Physician handoffs: opportunities and limitations for supportive technologies

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Abstract

Shift-to-shift handoffs refer to the process of transferring role and responsibility for providing care from one person to another, thus insuring continuity of care. Through focus groups of residents and supervising physicians, we studied how physicians select patient cases to discuss during handoffs. We also compared the selection across level of experience. Understanding the patient selection criteria can give us insight into how to improve handoffs, in particular using supportive technologies that are integrated into the clinical information system. Studying the actual handoff process and note-taking also generated suggestions for handoff improvement.

1. Introduction

Transitions of care can endanger the quality of patient care and patient safety. Care transitions occur between physicians during patient transfers from a ward to another, or during shift changes. The handoff process involves the transfer of role and responsibility from one person to another1. Communication modalities range from in-person encounters to phone calls or written sign-outs. Studies of adverse events established that up to 60% of preventable adverse events are related to communication failures2. Improving handoffs can be challenging, as the modalities and processes vary widely from one department to another.

This study focuses on the evening handoffs between usual day teams (Monday to Friday) and the night teams (who also cover Saturdays and Sundays). During this evening handoff, the dayshift teams discuss a selection of patients from their wards with the nightshift team in presence of the supervising physician, covering for the weekend. Not all patients will be discussed. Patients thought to be stable, for example, are usually not presented during evening handoffs. Weekend shifts work on the same model, with an additional written handoff for all patients on Friday evenings. While prior studies on handoffs have suggested ways to standardize the overall content of handoffs with the use of checklists3, for example, or to structure the presentation of each case with mnemonics4, little evidence supports the process underlying the choice of patient cases to be discussed.

Handoffs are complex procedures, requiring the integration of a large amount of information about each patient, and errors can lead to high costs. Job aids were designed to “extend human capability to store and process information”, and have proved to be especially useful for tasks with these characteristics5. Yet, the design of useful job aids, which can help decrease the cognitive load, require a clear understanding of the tasks and reasoning procedures. As stated in the Cognitive Load Theory, “An element is anything that needs to be understood and/or learned. If elements interact, they cannot be understood in isolation”. The multiple interactions between pertinent features contribute to the complexity of handoffs, and should influence how the job aid is designed.

Selective handoff processes, where only certain patients are handed off, emphasize the need for appropriate patient selection. Understanding this selection process can have implications both for educational interventions about the handoff preparation process, as well as for the design of supportive technologies. The current electronic medical records include many features, such as admission, progress and discharge notes, labs, radiology images and reports, reports of all other ancillary tests, nursing documentation, and a dashboard for the healthcare users. It does not, however, have a specific handoff tool. Notifications and alerts can be potentially used to help identify patients for handoffs, but the criteria for such notifications need to be well chosen, to avoid forgetting to hand off a patient, and to avoid alert fatigue6. The goals of this study are to identify patient selection criteria, and to compare the approaches of physician residents and supervising physicians. We present a framework for patient selection, which was similar across level of experience, and suggest ways

2. Methods

2.1 Data collection

After approval by the State ethical review board, we conducted four semi-structured focus groups of five to seven participants between February and May 2014: two with residents, and two with supervising physicians. We recruited participants from the Division of General Internal Medicine through emails and general announcements (i.e., prior to
grand rounds). We excluded the senior attendings, as they do not take part in the evening handoff process. Using eight standardized clinical vignettes of typical internal medicine patients, participants started by individually selecting the patients that they would hand off for both a weekday and weekend handoff session. The cases are detailed in Table 1. The choices were reported on a board to facilitate the group discussion. Then as a group, participants shared the reasons of their choices, and reached a consensus handoff. We completed the session with an open discussion about more general questions on personal experiences, in particular during their on-call months, during which they were on night and weekend shifts. We also enquired about the importance of the order in which cases were handed off, and whether handing off to a supervising physician (rather than a resident or medical student) would have affected the content. We asked about the use of mnemonics for the verbal handoff. All sessions were conducted in French.

Table 1. Overview of standardized cases

<table>
<thead>
<tr>
<th>Cases</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Prior nocturnal agitation in a 79 yo male, recovering from spleen rupture, pneumonia and renal failure, and who fell from his bed two nights ago</td>
</tr>
<tr>
<td>Case 2</td>
<td>Fever and hypotension in a 79 yo female with diabetes</td>
</tr>
<tr>
<td>Case 3</td>
<td>Subacute onset of fever, in a context of bloody diarrhea in a 38 yo male</td>
</tr>
<tr>
<td>Case 4</td>
<td>Asymptomatic INR of 6.2 (excessive anticoagulation) in a 84 yo female with diabetes, atrial fibrillation and currently admitted for pneumonia</td>
</tr>
<tr>
<td>Case 5</td>
<td>Malaise at time of handoff in a 71 yo female with ischemic heart disease, atrial fibrillation and diabetes, admitted for weight loss and anemia</td>
</tr>
<tr>
<td>Case 6</td>
<td>Abdominal pain during chemotherapy in a 67 yo male with non-small cell lung cancer</td>
</tr>
<tr>
<td>Case 7</td>
<td>Iliac pain &lt;24 hours after medullary biopsy during work-up for multiple myeloma for in a 66 yo male with chronic lumbar pain and depression</td>
</tr>
<tr>
<td>Case 8</td>
<td>Shortness of breath in a 59 yo male with emphysema, admitted for suspected lung cancer</td>
</tr>
</tbody>
</table>

2.2 Study setting

Medical teams in the Department of General Internal Medicine at the largest Swiss teaching hospitals organization are responsible for patients throughout the day from 8 am to 6:30 pm during the week. At 6 pm, the day teams hand off their patients to the nightshift resident. The Department is split into two zones, each of which is managed by one nightshift resident until the next morning. Each nightshift resident cross-covers about 80-90 patients from five different wards, which means they are responsible for all of these patients, regardless of whether they are familiar with their cases or not. Although nightshift residents have in-house supervision, the supervising physician actually works in the Emergency department, and usually only discusses urgent or complex cases with the nightshift residents.

Between Mondays and Thursdays, day teams typically leave written progress notes as needed, i.e. for a procedure performed during the day like a pleural tap, or for a new management approach. On Fridays, however, all day-teams are required to leave a full progress note for each patient, which also serves as a written handoff, since it also includes which parameters to monitor, tests results to track, and a general list of problems.

2.3 Data analysis

All discussions from the focus groups were transcribed and de-identified for subsequent coding with thematic content analysis. Two of the investigators coded the transcripts, iteratively comparing and contrasting themes
between individuals, cases and focus group sessions. We also analyzed according to the level of experience (resident vs supervising physician). The results of individual patient selection from the board were also analyzed using descriptive analyses, and a multi-rater kappa analysis by level of experience.

3. Results

3.1 Participant characteristics

We enrolled 12 residents and 10 supervising physicians. Residents had an average of 2.8 years of postgraduate clinical experience (range of 1 to 5 years), and supervisors had an average of 6.8 years of experience (range of 5 to 9 years), with 2.4 years on average of supervision. These levels of experience are representative of the current physicians in our Department (senior attendings not included in this study), with board certification occurring on average after 5 years experience. There were 7 female supervisors, and nine female residents. Six supervisors and three residents reported some prior handoff training. All participants had completed at least one 3-month rotation in emergency medicine.

3.2 Patient selection

Our study focused mainly on patient selection for verbal handoffs. Participants identified several criteria to help identify patients that needed to be handed off to the night-shift physician or weekend teams. Despite some degree of overlap, we can categorize the criteria. A) related to patient safety, such as unusual or complex cases, or information that might be difficult to find in the EMR. B) related to care workflow, such as tracking tests results, or clinical monitoring. C) related to acute situations, with recent aggravation or unstable patient that need close monitoring. D) patient comfort, and end of life care. Finally, E) related to the prevention of complications or F) events that are anticipated. These themes are illustrated in Figure 1.

Figure 1. Criteria for patient selection.
**Patient safety**

Patient safety involves issues in clinical reasoning and information retrieval. Participants handed off cases with atypical management, to avoid confusion or even errors by the night shift physician. Supervisor SP3 explains: “We had to choose an unusual antibiotic for one of my patients, a choice that could have been questioned by the night physician… Sometimes, when we explain why we decided to choose B rather than A, the night-shift physician won’t waste time wondering why the day-team chose this or didn’t do that. So I like to handoff unusual approaches.” SP5 also gave an example of this: “For patients with fever of unknown origin, we want to avoid antibiotics. The spinal reflex for fever usually is to administer an antibiotic. So I like to hand off when to give which antibiotic, and to explain why we choose to NOT give an antibiotic to someone with fever.”

Cross-covering physicians are not familiar with the patients they are responsible for, and are often under-time-pressure. Day-time physicians are much more familiar with the patients’ conditions and have time to discuss patient management with their supervising physician and consultants. Providing a brief explanation for certain diagnoses can help the night physician make decisions, or at the least help save time when reviewing the medical charts. One resident (R11) said about a patient with chronic hypokalemia from renal loss: “The day-physician who has been managing this patient over the last week knows her situation by heart, particularly for potassium substitution, whereas the night doc may not have the time to review the case in depth.” R3 describes her own experience during night-shifts: “It’s not because we don’t want to think, it’s just to help understand where the problem lies because nights are busy, we are not familiar with the patients, and sometimes it’s just tricky to go over the whole story when it’s urgent.”

Another reason to hand off a patient was if they thought that some medical information might be difficult to find in the EMR. For example, SP2 reported an example with dialysis: “For dialysis, the information needs to be more detailed. Urgent dialysis takes place in the ICU. So for patients – I remember this patient who had a “Do not resuscitate” order, yet would have been admitted to the ICU for urgent dialysis. It wasn’t well handed off, and that information was hard to find…” The goal then of handoff in this case would be to raise awareness about certain aspects of patient management.

**Care workflow**

Participants also handed off patients who had pending imaging, on-going labs or other tests, so that the on-coming physician could track results in a timely manner, and adapt a patient’s management if needed. SP5 discusses tracking as a handoff goal: “[…] tracking exams that have been ordered, so there’s no chest x-ray with a white-out that is missed until the following morning. So pending lab tests and imaging should be tracked by the night-shift to avoid late discoveries.”

**Acute care**

Patients who were considered unstable, or who had a recent aggravation of their clinical state, were also handed off. R9 explained: “Something acute is happening, and we are starting initial measures. But we need to see how the patient will respond to all this, so we can’t assess if the patient is stable or not at this time.” Handoffs allow patients to be seen rapidly for an initial assessment, and then to be monitored during the night, ideally with clear recommendations for pain, blood pressure or diuresis, for example.

Receiving a handoff about an unstable patient also helps the on-coming physician to attribute priorities to the numerous tasks she has to accomplish. The day team sometimes emphasizes the need to see a patient soon to reassess the situation. As stated by one supervising physician (SP5): “One of the goals of handoffs is to help the night resident decide the order in which to do things. By handing off [an unstable patient], she might start by assess this patient, rather than just come across her later during her shift, and he might realize that the diuresis decreased over the past two hours. If instead she does receive a handoff about this sick patient, she might go see her earlier.” Nursing concerns can also contribute to a physician to hand off a patient. Nursing teams are more present at the bedside than physicians, and may be more able to assess changes in status. Nurses are also often the first person to detect or suspect a cause for concern in hospitalized patients. In the case with suspected lung cancer, SP4 explains: “I would hand off this patient because the nurse assessed him to have increased shortness of breath. It’s a vague symptom, and because it’s vague, I will probably need to hand him off for more investigation. I believe the day resident should go and evaluate the patient, to gather more information, so that the night physician can re-assess the patient later in the evening. There may also be a chest X-ray to track.” In this example, we see that there are often several reasons to hand off a patient, first due to a yet unexplained aggravation in the clinical status, which then needs clinical monitoring by the night physician and potential test result tracking.
**Prevention**

In order to maintain continuity of care for patients, participants emphasized the need to anticipate potential problems during the night or weekend. Anticipation requires good knowledge of a patient’s case, where recurrence of an event is possible, or with good knowledge of a clinical situation, such as a common complication of a procedure. An example of a recurrent event, is described by a supervising physician (SP2): “ [...] because this patient had a high probability of presenting another episode of agitation, he’d had them often in the past.” Another supervising physician anticipates a complication of a recent intervention: “I would discuss this patient simply because he had an intervention the day before, and because he’s still in the time frame for a complication. It’s not just the pain, it’s also about seeing if there’s bleeding or a hematoma” (SP4)

**Patient comfort**

Participants also agreed that patients with end of life care should be handed off, so the night shift physician could (1) assess patient comfort and adapt treatments if needed, (2) not be alarmed if the nurse calls about the time of death, and (3) be aware who to inform about changes in condition or death (and in what delay this needed to be done). As illustrated by SP10’s statement: “It’s to let us know that if the clinical state worsens, to provide end of life care rather than aggressively reanimate. It’s also to inform about whether the family wishes to be called any time of the night, to know where to find their phone number...” (SP10)

**Other reasons, divergent opinions and use of written handoffs**

Other reasons to handoff a patient were to inform about patients with multiple or recurrent symptoms of unclear origin (after excluding the treatable or urgent etiologies), such as “chest pain, which has already been worked up several times, cases where clinicians tend to worry and begin the work-up all over again each time the symptom appears” (R9).

Physicians also reported relying on nursing teams for part of patient monitoring. In some situations with divergent opinions about handoff, some clinicians advocated mainly relying on the nursing team, providing clear targets for monitoring, and expecting nursing teams to call the night physician if the targets were not reached. SP1 described this for the case with sepsis: “ [...] an acute event in a hospitalized patient [...] after a clinical assessment, I would decide about prescribing an antibiotic and close nursing surveillance for blood pressure and diuresis. I think the nursing team has a role to play here, and it’s the nurses who will call the doctor if needed. So for the night physician, I don’t see what more the doc could do if just checking in spontaneously, if the monitoring targets are well established.” For other participants, handing off such a patient was a potential a teaching moment for the night resident, about what to do if the targets were not achieved. Handoffs in this case were also about deciding when to call the ICU to transfer the patient.

In several of the discordant opinions about handoffs, the debate was not so much about whether to hand off a patient, but more about whether the handoff should be verbal or written. Oftentimes, simple to-dos such as weight monitoring or labs to track are not handed off verbally, but will be highlighted in the written handoff notes for the weekend day physicians.

**3.3 Resident vs supervising physician approach**

Overall, there was clear agreement on the ultimate goal of handoffs, which is to maintain continuity of safe and effective healthcare. Participants also clearly stated differences in patient management during day and night shifts, where night teams manage the acute events, and follow recommendations made by the day teams. During the day, patient management includes a more in-depth study of patient cases, addressing more chronic issues, work-up, and discussions with consultants.

Using descriptive statistics, our results show similar proportions of evening handoffs and weekend handoffs between residents and supervising physicians. (Figure 2)
Figure 2. Proportion of cases handed off by level of experience. There was no significant difference between cases selected by residents or by supervisors.

The multi-rater kappa statistic showed moderate agreement for patient selection among residents and supervisors for both weekday evening handoffs (0.53 and 0.65 respectively) and for weekend handoffs (0.44 and 0.58).

Handoff rates were lower during the weekends. In our usual practice for weekends, day-teams prepare a written sign-out for the weekend teams, with a summary of current problems, and a list of to-dos, with the context (relevant past history). A complete sign-out is often not prepared for weekday handoffs, and only a brief note is left when a procedure is performed or if the patient’s condition changes.

3.4 General comments about handoffs

There was also an overall agreement about the content of a verbal handoff. They were expected to be concise, with clear day-team recommendations for anticipated problems (if-then statements) and a to-do list of tasks, such as tracking a lab or other ancillary test results, or clinical monitoring. Participants all felt that keeping handoffs brief helped to avoid “diluting” the information.

While there is no formal handoff training in our institution, clerks and residents receive a pocket card with a mnemonic for handoffs when they start their employment in our department. This mnemonic suggests a way to present the verbal handoff, but does not concern the patient selection process. Participants did not use this pocket card or mnemonic, some barely remembered having this card, because they considered that their current process was close to the recommendations in the mnemonic (“I read the card, and it seemed to resemble what I currently do, so…” R2). The card seemed to have more use as support when explaining handoffs to the medical students. Day teams sometimes discuss the patient selection with the supervising physician. The handoff itself can be given by a resident, a final-year clerk, or more rarely by a supervising physician.

The order in which patients were presented did not matter to the participants, as they mainly needed to know the ward in which the patients were. Participants all confirmed the importance of interactions during the handoff, for clarification about recommendations, general management decisions, or simply for precision.

Participants mentioned the importance of taking notes while receiving handoffs, as a way to remember key features for a patient. The current practice for note-taking in our practice is to start with blank paper. Participants usually ask the day teams to give the ward name before beginning their handoff, in order to take notes at the right place in their sheets. In most cases, the handoff begins with the name of the patient, year or date of birth, resuscitation order, followed by medical information and “to-do list”. Although the spelling of patient names may be incorrect, and despite potentially missed items while annotating, participants were quite satisfied with the current process. There is no access to the electronic medical record (EMR) during the handoff, but participants reported using the EMR after the handoff process to clarify the information received, if uncertainties remained after the handoff process. Both residents and supervising physicians mentioned that improvements in handoffs should not lead to an increase in workload for the day-teams, particularly since many already work overtime on Fridays preparing written handoffs for their patients.

Last but not least, participants agreed that knowing who they are handing off to can change the content of the handoff. Clinicians tended to provide more detailed information to junior physicians, with more recommendations.
4. Discussion and design implications

Understanding the residents’ and supervisors’ perceptions and expectations of the handoff process is the first step to improving handoffs. Participants agreed on the main goal of handoffs, which is to maintain the continuity of care between day and night teams through a transfer of responsibility. Therefore, there was overall agreement over the need to (1) identify patients at risk of possible serious events in the near future, (2) explain unusual or complicated reasoning processes, (3) identify patients with pending tests, and (4) provide recommendations for the night or weekend teams, in particular with explicit if/then statements.

Improving handoffs can be achieved through combined approaches. We propose ways for supporting handoffs in Figure 3.

Figure 3. Approaches for improving handoffs. Dark blue boxes describe the sequential steps of handoffs, whereas the white boxes suggest approaches to support each step.

Support for patient selection:

Supportive technologies for handoffs can address some of the patient selection criteria used to identify patients who need to be handed off. Despite an overall agreement about these criteria based on our standardized clinical cases, many criteria are based on clinical reasoning processes, standard processes in patient management and on the expected evolution over time. Providing technological support for these criteria may therefore be more difficult than for other criteria such as pending tests.

Simple notifications or alerts could be created for patients who await some kind of imaging or lab test, or who have had a test with a pending result. If these notifications are visible in an overview mode, they could help the day-team identify patients to hand off for result tracking and subsequent management. Designing such a system could have additional benefits for certain time-consuming tests, such as cultures for mycobacteria, which can take several weeks or months. Currently, some of these results may be missed altogether; or they may be seen by the hospital physician but not the ambulatory physician if the patient has been discharged. Receiving some form of notification for these tests could help improve the communication process.

Anticipation seems to be a key component for patient selection for handoffs, as it is required when assessing risk of problems occurring in the future. Anticipation requires an understanding of the patient’s diagnoses, and of how they will evolve over time. Clinical evolution of a given diagnosis has been studied in the form of clinical pathways, or trajectories\(^{10}\). We could imagine having a supportive system that could notify the physician when a patient’s evolution diverges from a clinical pathway. For example, for patients with pneumonia, fever should abate within 72 hours of the start of antibiotics. If this is not the case, the supportive system could notify the day physician as she prepares for handoffs at the end of the day. Ideally, not only vital signs, but also lab results should be integrated in the expected trajectory. The difficulty, however, is that the effect of a patient’s comorbidities and age on the time-frame of the trajectory is less well studied. Furthermore, it is not just the absolute value that is of importance for a trajectory, but its relative value, particularly for changes in settings with chronic diseases (i.e., creatinine values with...
and without chronic kidney disease). This trajectory-based approach has been discussed also for patient prioritization\textsuperscript{11}, when a physician chooses the order in which to perform daily tasks for a set of patients.

Another advantage of this trajectory approach would be its ability to detect early warning signs for a patient starting to be unwell. Although nurses take the vitals during the nursing rounds, changes in status may not be immediately apparent, or may initially go unnoticed if the change is small. There may then be a delay until the doctor sees the change, or until the nurse discusses her concern with a doctor. A trajectory-based approach could also serve as an early warning system for patient deterioration.

One of the main challenges about notifications and alerts is the target physician and the threshold to activate the alert. We propose that for handoff support, day physicians should see a notification in an overview mode of the ward. The cause of the notification (pending tests vs divergent trajectory) should be visible, with easy access to the pertinent part of the chart for clarification. Another challenge about notifications is the threshold of abnormality\textsuperscript{12}, particularly for easily fluctuating variables such as pulse or blood pressure.

Notification systems about pending results or divergent trajectories would benefit greatly from a global view of the patients in a ward. For the nightshift team, this could even be for all 4 or 5 wards that they cross-cover. The current EMR system at our institution has two overview modes for a ward: the first mode is a table, which lists all patients in a ward in an alphabetical order, with information on gender, date of birth, and date of hospitalization. The second mode is a synoptic view with the rooms and emplacement of patients within the ward. It also contains information about patient flow, with lists for the in-coming and out-going patients. The nursing version of the synoptic view already has information about whether new orders have been placed and whether they have been carried out by the nursing staff. This synoptic view could also present information about pending tests or pending results for each patient.

The form of notification is also important, in particular to avoid information overload\textsuperscript{13}, or alert fatigue\textsuperscript{14}. We propose a design with more subtle modified background for a trajectory-based approach, with hues according to divergence with the planned trajectory. Thus, the system informs the physician about a degree of “sickness” or of need for attention without giving explicit notifications or recommendations. Humans interpret a value quicker in a graphic form than in a text form, such as alert messages\textsuperscript{15}. Furthermore, this graphical representation reduces cognitive workload\textsuperscript{15}. The visual representation may further point to more detailed, textual information. For the pending test results, we propose a notification on the overview pages only, as our EMR summary cockpit page presents the most recent results, with an agenda for future tests.

Detection of unusual or complicated patient cases is difficult to support through technology. Our system currently does not track the number of consultants involved in a patient case, but this could be a proxy for the complexity of a case. The trajectory-approach, if detailed enough to identify therapy choices, could possibly be a way to help detect unusual patient management strategies. The choice of antibiotics, for example, could help differentiate a standard management from an usual process (e.g., resistant bacteria). On the other hand, physicians can usually identify unusual management choices, and may not need supportive technologies for this selection criterion.

\textbf{Support for handoffs}

Although observing the actual handoff itself was not the main goal of our study, participants all did mention taking notes when receiving the handoff. The preparation for the handoff could also include a written component, which could help improve the note-taking process. While we recognize the desire and need to make personal annotations about each patient, according to individual mental models, we also see potential areas for improvement. We could imagine using a print-out with key words, patient identity and basic demographics for the selected patients, for example.

As our hospital prepares mobile versions of our current EMR, we can suggest a design of brief patient summaries, easily extractible from progress notes or problem lists for each patient. By providing the patient name, and main problems, we hope to help the receiving physician focus on the handoff. These key problem lists should be expandable, thus providing information about the evolution, ancillary tests and consultations from the medical specialties when required. We do however need to avoid overwhelming the receiving physician with the written information, which (1) is a distraction from the verbal handoff, and (2) should not require additional paperwork for the day teams. Designing for mobile interfaces, due to their limited screen size, requires mindful selection of the pertinent information. The physician may access the deeper levels of information (i.e., specific laboratory results, more detailed information about on-going work-ups) when required by using the touch screen. Mobile devices may thus respond well to the needs of physicians during handoffs.
4.1 Limitations

The generalizability of our findings is somewhat limited by differences between our local practices and those of other institutions, particularly in terms of work organization and local EMR system. This variability in handoff procedures is a barrier to handoff improvement, and has motivated recommendations for standardization. Although some EMR systems may already have parts of the features suggested here, we have presented design implications that are based on our local EMR system, with which our physicians are familiar. We also note the use of fictitious cases, based on short vignettes, which differ from real patient cases that physicians manage. Although focus groups can lead to biased discussions due to peer pressure, we included an individual selection phase prior to the group discussion. We had a slightly higher representation of female physicians in our sample compared to our actual population, in both resident and supervising physician groups, which may affect some of our results.

Among the strengths of this paper, we note the local practice of patient selection for handoffs, which emphasizes the anticipation of potential problems in the patients near future, and allows the clinicians to keep their focus on the sicker patients. Even if this patient selection process may not be found in other healthcare models, our findings can help guide improvement in the handoff content, by focusing particularly on the features we identified for patient selection. We did reach saturation with our four focus groups. Furthermore, the use of standardized cases for the discussion allows for a comparison across focus groups and across level of experience. Participants found the cases realistic, and could relate to similar situations in their own experience.

5. Conclusion

Our focus group sessions with residents and supervising physicians used standardized patient vignettes to help study how physicians assess and anticipate needs in patient management. Patients considered to be unstable, or with yet unclear evolution after an acute event, those with unusual management strategies, those with complex medical cases, those who need monitoring or follow-up on tests, and end of life situations are selected for discussion during handoffs. Better awareness of these situations could help facilitate the handoff preparation process.

Future works

Based on our findings in this study, we plan to conduct usability studies with our new design implications for supportive technologies for handoff preparation. Using a mock-up of our current EMR, we plan to assess physician impressions and usability with the suggested changes, in particular for the synoptic view of an entire ward with notifications. Implementation of the notifications or alerts suggested above will require not only changes in the EMR system, but also further reflection how to reach the appropriate target, and will take much longer for implementation.

After studying the handoff preparation process, we are currently conducting a study on the integration of verbal handoff information, with the subsequent chart-biopsy process during cross-covering, followed by the participants giving their own handoff. We are comparing two interventions with the current note-taking (control): EMR access during the verbal handoff and use of a paper summary as suggested above (including patient identification and a list of problems). Studying the participants’ handoffs in this new study will provide further insight into the handoff preparation process.

References


