Resident-Led Handoffs Training for Interns: Online Versus Live Instruction with Subsequent Skills Assessment

Elizabeth Hill, DO,a Richard H. Cartabuke, MD,a Neil Mehta, MD, MS, b Colleen Colbert, PhD, b Amy S. Nowacki, PhD, b,c Cassandra Calabrese, DO, d Ali Mehdi, MD, d Ari Garber, MD, d Mohammad Mohmand, MD, d Odai Sinokrot, MD, a James Pile, MD, a,b

aInternal Medicine Residency Program, Cleveland Clinic, Cleveland, Ohio; bCleveland Clinic Lerner College of Medicine of Case Western Reserve University, Cleveland Clinic, Cleveland, Ohio; cDepartment of Quantitative Health Sciences in the Lerner Research Institute, Cleveland Clinic, Cleveland, Ohio.

The Accreditation Council for Graduate Medical Education implementation of duty hour restrictions led to an increased number of resident handoffs.1 Communication errors during handoffs have been associated with patient harm and identified as a leading cause of sentinel events,2 highlighting the need to standardize best practices on handoffs. Despite this need, there is no uniformly accepted handoffs protocol in the United States. There is also a lack of consensus on the optimal method of delivery for teaching and assessing resident handoffs.3 In-person handoffs training has been found to reduce adverse events,4 although these initiatives may be difficult to replicate in large or multisite programs. An online training approach, if equally effective, could offer an attractive alternative to sites with fewer resources. Currently, there are few tools for assessing handoffs performance, although experience piloting and validating an observed simulated handoff experience with a handoffs clinical examination instrument has been published.5

To promote acceptance of any resident education initiative, learner engagement is essential. One method of enhancing engagement is to involve residents in the development and implementation of a quality-improvement initiative. To our knowledge, no previous publications describe a handoffs curriculum developed and implemented by residents.

PURPOSE
Our pilot project was a resident-led educational innovation in which we developed a handoffs mnemonic based on a multidisciplinary needs assessment, assessed current resident handoffs performance via a standardized assessment tool developed by the authors, and compared efficacy of online versus interactive workshop handoffs training in the subsequent intern class with an observed simulated handoff experience. The Cleveland Clinic Institutional Review Board approved this quality-improvement project.

MATERIALS AND METHODS
Setting and Context
The handoffs initiative was designed and implemented within the internal medicine residency program at...
Cleveland Clinic’s main campus, which includes a large quaternary hospital. The internal medicine residency program has 180 residents, including 164 categoric residents and 16 additional first-year residents completing 1 year of internal medicine training.

Participants
Incoming residents (N = 68) participated in our structured handoffs training as a new and required part of the internal medicine residency program orientation, which occurs in June of each year.

Needs Assessment
Our group met regularly from November 2014 to November 2015 to develop and implement this project, following recommended curriculum development steps. A literature search about handoffs was performed with medical librarian assistance. A needs assessment of handoffs practices within our internal medicine residency program (N = 180 residents), which included standardized assessment of 100+ patient handoffs, revealed a lack of a standardized handoffs protocol or any formal handoffs training.

Mnemonic Development
On the basis of a literature review and needs assessment, we developed a mnemonic referred to as “Patient information, Active hospital course, Status, Supporting data, Overnight to do, Nursing, Summary by received” (PASSONS) (Figure 1).

In comparison with other handoffs tools, the PASSONS mnemonic provides a prompt to include supporting data and adds a novel nursing component. The nursing component was developed on the basis of results from a questionnaire administered to nurses, which indicated that nurses frequently sought information typically omitted from resident-initiated overnight handoffs. This information included diet, analgesia plan, and code status. We worked with the hospital information technology department to incorporate components of our handoffs mnemonic into the preexisting electronic written handoffs tool. The revised written handoffs tool included drop-down boxes for diet, patient status (sick/not sick), and code status; a free text box provided a prompt for analgesia plan. Our institution’s handoffs tool is linked to the electronic medical record and has limited autopopulated information (eg, patient name, age, medical record number, sex, and room number), as well as additional space for free text information.

Assessment Tool Development
We created verbal and written assessment tools that assessed each element of the mnemonic (Appendix A, Appendix A).

PERSPECTIVES VIEWPOINTS

- There is a lack of consensus on the optimal method for delivering instruction on resident handoffs.
- Online educational modules provide standardized, efficient, and effective training on handoffs.
- Online modules may be a viable alternative to in-person training on handoffs.

<table>
<thead>
<tr>
<th>PASSONS Case Example for Verbal Handoff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P</strong> Patient information</td>
</tr>
<tr>
<td>Mr. Jones is a 77-year-old male with community-acquired pneumonia.</td>
</tr>
<tr>
<td><strong>A</strong> Active hospital course</td>
</tr>
<tr>
<td>He was initially hypoxic and hypotensive but improved with intravenous fluids and levofloxacin.</td>
</tr>
<tr>
<td><strong>S</strong> Status (code status, sick or not sick)</td>
</tr>
<tr>
<td>He was originally sick and now he’s stable. He’s full code.</td>
</tr>
<tr>
<td><strong>S</strong> Supporting data</td>
</tr>
<tr>
<td>His chest x-ray showed right middle lobe infiltrate. Blood and sputum cultures are negative so far.</td>
</tr>
<tr>
<td><strong>O</strong> Overnight to-do (including contingency plan)</td>
</tr>
<tr>
<td>Nothing to follow-up on overnight. If he spikes a fever, perform infectious work-up, and if oxygen saturations drop, have a low threshold for transfer to the intensive care unit.</td>
</tr>
<tr>
<td><strong>N</strong> Nursing (pain plan, diet status, procedures)</td>
</tr>
<tr>
<td>He has no pain but it’s okay for acetaminophen as needed. He is on a regular diet. No procedures planned for tomorrow.</td>
</tr>
<tr>
<td><strong>S</strong> Summary by received</td>
</tr>
<tr>
<td>Mr. Jones is a 77-year-old male with community-acquired pneumonia and is doing well on antibiotics. We’ll be sure to check in on him if vitals change and have a low threshold for critical care transfer.</td>
</tr>
</tbody>
</table>

Figure 1 The PASSONS mnemonic and verbal handoffs case example were widely distributed on pocket cards and posters.
available online). The verbal and written assessment components were emphasized during both the interactive workshop and online module.

In an effort to reduce interobserver variability in use of the assessment tool, we required at least 3 practice assessments to be completed with other assessors before completion of independent assessments. After each practice assessment, the assessors would debrief regarding discrepancies in their assessments and discuss until consensus was reached.

Case Development
Three cases were created for use during the interactive workshops: 2 cases for verbal handoffs practice and 1 case for written handoffs practice. Cases featured conditions commonly encountered on inpatient medicine services, such as chronic obstructive pulmonary disease exacerbation, and were formatted as a history and physical note. The cases were used for teaching during the interactive workshop. They were not incorporated in the online module.

Development of Online Module
The online module “Optimizing Patient Handoffs” was designed in collaboration with our institution’s Center for Technology-Enhanced Knowledge and Instruction (Appendix B, available online). The module contained the same didactic information as the workshop. Questions were embedded throughout the module to encourage reflection on the overall process, and a brief post-test was incorporated for formative assessment.

HANDOFFS TRAINING
Because performance of intern baseline handoffs is generally poor and face-to-face training is known to improve performance, we focused on comparing the effectiveness of 2 training modalities: an online module and an interactive workshop.

During the standard internal medicine residency program orientation, incoming interns are quasi-randomly assigned into 4 cohorts (groups 1-4). We used these groups for our quality-improvement project, with groups 1 and 4 (N = 33) assigned to the interactive workshop and groups 2 and 3 (N = 38) assigned to the online module. Both the interactive workshop and the online module were completed during residency orientation.

In-Person Workshop
The 60-minute in-person workshop, implemented in June 2015, stressed the significance of handoffs, including the Joint Commission and Accreditation Council for Graduate Medical Education recommendations regarding best practices. A humorous resident-created video (“What Not To Do” Handoffs Video) was shown to demonstrate ineffective handoffs; interns were then asked to critique the handoffs and reflect on prior handoffs experiences. Subsequently, the PASSONS mnemonic was introduced, and a second resident-created video (PASSONS Handoffs Video) demonstrating “ideal” handoffs performance was shown. Interns then practiced performing verbal and written handoffs in facilitated small groups. Facilitators, who included resident authors and the associate program director author, provided real-time feedback. We did not administer a test to the workshop group because we assessed learner knowledge and provided real-time feedback.

Online Module Training
The online module guided learners through the components of the PASSONS mnemonic, using the case listed on the pocket cards (Figure 1). Time spent completing the online module was user-dependent; interns were provided protected time to complete the module during orientation. Completion of the module required correctly answering 100% (6 of 6) of the test questions incorporated at the end of the module. Laminated pocket cards were distributed to all residents, and posters were displayed in designated handoffs areas to reinforce use of the PASSONS model.

THE OBSERVED SIMULATED HANDOFFS EXPERIENCE
Because teaching structured handoffs has been shown to improve resident perceptions and performance of handoffs (ie, a training effect), we did not perform baseline assessments on our learners. We assessed intern handoffs skills via an observed simulated handoff experience 4 months post-training in a classroom at our institution. Interns were evaluated via the observed simulated handoff experience if they completed the online or interactive workshop training. Although not a research study, it fits with a post-test only design.

The observed simulated handoff experience included 3 stations and lasted 45 minutes. Facilitators included some of the authors of this study and 3 additional faculty. The 3 facilitators with no prior involvement in the project participated in a focused faculty development session before the observed simulated handoff experience.

Interns were assessed on verbal (stations 1 and 2) and written (station 3) handoffs skills. At stations 1 and 2, they were asked to read a case and perform a verbal handoff; intern A handed off to intern B at station 1 and vice versa at station 2. Station 3 included completing a written handoff using a printed version of our institution’s online written handoffs form. Each station had unique sample cases that lasted 15 minutes, and real-time individual feedback was provided.
STATISTICAL ANALYSES
Data were collected and managed using REDCap electronic data capture tools hosted at the Cleveland Clinic. We focused on descriptive statistics and effect sizes, reporting simple proportions that best illustrate results from this pilot project. It was determined a priori that at least a 25% absolute difference, which equates to an approximate 7 to 8 subject difference, would be considered actionable.

RESULTS OF THE INNOVATION
A total of 71 interns enrolled in our residency program participated in the new handoffs curriculum. Thirty-eight interns (54%) were assigned the online module, and 33 interns (46%) were assigned the interactive workshop via the quasi-randomized process described. Sixty-eight interns (96%) completed their assigned training (Figure 2), with 62 (87%) and 60 (85%) completing the written and verbal observed simulated handoff experience assessment, respectively.

Similar results in observed simulated handoff experience performance were observed between interns trained via online module and interactive workshop, with the sole exception of code status on verbal assessment (Table). Code status was included 74% versus 46% of the time when comparing online with interactive workshop training. The explanation for this difference is unclear.

IMPLICATIONS
Results of our pilot curriculum demonstrate that interns trained via an online training module or interactive workshop performed similarly on the observed simulated handoff experience. To our knowledge, no previous articles have described online versus workshop training for resident handoffs, followed by structured performance assessment.

Numerous training programs have explored best practices in handoffs training. These proposals have included mnemonics, workshops for teaching these methods, assessment tools, and suggestions for translation to other programs. Consistent implementation and assessment of handoffs training remain challenging, largely because of the difficulty of ensuring quality of handoffs when translated from the classroom to actual patient care. Furthermore, there is a need to develop efficient and effective methods of teaching and assessing handoffs processes in the reality of busy clinical training environments.

Figure 2  Intern participation is mapped in this flow diagram. OSHE = observed simulated handoff experience.
Solan and colleagues describe a multidisciplinary handoffs initiative that incorporated charge nurses during resident handoffs. Our pilot is the first to describe nursing input for resident handoffs mnemonic development, ultimately leading to a novel nursing component within the mnemonic.

Our online delivery model is efficient and learner-centered, and requires only modest faculty development. In addition, the online model allows residents to learn new information at their own pace, as well as to review content on an as-needed basis.

STUDY LIMITATIONS

This article describes the first year of implementation, with a relatively small sample size. In this curriculum innovation, there were no baseline assessments of handoffs skills, although other investigators have demonstrated them to be low in the absence of specific intervention. We also do not have long-term follow-up data measuring skill decay related to resident handoffs performance. It was beyond the scope of this project to examine the direct impact of handoffs training on patient outcomes.

CONCLUSIONS

This pilot project showcased a resident-led multidisciplinary innovation in improving quality and fidelity in resident handoffs and compared intern handoff performance after 2 types of training. Results of this pilot project support prior work by Farnan et al, which suggests resident competency in performing handoffs may be efficiently assessed via an observed simulated handoff experience, as well as the work of Gaffney et al, examining the performance of incoming interns via completion of a handoffs online training module followed by an observed simulated handoff experience. Online educational modules may provide an effective and time-efficient method for programs to teach a structured approach to patient handoffs. Achieving competency in conducting patient handoffs is clearly important for residents and may be efficiently assessed via an observed simulated handoff experience. We believe that our innovation can be generalized to other settings, where it can be modified to meet learner needs.

ACKNOWLEDGMENTS

The authors thank Laura Greenwald, director of communication for the education institute, for multimedia support; the internal medicine residency program director Dr Abby Spencer, for unflagging support and encouragement; and our internal medicine residents, faculty, nurses, librarians, and information technology department.

ETHICAL APPROVAL

The Cleveland Clinic Institutional Review Board categorized this project as a quality improvement initiative. October 26, 2015, Study# 15-1364.

DISCLOSURES

The project was presented in part as a workshop at the Society of General Internal Medicine Midwest Regional Meeting, August 27 to 28, 2015, Cleveland, Ohio: E. Hill, R.H. Cartabuke, M. Mohmand, O. Sinokrot, C. Calabrese, A. Garber, C. Colbert, A. Mehdi, J. Pile. Optimizing handoffs in an era of discontinuity.

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References


SUPPLEMENTARY DATA

Supplementary Material accompanying this article can be found in the online version at doi:10.1016/j.amjmed.2017.06.003.
### Written Handoff Assessment Tool

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief symptom or primary diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick or not sick (vitals = “no”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain plan (any pain medications identified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting data (labs AND imaging AND procedures). If not indicated, mark “yes.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important medications included</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prioritized problem list</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To-do tasks identified (NTD/no issues = “yes”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingency plan (if nothing expected = “yes”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information up-to-date and accurate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Verbal Handoff Assessment Tool

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient information (age, sex, and cc/diagnosis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick or not sick (vitals = “no”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting data (labs AND imaging AND procedures). If not indicated, mark “yes.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overnight to-do (NTD/no issues = “yes”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain discussed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet status (not tolerating PO = “no”)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary by received</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logical presentation flow</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NTD = nothing to do; PO = per os.
The Importance of Handoffs

- As resident duty hours are limited, inpatient care has subsequently become fragmented, leading to increased handoff frequency.

- Miscommunication was identified as a root cause in the majority of sentinel events by The Joint Commission (TJC) during its review between 1995 and 2005.

The Importance of Signout

- Communication errors can cause preventable health care adverse events. Some of these errors occur when physicians handoff their patients’ care.

- According to estimates from the Institute of Medicine, 44,000 to 98,000 patients die in U.S. hospitals annually because of injuries in their care due to errors. Some of these errors have been attributed to trivial lapses in communication.

Optimizing Patient Handoffs

- The transfer of role and responsibility from one person to another in a physical or mental process.

- A mechanism for transferring information, responsibility, and/or authority from one set of caregivers to another.


Video—part 1

Click to view video:
Patient Handoffs: What not to do

Note: This video is best viewed in Internet Explorer. Please check the volume of your speakers or headphones, as audio is included in the presentation.
**Question**

What is/are the pitfall(s) in the handoffs displayed in this video?

- A. No face-to-face communication
- B. Noisy setting
- C. Missing key content
- D. B and C
- E. All of the above

**Answer**

What is/are the pitfall(s) in the handoffs displayed in this video?

- A. No face-to-face communication
- B. Noisy setting
- C. Missing key content
- D. B and C
- E. All of the above (Correct)

**Key Elements of a Successful Signout**

**Written sign-out**

- Patient content
- Code status
- Anticipated problems
- Active problems
- Baseline exam
- Pending test or consults
- Overall features
  - Legible
  - Relevant
  - Accurate
  - Up-to-date

**Verbal sign-out**

- Face-to-face
- Anticipate
- Pertinent
- Thorough

**New Structured Form of Verbal Signout**

**Examples of Communication Failure**

- Content omission
- Active medical problem
- Code status
- Baseline status
- Medications or treatments
- Tests or consults
- Communication processes failure
  - Double signout (swapping shifts)
  - No face-to-face communication
  - Setting (quiet vs noisy environment)
  - Unclear written signout
  - Miscommunication of nursing issues

**The P.A.S.S.O.N.S Model**

Source:
- Arora et al Qual Saf Health Care 2005
P: Patient Information

Example
Mrs. Smith is 64 yo woman with a PMHx significant for CAD status post PCI with DES to LAD 2010, DM type II, hyperlipidemia admitted with pyelonephritis.

S: Supporting Data

Example
She has been afebrile last 24hrs, HR 60-80, BP 110-130/75-85. Physical exam remains unremarkable. Labs: Leukocytosis is trending down to 9 — 12 on presentation. Urine culture growing E.Coli, Blood Culture: negative x48 hours. Kidney ultrasound is unremarkable. Her stable problems include DM type II which is well controlled.

A: Active Hospital Course

Example
She was admitted from the ED two days ago with 3 days of fever, flank pain and dysuria. Met 3/4 criteria for SIRS on admission, HR was 95, Temp of 38.5, WBC of 12. Lactate was negative. UA + for WBC casts. She was given 1L of IVF, and started on IV ceftriaxone. She responded well to the fluids and antibiotics and is now clinically better.

O: Overnight To Do

Example
No pending labs/imaging. Do not expect any issues.

S: Status. Sick/Stable, Code Status

Example
She’s stable now. She’s full code.

N: Nursing Component

Example
Two 20 gauge peripheral IVs for access. She is on a heart healthy carb controlled diet. She has prn Tylenol ordered for flank pain; no procedures planned for tomorrow.
**S: Summary by Receiver**

Example
In summary, this is a 64 yo woman who was admitted with pyelonephritis; it seems like she’s responding to the ceftriaxone nicely. From what I’ve heard, don’t think there’s any acute issues for this patient. If anything new comes up overnight, I’ll let you know in the morning.

---

**Question**

What is/are the “best practice”(s) displayed in the handoffs in this video?
A. Good telephone handoffs
B. “PASSONS” mnemonic
C. Quiet setting
D. Summary by receiver
E. B, C, and D
F. All of the above

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**P.A.S.S.O.N.S**

**P:** Patient information
**A:** Active hospital course
**S:** Status (Sick vs not sick; code status)
**S:** Supporting data
**O:** Overnight to do
**N:** Nursing
**S:** Summary by receiver

---

**Answer**

What is/are the “best practice”(s) displayed in the handoffs in this video?
A. Good telephone handoffs
B. “PASSONS” mnemonic
C. Quiet setting
D. Summary by receiver
E. B, C, and D (Correct)
F. All of the above

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**Video—part 2**

Click to view video:
[Resident / patient handoffs](#)

**Note:** This video is best viewed in Internet Explorer. Please check the volume of your speakers or headphones, as audio is included in the presentation.

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**New Structured Form of Written Signout**

Integrates the following elements:
* Code status (drop down)
* Clinical status (sick vs not sick) (drop down)
* Diet (drop down)
* Pain plan (free text)
Video Links for Appendix B

Patient Handoffs: PASSONS
https://www.youtube.com/watch?v=O4x0Rk_r-rs
Patient Handoffs: What to do, what not to do
https://www.youtube.com/watch?v=wSyV5F6m-VU