repeating obvious or insignificant information.

Most often, handoffs involve pieces of paper that are subsequently discarded. Even though the EHR is presumably the repository of the official and most accurate information, it is often ignored or relegated to a marginal role. This may be because of its widespread use is comparatively recent; because it is not part of the routine training process; because it is seldom designed for handoffs; or because the use of HIT has heretofore required proximity to a computer screen—a situation that has been altered with computer tablets.

**Information Source and Limitation**

The presentation is based on several years of observations of handoffs in many hospitals. We examine handoffs that are primarily face-to-face between two staff members. Thus, we exclude hospital discharges, transfers from ambulatory care, or transfers between hospitals and long-term care facilities unless there was an additional meeting of clinicians that we could observe. We exclude phone conversations since we could only overhear one side of the interaction.

### 1. A TYPOLOGY OF HANDOFF ELEMENTS

To create a context for analyzing handoffs, we explore some of the parameters within which they occur, e.g., specific locations; whether they occur with or without paper, structured formats, access to computers, participation of other clinicians, presence of senior clinicians, and so on. The table below (Table 1) presents a typology of factors that influence handoffs’ clarity and accuracy. We refer to clinicians leaving the patient, shift, or hospital as “departing” clinicians and to clinicians accepting care of the patient, starting the shift, or managing the floor as “incoming” clinicians.

**TABLE 1. Sixteen Parameters of Handoff Interactions: Roles of Media (HIT, Paper), Memory, Type & Use of Structured Formats, Location, Patient Presence, Other Artifacts, Dyadic or Group Setting, Intra- or Inter-disciplinary, Face-to-Face or Mediated, & Involvement of Other Clinicians**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
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<tr>
<td>1. Media</td>
<td>Generally includes Oral. If also other media, they could be: Paper only; Paper combined with HIT; HIT only. Different media might be used by incoming and departing staff, e.g., HIT information from departing recorded on paper by incoming; paper information entered in HIT and also on paper, etc. There might even be a note in lieu of face-to-face communications.</td>
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<td>2. Documentation</td>
<td>Oral handoff with no recording of information in any medium. Paper, and even more, HIT provide documentation accessed by more people. Many handoffs were observed without reference to paper or HIT documentation.</td>
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<tr>
<td>3. Reliance on Memory</td>
<td>Extent to which information is provided based on what the departing clinician knows or remembers rather than in addition to what is documented.</td>
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<td>4. Incoming clinician seeks information</td>
<td>Recipient’s questions and recipient looking up information. Reflects incoming clinician’s active involvement in researching information and asking questions.</td>
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<td>5. Degree and Type of Structure in Handoffs.</td>
<td>Categories by problem, medication, organ system or temporal proximity, etc—adhered to by departing clinicians. Use of structured discussion (such as SBAR) may be informally recorded.</td>
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<tr>
<td>6. Use of Available Structured Forms</td>
<td>Structured handoff reflected in templates or forms: HIT, paper or a combination. Templates/forms may be used, partially used or ignored.</td>
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<tr>
<td>7. Accessibility &amp; Readability</td>
<td>For paper: Small print summary sheets with little room for additions and notes. For computer: large-enough screen, viewable/findable by relevant parties</td>
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<tr>
<td>8. Handoff Location</td>
<td>Patient Room; Nurse Station; Physician work area; Hallway; Other</td>
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<td>9. Proximity of patient &amp; artifacts</td>
<td>Role of patient’s presence in the handoff process. Role of other artifacts (e.g., medications, IV bags)</td>
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<td>10. Dyadic or Group</td>
<td>Two clinicians alone or as part of team, rounds or other group settings</td>
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<td>11. Intra- v. inter-disciplinary</td>
<td>MD to MD; RN to RN versus interdisciplinary, e.g., MD to RN or multi-disciplinary rounds.</td>
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<td>12. Hierarchy</td>
<td>Peers (resident to resident); or different levels (nurse manager to staff nurse)</td>
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<td>13. Face-to-Face or Mediated</td>
<td>Traditional face-to-face, or involving the use of tape or voice mail.</td>
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<td>14. Consultations</td>
<td>Others contacted or not; participation by others by chance or actively sought.</td>
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<tr>
<td>15. Speed</td>
<td>Time allotted or available for handoffs.</td>
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<tr>
<td>16. Fragmentation</td>
<td>Degree to which staff are interrupted and face other distractions to the handoff.</td>
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While the table reflects months of observations and interviews over several years, we offer no systematic analyses of the frequency of each category or of the correlations among the categories. Some relationships are obvious: Patient involvement is more likely if handoffs are in or near patients’ rooms; proximity to computers is needed for their incorporation in handoffs. Other physicians are more likely to be nearby if the handoff is conducted in a group setting or at physicians’ workstations. Moreover, the parameters provide a basis for examining additional issues such as: errors if the documented information is wrong or outdated; errors of memory; staff sanitizing phrasing due to concern about a patient overhearing prognoses; time required to create a structured report versus information loss or misunderstandings with unstructured or poorly documented reports; corrections provided by third parties and by those from other disciplines; inefficiencies of ‘translating’ information to another discipline’s argot.

In addition, other categories could be included, e.g., fragmentation of the information by other activities, role of clinician experience (head nurse, interns, senior physicians), and delays caused by efforts to collect needed additional information. This typology is elaborated in the following discussion, in which we use paintings and etchings as metaphors to illustrate vulnerabilities involving handoff communications.

2. HANDOFFS AND HIT

Hierarchy and status are always elements of handoffs (Figure 1), and their roles in patient safety are critical—whether between peers (e.g., nurse to nurse; resident to resident) or between those of different positions (e.g., resident to attending).

2.1. Structure and Meaning

The Kandinsky painting (Figure 2) depicts the often amorphous structure and freeform presentation in handoffs—allowing clinicians much latitude in evaluating essential vs. less important information as long as they use the two forms well and the incoming clinician sees which is which. Many of the handoffs we observe combine areas of clear and understandable information with opaque, and
sometimes information that is missed entirely or assumed away. These handoffs are largely unstructured either by the departing clinician or the incoming clinician. Notes are sporadic and not organized in any clear way. For example, we often observe clinicians referring to areas of a page or screen that encompass medications, diagnoses, and laboratory reports. Some of the information is specific (e.g., laboratory values) but other parts are suggestions for new observations or tests. Of course, assumptions about the other clinician’s focus or understanding may not be shared.

As suggested by the next Kandinsky (Figure 3), even when there is clear structure in the handoff process, clinicians may differ about what data are most essential and what should be covered. That is, one or both of the clinicians has a physical or mental checklist or set of items that is a backdrop to the interaction. Only a few of the items, however, are discussed in the handoffs and no structured handoff record is maintained. The rest of the checklist is taken for granted as known. This is not necessarily dysfunctional: in the hands of experienced clinicians both of whom know what items are essential and what are sufficiently routine or well known, much information can be skipped.[6,7] (Some information might be intentionally excluded [e.g., prior drug use] to protect patients by only allowing sanitized medical records.) Moreover, there is an infinite amount of information that can be conveyed about the patient; only certain items are news. It is impossible, however, to be sure both sets of clinicians are fully aware of all patient issues, and such assumptions are risky. Even attentive and experienced people might miss or forget an essential item, or they might assume a level of understanding and familiarity that the other clinician does not possess. Patient status and lab results change, sometimes unexpectedly—and clinicians who have been treating a patient for a week or more may be believe there is little new information in the chart. In addition, because not all relevant information is always systematically recorded, some information might not be available for later review. In turn, systematic documentation, while it can be reviewed and interrogated, is subject to the same selectivity and need for assumptions about each participant.

2.2. Level of involvement

The disaffected woman in the Modigliani (Figure 4) reminds us that clinicians, like all humans, vary in their level of attention to and involvement in the handoff process. Is the departing clinician/team exhausted or eager to leave? Is the incoming clinician/team a passive recipient due to overconfidence, unrealistic beliefs about the patient’s condition, disciplinary presumptiveness or risky eagerness to start care? On the other hand, perhaps the incoming clinician already knows a lot about the patient, so only new information is needed. Adding more information would be wasteful or at least one presumes so. In these cases, the failure to
incorporate structured handoff forms, EHRs, and/or paper records could produce unwanted consequences. Relying on memory, when the initial transfer of information was poorly attended and documented, seems unwise.

The image of two angles with Christ (Figure 5) poses the dilemma when an authority figure (e.g., attending physician) offers insights and great learning, but may also inhibit free (and needed) communication. Some handoffs are mediated by a respected authority, such as a senior physician or a nurse manager. The respected authority may help clarify ambiguous information, demand additional information, raise new issues to increase understanding and improve treatment plans. As noted above, however, the authority figure may prevent questioning and additional inquiry.

2.3. HIT Handoffs and Hierarchy

We often observed younger clinicians in the presence of older and respected authorities use available HIT as a neutral means to broaden the discussion by referring to patient information, clinical guidelines, or even recent articles on patients’ conditions. Here the authority’s power is moderated by the HIT in respectful but helpful ways. We also repeatedly observed settings where senior clinicians, while acknowledging the HIT-provided information, offered additional insights to impart lessons on the complexity of care and the need to balance factors missing in the standard protocols.

2.4. Templates and Structured Handoff Forms

Ellsworth Kelly’s painting (Figure 6) highlights the role of structure. Highly structured handoff forms & processes increase the probability that all items will be included. But critical issues and consequential nuance may be lost. Highly structured forms or templates can simplify and organize handoff information—making information entry and retrieval faster and more secure than other methods. The downside of such forms is that they often encourage a disgorging of routine and redundant data, in loss of emphasis and critical nuance. These advantages and disadvantages hold true for both HIT-based templates and paper forms. One possible advantage of paper is that the affordances of the medium allows easier annotation and comment than does the digital form. Also, independent of the medium, each of these forms and templates are met with varying levels of compliance.

2.5. Paper and HIT Integration

We insert a computer screen into Durer’s Adam and Eve (Figure 7) to ask whether HIT helps to convey needed information or is a distraction. EHRs, lab reports, I-O
charts, progress notes (in paper or HIT or both) are used in some handoffs. How can these media be integrated to help focus clinicians on essential elements and present their missing critical information? What are the risks these media will disperse focus and lead clinicians to incorporate irrelevant or obvious information? Do they generate more “busy work” that detracts from the clinicians’ thought-flow, workflow and time for direct care? Are they used consistently or erratically? Does their use vary by unit, individual, or supervisor? Most important: how are the paper and HIT (if both) integrated? If they are hybrid systems – which most appear to be – do they maximize the advantages of each medium? Are they redundant, complementary, reinforcing, or distracting? While these are not new questions for any handoff analysis, the framework suggested in Table 1 may help structure questions and a research agenda for further and systematic investigation.

The meaning of Rembrandt’s Abraham and Isaac (Figure 8) depends on knowing the biblical story. In addition to conveying information (in whatever form), a successful handoff must reflect not only the recipient’s level of understanding—both of medical knowledge and the patient’s condition—but also accommodate the participants’ interactions and relationships. There is always a context, expertise of each participant, and a history of previous interactions in addition to the information exchange. Efficient and effective handoffs reflect both needed information and awareness of the participants’ context, backgrounds, and expectations.

3. Summary

Handoffs are consequential for patient care, clinician learning, patient safety, clinical efficiency and liability. Improving our understanding of handoffs—especially how to integrate HIT into handoffs—can improve outcomes. We suspect the use of HIT in handoffs will improve care and efficiency. To date, HIT use in handoffs appears inconsistent, is frequently supplemental, and may distract as well as illuminate. Paper remains the medium of choice and integration of oral, paper and HIT is not well thought out. To address this essential patient safety concern, we need a coherent strategy for handoff processes that use of HIT and/or HIT with paper documents. We hope this typology and the illustrated discussion spur further examination of HIT in handoffs, leading ultimately to efficacious use of HIT and other media to improve the quality and efficiency of patient care.

References


