Handoffs in general surgery residency, an observation of intern and senior residents

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Abstract

BACKGROUND: Handoffs have become an area of concern as duty-hour restrictions impose an increasing number of shift changes. The objective of this study was to study handoffs in a general surgery residency and identify problems that exist in the current handoff process in preparation for a standardized implemented protocol.

METHODS: A resident researcher observed resident-to-resident handoffs for 5 surgical service teams, Monday through Friday, for the middle 2 weeks of the 3rd month of the academic year. Each handoff was observed for the presence, absence, or inconsistency of code status; anticipated problems; active problems; current baseline status; pending tests or consults; and closed-loop communication.

RESULTS: Thirty-eight residents in 2010 were observed, with a total of 52 handoffs ranging from 1 to 27 minutes in length. Five handoffs (10%) were by phone, 47 handoffs (90%) were observed in person, 10 handoffs (19%) were by senior residents, and 37 handoffs (71%) were performed by junior residents. Of the 47 in-person handoffs, code status was mentioned in 2 (4%), and 6 (12%) were given written notes. Of the 37 intern handoffs, the presence of measured criteria occurred in the following percentages: 59% for anticipated problems, 70% for active problems; current baseline status, pending tests or consults, and closed-loop communication. Of the 10 senior-level handoffs observed, all consistently included the previously mentioned criteria.

CONCLUSIONS: This study demonstrates the lack of consistency and propensity for error in unstructured handoffs among junior residents. The finding that senior-level residents exhibited consistently proficient handoffs demonstrates that handoffs are a learned skill. Therefore, teaching junior residents a structured handoff supervised by senior residents would most likely reduce the inconsistency and error-prone nature of the junior-level handoffs observed in our study.

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The handoff process is ubiquitous between most personnel within the health care setting. This transition of care is a point of interest in health care improvement initiatives, as failure of adequate communication can precipitate significant patient care quality issues¹ and can be the root cause of 60% of sentinel events.² Errors in communication have the potential to become increasingly more prevalent as transfers of care increase with resident duty-hour restrictions. Therefore, a close look at the handoff process is needed, as almost all of these errors are completely preventable.

Many studies of the resident handoff process have shown that communication errors between shifts can lead
to uncertainty in patient care and ultimately suboptimal care. A study by Arora et al\(^3\) noted that significant events due to deficient handoffs were due largely to failure to report an active problem or pending test and lack of face-to-face communication. Other studies have noted that poor background on patients and failure to communicate goals of care lead to errors or delay in critical decision making when on call.\(^4\) Furthermore, breakdowns in communication from lack of a written handoff and lack of memory from information overload have been cited as significant problems in the handoff process.\(^5\)

In July 2003, the Accreditation Council for Graduate Medical Education placed an 80-hour-per-week maximum for residency programs in an effort to reduce sleep deprivation and improve patient safety.\(^6\) Although these restrictions made some positive strides in improving sleep deprivation among residents,\(^7\) they have a negative impact on the continuity of care by requiring a handoff of information at least twice a day to stay within duty-hour limits. In 2006, the Joint Commission on Accreditation of Healthcare Organizations directly addressed handoff improvement and created a patient safety goal that outlined expectations for health care handoffs.\(^8\) In 2008 the World Health Organization followed suit and listed “communication during patient care handovers” as 1 of its “High 5” patient safety initiatives.\(^9\) These recommendations were generalized to all health care workers, but they came at a time when resident-to-resident handoffs became increasingly more important because of their increase in frequency.

Recognizing the impact of increased handoffs and their potential for error, the Accreditation Council for Graduate Medical Education declared that instituting a structured handoff was a main priority in 2010.\(^10\) However, in July 2011, the council expanded these restrictions to limit postgraduate year (PGY) 1 residents to a maximum of 16 hours with 10 hours off between shifts and a 24-hour shift limit for PGY 2 residents.\(^11\) Although aimed to reduce the errors of fatigued interns, these changes potentially weakened the beneficial effects that work-hour limitations aimed to achieve at the outset by further increasing the number of handoffs.\(^12\)

An additional challenge posed to residents at this time is the lack of standardization of handoffs in each medical specialty and the lack of training to perform them proficiently.\(^13\) Studies based on handoff protocols demonstrated that the process is highly variable between specialties and institutions.\(^2\) This makes standardized training challenging and a system that is difficult to perpetuate depending on the residency.

Using criteria from previously studied successful handoffs,\(^3\) residents were observed for the presence or absence of these criteria. The aim of this study was to assess the quality of surgery residency handoffs and to best understand its strengths and weaknesses as a standardization process is created.

### Methods

Institutional review board approval was obtained from the Springfield Committee for Research Involving Human Subjects (study number 10-073). After full written consent was obtained, handoffs by surgical residents from the Southern Illinois University Department of Surgery at Memorial Medical Center in Springfield, Illinois, were observed in September 2010. A resident researcher, who was at the time not affiliated with any of the discussed patients, observed the PGY resident-to-resident handoff for 5 surgical service teams, Monday through Friday, for the middle 2 weeks of the 3rd month of the academic year. This resident researcher was at the time a PGY 3 general surgery categorical resident who was very familiar with the handoff process.

The resident performing each of the handoffs was a resident currently participating on 1 of the 5 surgical teams: general surgery for the university, general surgery for private practice physicians, vascular surgery, colorectal surgery, and the trauma service. The teams typically consisted of an intern, a midlevel resident, and a senior or chief resident. At the start of their internship, the PGY 1 residents are given a brief overview on how to conduct a proper handoff. Over the course of the 2 months preceding this observation, interns were to learn the handoff process by the senior residents on their team, though no formal curriculum was in place. The responsibility of handing off is left to the intern on the team, as the interns are responsible for looking after the patients while the senior resident is often in the operating room. If the senior resident is present at the handoff, coaching is given if needed as the junior resident communicates the information. The senior or chief resident will conduct the handoff independently if the junior resident is occupied with other tasks. The resident receiving the handoff was a PGY 2 general surgery resident on the night float service. This resident was paired with a PGY 4 night float resident who was also encouraged to attend the handoff.

The majority of the handoffs occurred in an assigned private resident room where computers were available to access patient lists and other patient data. A written handoff consisted of patient lists printed directly from Cerner PowerChart (http://www.cerner.com/solutions/Hospitals_and_Health_Systems/Acute_Care_EMR/) and included the following for each patient: name, date of birth, room number, date of admission, age, gender, attending physician’s name, and a comment, which usually included the attending physician’s name, date of consult, and surgery performed. Additional written handoff on these patient lists was encouraged but not mandatory. The resident receiving the handoff was expected to write down the verbal handoff information on the patient list if not already written.

The handoff was observed for the presence, absence, or inconsistency of code status; anticipated problems; active problems; current baseline status; pending tests or consults; and closed-loop communication, as recommended per Arora et al\(^3\) and the Joint Commission\(^1\) for successful handoffs. A handoff criterion was denoted as present in terms of the measured criteria if during >50% of the patients handed off, mention was made of anticipated problems, active problems, current baseline status, pending test of
consults, and closed-loop communication. If during a hand-off mention was made of the above items <50% of the time, they were marked as inconsistent. If the item was completely absent in a handoff, it was marked with absent. Presence or absence of face-to-face encounters, upper-level or chief-level attendance, coaching from an upper-level resident, and the number of interruptions per handoff were also tallied. See Table 1 for the template used during the monitoring process.

**Results**

A total of 52 handoffs were observed in September 2010. The handoffs ranged from 1 to 27 minutes in length over patient lists that had anywhere from 5 to 41 patients. Patients encompassed floor, intermediate status, and intensive care unit levels of care. The trauma team list included patients for whom these residents were responsible for managing critical care in the intensive care unit. The junior resident receiving the handoff was responsible for fielding the first page on any issues concerning these patients overnight.

A majority of the handoffs, 47 (90%), were observed in person in a designated private resident room. A few of the handoffs occurred in the trauma bay or a nearby call room. Of the remaining 5 handoffs that were conducted over the phone, 4 included written notes on the patient list left for the on-call resident in the resident room. Six of the 47 in-person handoffs (12%) included written notes on the patient lists. The notes left on the patient lists inconsistently included tasks left to be completed, current patient status, medications, and other facts about the patients. The contents of these notes were not actively surveyed or tallied for this study, because of their limited amount (Table 2).

Twenty-nine of the 47 in-person handoffs (61%) included interruptions from pages, phone calls, or other residents in the room concerning matters outside of the current handoff. Some of these interruptions were pages for new traumas that not only interrupted the handoff but changed the location where the handoff resumed. The number of interruptions ranged from 0 to 10 and averaged approximately 2 interruptions per handoff. During handoffs that included large numbers of interruptions, the process took significantly longer and extended it up to 27 minutes in some cases.

Of the 37 intern handoffs, 59% were marked as present for anticipated problems, 70% for active problems, 51% for current baseline status, 64% for pending tests or consults, and 81% for closed-loop communication. Intern handoffs were marked as inconsistent 35% of the time with anticipated problems, 29% of the time with active problems, 48% of the time with current baseline status, 32% of the time with pending test or consults, and 14% of the time with closed-loop communication. These criteria were completely absent in only 3 categories: 2 handoffs (5%) failed to mention anticipated problems, 1 (2%) failed to mention pending tests or consults, and 2 (5%) did not include any form of closed-loop communication (Table 3).

Of the 37 junior resident handoffs, 8 (21%) had coaching from senior residents on the team. The number of corrections ranged from 2 to 15 per handoff and included information such as type of surgical procedure, timing of surgical procedure, significant details of surgical procedure

<table>
<thead>
<tr>
<th>Description</th>
<th>n</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of handoffs</td>
<td>52</td>
<td>100</td>
</tr>
<tr>
<td>In-person handoffs</td>
<td>47</td>
<td>90</td>
</tr>
<tr>
<td>Handoffs over the phone</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>In person handoffs by interns</td>
<td>37</td>
<td>71</td>
</tr>
<tr>
<td>In person handoffs by seniors</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Handoffs with written notes</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Handoffs with code status</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date:</th>
<th>SIU</th>
<th>SPC</th>
<th>Trauma</th>
<th>CRS</th>
<th>Vascular</th>
</tr>
</thead>
<tbody>
<tr>
<td># interruptions</td>
<td>P presence, A absence or I inconsistent:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code status</td>
<td>Anticipated problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active problems</td>
<td>Current baseline status</td>
<td></td>
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<tr>
<td>Pending tests or consults</td>
<td>Closed loop communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[P] presence or [A] absence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face to face</td>
<td>Upper level resident present</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chief level resident present</td>
<td>Coaching from upper level</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

The column headings indicate the surgery services that were involved in the handoff as follows: CRS = colorectal surgery patients; SIU = general surgery for the university; SPC = general surgery for private practice physicians; trauma = trauma surgery patients; vascular = vascular surgery patients.
Comments

This study serves as a valuable snapshot of the handoff process. Although it has many limitations, these data show that there is a large difference between a junior-level and senior-level handoff and indicates that the handoff is a learned skill that necessitates further mentoring during the learning process. Additionally, these data indicate large room for improvement in terms of interruptions and consistency of relayed data. This deficiency poses an opportunity for improvement through a regulated handoff process with a structured template and an improved resident culture.

The limitations of this study include but are not limited to the small number of handoffs observed and the limited time period during which they were surveyed. The additional handoffs that occurred in the morning and over the weekends were not observed and thus not included, therefore limiting the scope of our conclusions. Only 1 subset of residents was observed in this study, which adds to the possibility of an error due to an individual rather than by process or level of training. Additionally, this study had only 1 observer, who was not blinded to the residents’ identities during the process. The residents being observed were also aware of the fact a study was being conducted, which introduces the question of the Hawthorne effect.

Our process was not matched to an alternative method, and therefore no control exists in our study. The large difference between the junior-level and senior-level handoffs was not anticipated, and therefore the number of senior-level handoffs was not matched to the number of junior-level handoffs. These data are, however, currently being used to design a standardized handoff process at our institution in anticipation of a comparison study of the structured handoff versus our current data from the unstructured handoff.

Although the literature supports the consequences of the errors in handoffs, the consequences of the communication errors observed were not obtained in this study. This is due in part to the difficulty in collecting these data, as well as patient privacy standards. Additional subjective data per resident and nursing staff could be collected if an additional study is pursued with a new standardized process. This could be used to judge the efficacy of the new standards.

Despite all its limitations, our data do show a clear difference between junior-level and senior-level residents. Both handoffs were done with the same patient list and under the same set of circumstances, indicating that proficiency in conducting a handoff successfully is a learned process. Part of the ease of the senior handoff comes from the experience of being on call and knowing what issues to anticipate and what information is needed to address them. With the encroachment of duty-hour regulations on the interns’ experience on the floor and on call, a larger effort toward directed handoff is needed.

A formal handoff course may provide some essential groundwork for these interns, but the progression to proficiency needs to be aided by direction from the senior residents. As the results of our study show a large difference between the proficiency of the junior and senior residents, we surmise that the teaching of handoffs from senior to junior residents was not sufficient, complete, or made a priority. The importance of a proficient handoff also needs to be encouraged as part of the culture by senior residents. This should be demonstrated by time taken to teach the junior residents, supervision as they learn, and aiding in minimizing interruptions during the process by offering help in answering pages and encouraging a quiet environment. A formal curriculum may help impart this knowledge more efficiently and may bring attention to the importance of teaching between junior and senior residents in this setting.

Although every effort by senior residents should be made, a formal on-paper handoff template with the monitored criteria is still needed to minimize variability and human error. The lack of such a document in this study is recognized as a large deficit. However, an effort to implement a separate document outside of the printed list was met with large resistance because it added a significant amount of time to handoff preparation. Because residents’ hours are tightly
regulated, a template directly from the electronic medical record with prefilled information would be most efficient. Our institution is currently working with the electronic medical record system at each hospital to generate a printable list of patients that would include code status, consults, medications, current vital signs, intake and output data, as well as room for notes by the resident team. This system would still allow the convenience of a printable list from the electronic record while providing the necessary criteria as well. Although the details of such a template should be tailored to each institution and residency program, the effort to create a standardized process should be attempted by all.

Errors in resident-to-resident handoffs have the potential to cause as much harm as errors in management from lack of knowledge or in the operating room from poor technique. As such, the handoff process should be categorized as a core competency and ought to be observed and graded for proof of efficiency. The skill and practice of a handoff will continue to be relevant across all specialties and will gain importance as the practice of medicine continues its trend toward shift work. Therefore, early teaching, proved proficiency, and continued attention as to the importance of the handoff process throughout training should become the new standard.

Conclusions

Our study illustrates the characteristics of an unstructured handoff process by both junior-level and senior-level residents. The errors and inconsistency seen by junior-level residents compared with senior-level residents indicate a need for handoff teaching and mentorship by senior-level residents, especially as duty hours have limited junior-level residents’ experience with patients and on call. A structured handoff template and process is also needed to eliminate human error and to maintain an established process with each handoff.

References