

Original Publication

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# I-PASS Mentored Implementation Handoff Curriculum: Implementation Guide and Resources

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## Abstract

**Introduction:** Communication failures during shift-to-shift handoffs of patient care have been identified as a leading cause of adverse events in health care institutions. The I-PASS Handoff Program is a comprehensive handoff program that has been shown to decrease rates of medical errors and adverse events. As part of the spread and adaptation of this program, a comprehensive implementation guide was created to assist individuals in the implementation process. **Methods:** The I-PASS Mentored Implementation Guide grew out of materials created for the original I-PASS Study, Society of Hospital Medicine (SHM) mentored implementation programs, and the experience of members of the I-PASS Study Group. The guide provides a comprehensive framework of all elements required to implement the large-scale I-PASS Handoff Program and contains detailed information on generating institutional support, training activities, a campaign, measuring impact, and sustaining the program.

**Results:** Thirty-two sites across North America utilized the guide as part of the SHM program. The guide served as a main reference for 477 hours of mentoring phone calls between site leads and their mentors. Postprogram surveys from wave 2 sites revealed that 85% ( $N = 34$ ) of respondents felt the quality of the guide was very good/excellent. Site leads noted that they referenced the guide most often during the early part of the program and that they referenced the sections on the curriculum and handoff observations most often. **Discussion:** The I-PASS Mentored Implementation Guide is an essential resource for those looking to implement the large-scale I-PASS Handoff Program at their institution.

## Keywords

Handoffs, Patient Handoff, Transitions of Care, I-PASS, Implementation Guide

## Educational Objectives

After reviewing these resources, learners will be able to:

1. Assess the local environment and plan for a successful implementation of the I-PASS Mentored Implementation Program.
2. Describe the components of the I-PASS Mentored Implementation Handoff Curriculum for frontline providers, I-PASS champions, and key institutional leaders and stakeholders.
3. Articulate the importance of handoff observation and assessment.
4. Create a data-collection plan to determine the impact of the I-PASS Mentored Implementation Program.
5. Format computerized or printed handoff documents to reflect the structure of the I-PASS mnemonic.

## Introduction

Communication and handoff failures are both common and potentially hazardous and have been identified by The Joint Commission and the Department of Defense as a contributing cause in approximately two out of every three sentinel events—serious, often fatal, preventable adverse events in hospitals.<sup>1,2</sup> Recognizing the role of handoff failures in medical errors, the Accreditation Council for Graduate Medical Education now requires all training programs in the United States to teach resident physicians handoff skills and to monitor the quality of handoffs.<sup>3</sup> The Association of American Medical Colleges has also identified the ability to “give or receive a patient handover to transition care responsibility” as a Core Entrustable Professional Activity that all medical students should be able to perform upon entering residency.<sup>4</sup> Despite these requirements and concerns, effective handoff curricula and methods to ensure that trainees acquire handoff skills are lacking.<sup>5</sup>

## Appendices

- A. SHM I-PASS Mentored Implementation Guide.pdf
- B. SHM I-PASS Mentored Implementation Guide.docx
- C. I-PASS Training Materials Tips and Tricks.docx
- D. I-PASS Handoff Program Implementation Steps.docx

*All appendices are peer reviewed as integral parts of the Original Publication.*

To address this gap, in 2010, the I-PASS Study Group developed the I-PASS Handoff Curriculum (the key component of the I-PASS Handoff Bundle), which was studied as part of the 11-institution I-PASS Study. The I-PASS Handoff Curriculum is an evidence-based, standardized approach to teaching, evaluating, and improving handoffs and was created using a rigorous approach incorporating Kern's six steps for curriculum development.<sup>6,7</sup> This included a detailed needs assessment at all of the sites, development and refinement of goals and objectives, creation of all the training materials with a diverse group of experts from multiple sites, implementation of the curricular materials at the sites in three consecutive waves, and, finally, detailed evaluation and thoughtful revision of the entire curriculum. This comprehensive suite of curricular materials included seven major complementary components that were published on *MedEdPORTAL* in 2013.<sup>8-14</sup> Informed by a single-institution pilot,<sup>15</sup> the I-PASS Study<sup>16</sup> launched in January 2010 and concluded in May 2013. Following implementation of the I-PASS Handoff Bundle across nine institutions and 10,740 patient admissions, medical errors decreased by 23% (24.5 vs. 18.8 per 100 admissions,  $p < .001$ ), and preventable adverse events (medical errors resulting in harm to patients) decreased by 30% (4.7 vs. 3.3 per 100 admissions,  $p < .001$ ).<sup>17</sup> There were no significant changes in the duration of oral handoff per patient (2.4 vs. 2.5 minutes,  $p = .55$ ) or resident workflow, including patient-family contact or computer time.

Given the ubiquity of poor handoff communication in hospitals and the evidence that implementation of the I-PASS Handoff Bundle was associated with a substantial reduction in medical errors and an improvement in patient safety, the I-PASS Study Group sought wide-scale dissemination of the program in order to further its positive impact on patient safety. With this goal in mind, members of the I-PASS Study Group partnered with the Society of Hospital Medicine (SHM) to facilitate the enhancement and dissemination of the I-PASS Handoff Bundle. This partnership utilized SHM's mentored implementation methodology, a proven vehicle for successfully carrying out multicenter quality improvement initiatives.<sup>18</sup> As part of the SHM I-PASS Mentored Implementation Program, the I-PASS curricular materials underwent significant refinement and adaptation based on feedback from the nine original study sites in order to prepare for large-scale dissemination across 32 institutions in North America. These institutions were a mix of university-based and community hospitals, and all were associated with a residency training program. A critical component of the process was the development of a comprehensive guide that would provide detailed information on how to facilitate the implementation of the program and sustain it over the long term. This document would be used primarily by site leaders spearheading the implementation at their institutions; however, it could also be shared with site champions and other key stakeholders as needed.

The I-PASS Mentored Implementation Guide is a brand-new addition to the I-PASS suite of curricular materials and was not part of the 2013 publications. It grew out of ad hoc materials that were developed for the original I-PASS Study to assist site leads in the implementation of the program at their institutions. Given the complexity of the updated I-PASS Mentored Implementation Handoff Curriculum, study investigators recognized the need to build upon these materials and create a robust, well-planned guide for those looking to implement the program. Unlike the earlier I-PASS Study, the sheer scope of the SHM I-PASS Mentored Implementation Program (32 sites, as compared to nine in the original study) required greater coordination and structure of the rollout of the program at each site. Similar to other SHM mentored implementation programs, there would be a need to rely on the site mentors and leaders to manage more of the unique details of the implementation, and a comprehensive implementation guide would aid in this process.<sup>18</sup> The I-PASS Study Group also recognized the need to have detailed instructions for those looking to implement in the future, since they would not have the luxury of direct access to trained I-PASS mentors that the 32 sites in this project did. The sections of the guide were an amalgamation of information from various sources, including implementation guides adapted from previous SHM mentored implementation programs and materials created ad hoc for the original I-PASS Study, as well as brand-new sections developed for the SHM I-PASS Mentored Implementation Program. Key implementation steps were also identified for each section to assist site leaders in tracking their progress. Given the amount of detail and information that went into this guide, it had to be developed as a reference book (that could be printed or used electronically). The I-PASS Study Group felt the amount of detail and instruction required would be impossible to fit into a video or workshop. A guidebook would also be easy for site leaders to return to if they needed to reference various key sections during the implementation process.

The current publication comprises PDF and Word versions of the detailed I-PASS Mentored Implementation Guide (Appendices A & B, respectively), as well as the I-PASS Training and Implementation Materials Tips and Tricks for Success (Appendix C) and I-PASS Handoff Program Implementation Steps (Appendix D). While the implementation guide and associated implementation materials serve as an independent resource on all aspects of the I-PASS

Handoff Program and changing the handoff culture at an institution, the members of the I-PASS Study Group recommend using them along with the other complementary I-PASS curricular modules that are available on *MedEdPORTAL*. The entire I-PASS Mentored Implementation Handoff Curriculum is a multifaceted collection of six modules that provides training and strategic plans for every aspect of leading the culture change required to implement an effective handoff program that improves patient safety and outcomes. It is critical to note that the I-PASS Mentored Implementation Program is unlike any program submitted to *MedEdPORTAL* in the past. The program is unique in its sheer size and scope, and it is set up to promote culture change and sustainability of a handoff program at users' institutions. The implementation process used for the I-PASS Mentored Implementation Program is generalizable and can be applied to other large-scale, culture-change initiatives at an institution.

## Methods

### Development of the Implementation Guide

The development of the SHM I-PASS Mentored Implementation Guide began with a review of previous guides developed for SHM mentored implementation programs. Our team adapted and expanded sections on essential first steps, assessing the local environment, and planning for implementation. We then reviewed materials created ad hoc for the original I-PASS Study. From these ad hoc materials, we adapted and expanded sections of the I-PASS curricular materials, as well as guidelines for handoff observations, data collection, the printed handoff document, and the I-PASS campaign. Following that, our team met to discuss what additional sections should be added to the guide based on our experiences at our own sites and assisting other sites in their implementation. These discussions led to the creation of three brand-new sections for the guide that focused on addressing barriers sites may face, promoting sustainability of the program, and how to spread the handoff program to other specialties, departments, or units in one's institution. The guide was then shared with site leads from the original I-PASS Study who reviewed the content for clarity based upon their experience implementing at their home institution and made recommendations for edits. Lastly, our team developed a list of key implementation steps for each section of the guide. These key steps were set up as milestones that site leaders could check off as they were completed. We felt having these steps would be critical for site leaders to monitor their progress in the implementation process and determine what still had to be done. All of the sections were written by key members of the original I-PASS Study and underwent a rigorous review and editing process over a 6-month period.

### How to Use the Implementation Guide

The I-PASS Mentored Implementation Guide is the overarching resource on all elements of the I-PASS Handoff Program and is the first resource we tell site leaders to view at the start of the implementation. Site leaders will need to refer back to the guide throughout their rollout of the program. The individuals who have traditionally served as site leaders include residency program directors, division or section directors, chief residents, faculty members, hospital quality improvement leaders, and designated institutional officials. As site leaders, such individuals are responsible for thinking through the current state of shift-to-shift handoffs at an institution, the optimal state of what handoffs should consist of in the future at their institution, and how to roll out the program in a strategic fashion. Site leaders are then responsible for overseeing or directly facilitating the training of frontline providers and champions. They are also responsible for scheduling observations, collecting feedback, and tracking data to ensure successful implementation of the handoff program. Lastly, the site leaders are responsible for responding to resistance, local adaptation, and spread of the handoff program to other units, sites, or specialties. The implementation guide provides all necessary instructions for site leaders to accomplish these tasks.

During the SHM I-PASS Mentored Implementation Program, we found that a large percentage of our sites printed out the electronic version of the guide and placed it in a binder with labeled sections. With a printed version, they were able to highlight key information or write notes after monthly calls with their SHM I-PASS mentors. At the start of program implementation, we recommend that site leads set aside a few hours to do a high-level review of the whole implementation guide in order to get a global view of the entire program. However, we do recognize that the guide is very detailed and may appear overwhelming at first. Therefore, we have developed a time line for which sections site leaders need to give extra focus to during specific times in the rollout of the program.

- Three to 6 months before full-scale implementation: We recommend that site leads center most of their attention during the early stages on sections I, II, and III. These sections focus on how to use the guide, essential first steps, and planning for rollout.

- One to 3 months before full-scale implementation: As site leaders solidify their time line and local support for the project, they can move into reading sections IV, V, VI, and VII, which focus on the curriculum, handoff observations, and the printed handoff document.
- One to 2 months before full-scale implementation: As site leaders begin baseline data collection and after the official go-live of the I-PASS Handoff Program, they can move on to sections VIII and IX, which focus on the I-PASS campaign and how to gain the support of I-PASS champions.
- At the start of full-scale implementation and throughout the project: As site leaders move into the go-live of the program, they can then spend time with section X, which focuses on how to handle resistance and challenges to sustainability. Finally, during this time, site leaders should specifically pay attention to sections XI and XII, which focus on how to continue to improve the handoff process and spread it to other specialties, departments, or divisions at their institution.

#### Overview of the Curricular Materials

Below is an overview of the materials included in this module:

1. Appendices A (PDF format) and B (Word format): SHM I-PASS Mentored Implementation Guide.
  - This 88-page implementation guide is the main reference for all aspects of the I-PASS Mentored Implementation Handoff Curriculum and includes detailed instructions and guidance on the following critical elements of the implementation of the curriculum at a site:
    - Establishing institutional support.
    - Conducting a needs assessment of current handoff practices and goals for implementation of the program.
    - Planning for the high-quality implementation of the I-PASS Handoff Curriculum for various learner groups.
    - Engaging I-PASS champions for live observation of handoffs.
    - Creating effective systems to collect data and reliable metrics on how to measure the impact of the implementation of the I-PASS Mentored Implementation Program.
    - Revising existing computerized and/or written handoff tools.
    - Implementing a visual campaign.
    - Utilizing strategies to sustain the I-PASS Mentored Implementation Program and motivate I-PASS champions over time.
    - Appendices in the implementation guide include the following:
      - I-PASS needs assessment survey;
      - I-PASS implementation steps time line and delegation tool;
      - I-PASS handoff assessment tools (giver, receiver, and printed handoff tools);
      - I-PASS Handoff Program surveys for frontline providers and site champions;
      - I-PASS PDSA (plan, do, study, act) cycle worksheet;
      - I-PASS workshop evaluation forms (frontline provider and I-PASS champion workshops); and
      - I-PASS communication plan worksheet.
2. Appendix C: I-PASS Training and Implementation Materials Tips and Tricks for Success.
  - This short reference contains instructions on what needs to be done prior to, during, and following the various training workshops for frontline providers, champions, and key stakeholders.
  - The focused details include instructions on accessing videos that are part of the training, ensuring adequate audiovisual resources for training sessions, how to print off and collate handouts for the training sessions, and obtaining feedback from the various learners following training. These instructions are meant to be a companion to the information contained in the I-PASS Mentored Implementation Guide.
3. Appendix D: I-PASS Handoff Program Implementation Steps.
  - This document compiles the essential implementation steps at the end of each section of the implementation guide. Having all of the steps together in a single document makes it very easy for those implementing the program to print off a copy and track their progress.

## Evaluation of the Module

We evaluated the impact of this module through various mechanisms. We tracked the number of SHM I-PASS sites that used the implementation guide as part of the SHM I-PASS program, as well as monthly calls between the SHM I-PASS Mentored Implementation Program certified mentors and their assigned site leads. Material from the implementation guide, including content from all the sections and appendices as well as the implementation steps, was always reviewed during these calls. We also surveyed sites at the completion of their time in the SHM I-PASS project as to the quality of the material in the implementation guide, which times during the rollout of the program they used the guide most, which sections they felt were most helpful, and who at their site they shared the guide with during the implementation period.

## Results

Since the release of the original I-PASS Handoff Curriculum in 2012, initially on the I-PASS Study website<sup>19</sup> and then on *MedEdPORTAL*, there has been an impressive amount of requests for and dissemination of the curriculum across the globe. Roughly 9,608 individuals have been trained as participants in the original I-PASS Study and the first wave of 16 sites from the I-PASS Mentored Implementation Program. Countless others have been trained at institutions across the globe as a result of the curriculum requests from the I-PASS Study website and *MedEdPORTAL*.

For the SHM I-PASS Mentored Implementation Program, 32 sites utilized the implementation guide as a critical resource for the rollout of the I-PASS program. A list of these sites and the specialties in which they implemented I-PASS is detailed in the [Table](#). On surveys sent to all of the sites at the completion of the project, 85% of respondents ( $N = 34$ ) rated the quality of the information and layout of the implementation guide as very good/excellent.

**Table.** Sites Utilizing the I-PASS Mentored Implementation Guide as Part of Their Implementation of the I-PASS Handoff Program

Wave 1 Sites	Wave 2 Sites
Pediatrics	Pediatrics
Arkansas Children's Hospital	Johns Hopkins, Baltimore
Children's Hospital of Michigan	Children's National Hospital, Washington, DC
Levine Children's Hospital	Toledo Children's Hospital <sup>a</sup>
	Sanford Children's Hospital, South Dakota
	Children's Hospital Montefiore
	Children's Hospital Colorado
	Medical University of South Carolina
	The Children's Hospital of Philadelphia
	Children's Mercy, Kansas City
Internal medicine	Internal medicine
Boston Medical Center	Sparrow Hospital/Michigan State University <sup>a</sup>
Brigham and Women's Hospital	AtlantiCare, New Jersey <sup>a</sup>
Intermountain Medical Center <sup>a</sup>	Lankenau Medical Center <sup>a</sup>
Maimonides Medical Center <sup>a</sup>	HackensackUMC Mountainside <sup>a</sup>
New York Hospital, Queens <sup>a</sup>	New Hanover Regional Medical Center <sup>a</sup>
Sunnybrook Health Sciences Centre, Ontario	Gwinnett Medical Center, Georgia <sup>a</sup>
University of California, San Diego/University of California Medical Center	
University of Cincinnati Medical Center	
Mix/other specialties	Mix/other specialties
Hurley Medical Center (pediatrics, internal medicine-pediatrics, internal medicine, OB/GYN) <sup>a</sup>	University of New Mexico (pediatrics, internal medicine, family medicine)
Mayo Clinic (pediatrics, internal medicine)	
Trident Medical Center, South Carolina (family medicine) <sup>a</sup>	
University of Hawaii, John A. Burns School of Medicine (all GME programs)	
Virginia Commonwealth University (all GME programs)	

Abbreviation: GME, graduate medical education.

<sup>a</sup>Community hospital-based residency programs.

As part of the SHM I-PASS Mentored Implementation Program, each site was assigned a trained I-PASS expert who served as the site leads' mentor and assisted in guiding them through the rollout of the I-PASS program. The I-PASS mentors and site leads communicated once to twice per month on mentor calls that typically lasted 1 hour. The content of the I-PASS Mentored Implementation Guide was used to guide 477 hours of conversation between the site leads and their assigned SHM I-PASS mentors from 2015-2017 (see below). In addition, the content was heavily referenced during quarterly learning collaborative calls, which were attended by all of the active sites, their I-PASS mentors, and leaders of the SHM I-PASS Mentored Implementation Program.

- Mentor-mentee calls during waves 1 and 2 (2015-2017): 477 calls between site leads and primary mentors (each call 1 hour in length).
  - Four hundred seventy-seven hours of mentoring discussion focused on each site's specific implementation, during which content in the implementation guide was discussed and mentors referred to sections of the guide.
- Quarterly learning collaborative calls (2015-2017): four 1-hour calls during each wave, for a total of 8 hours across waves 1 and 2.
  - All site leads and primary mentors attended.
  - Updates on the project were discussed, and various sites presented their implementation challenges and successes; this information was used to inform edits to the implementation guide.

A sample of key illustrative comments from the site leads in response to questions about which times during the rollout of the program they used the guide the most, which sections they felt were most helpful, and who at their site they shared the guide with during the implementation period follows. These comments can serve as helpful guidance to those looking to implement this program at their home institution.

- At which times during the rollout of the I-PASS program at your site did you use the guide most often?
  - "We referenced the guide the most during the initial stages of implementation, before we even trained our first Front-line Provider or Champion. We wanted to make sure we had all the appropriate steps completed, including contacting all necessary stake holders so that they were aware of the program. The guide also helped us set a timeline and determine the best time for the official go-live date."
  - "The sections on maintenance and improvement were of particular importance after the go-live. We would use the guide to help facilitate PDSA cycles."
  - "As a site leader, I went through the guide before meeting with the institutional leadership to make a case for IPASS. It helped me get a clear understanding of how we will get from point A to point D, but also what points B and C, on the way, will be. The guide was also a great resource anytime our IPASS champions had questions or when the residents wanted an example of process mapping for the hand off process."
  - "In the beginning, while establishing the core team, and getting through the 'Essential First Steps.' Used it heavily again in establishing a timeline."
- Which sections of the guide did you reference most during your implementation of I-PASS?
  - "The key implementation steps were particularly helpful, for they gave us a to do list and a time frame. It was also great to see example of certain elements (i.e. process maps, observations forms) all in one place."
  - "I personally read through most of the whole guide in the first couple of months of the implementation. To understand the background, I read section I. I feel that I read and referenced sections II-IV the most in the beginning of our implementation."
  - "I reviewed chapters II (essential first steps) and III (assessing local environment) in my role as site lead, for my home institution."
  - "The appendices; Appendix B (timeline tool) early in implementation; the later appendices during mid-implementation; mostly for the evaluation forms; and the tail end 'How do you know if you've made a difference,' towards the end."
- Who did you share this guide with at your site?
  - "We did not share the entire guide with anyone at our site but certain sections (handoff process maps, organizational chart, etc.) were shared with our Champions."
  - "I shared the guide with my core IPASS team, especially my patient safety officer, MOC lead, some other key faculty members that helped with the project."
  - "Yes, with our I-PASS Champions, faculty hospitalists, and Chief Residents."
  - "Shared it with other programs; specifically, Family Medicine and Internal Medicine for they were considering Implementation."

## Discussion

The development of this resource reflects 6 years of experience and collaboration between medical educators, health services research, experts in quality improvement and patient safety, and the SHM to develop an evidence-based handoff curriculum to improve patient safety that can be easily implemented in a variety of health care institutions and specialties. Developed for the original I-PASS Study and refined and tested during the SHM I-PASS

Mentored Implementation Program, the I-PASS Mentored Implementation Guide has been noted by the site leads from 32 mentored implementation sites to be an invaluable resource during their implementation. We believe the implementation guide is the key element that links together all of the other elements of the I-PASS Handoff Program and serves to guide successful implementation of this robust program of culture change.

Having an extensive, detailed guidebook allows individuals leading the implementation of the I-PASS Handoff Program to review it at their own pace and easily share it with others as needed. Because the guide is well organized, readers can easily focus on key sections at different times in their implementation of the program and can return to those sections as needed. The charts, diagrams, and text are also a benefit to visual and read-write learners. Site leaders from the 32 SHM I-PASS Mentored Implementation Program sites also noted the benefit of the key implementation steps following each section in the guide; these steps provided them with deliverables at each stage of their rollout, as well as offering access to example process maps, PDSA forms, and organizational charts that they could easily replicate.

The site leaders from the SHM I-PASS Mentored Implementation Program did note a few limitations to the guide. Those limitations include the following:

- The length of the guide was intimidating at first (however, all site leaders noted that they did not feel anything could be removed from the guide).
- The guide was only available as a PDF, and therefore, the site leaders were unable to easily extract some of the information in its tables, diagrams, and appendices to be adapted for their individual sites.
- The PDF version of the guide did not have links to I-PASS curricular elements that were available online.

We recognize these limitations, and during the revision process of the guide between waves 1 and 2 of the project, we made efforts to make the guide as user-friendly as possible, including increasing bolding and prominence of various important sections and making the Word versions of appendices easily available to the site leads through other sources to allow for easy adaptation. We also note that our evaluation of the impact of the guide was limited by the scope of the entire SHM I-PASS Mentored Implementation Program. Evaluation of the guide was secondary to the vast amount of data collected for other aspects of the program. Evaluation of the implementation guide was also limited by a lack of cognitive interviewing and formal usability evaluation. We also recognize that there are sections of the guide that may be overwhelming to readers, including the sections on the curriculum and process mapping. We therefore recommend setting aside ample time when reviewing the guide.

In closing, we believe the I-PASS Mentored Implementation Guide is the centerpiece of the extensive I-PASS Mentored Implementation Program. It is a direct result of over 6 years of experience implementing the program at countless institutions and training thousands of learners. The guide contains a wealth of information, including how to engender local support for the program, provide training to various providers, address workflow and printed handoff documents, measure the effectiveness of the program through validated data-collection tools, adapt for the local environment through quality improvement efforts, and sustain the intervention over the long term. We hope these implementation materials will help improve the rollout of the I-PASS Mentored Implementation Program at countless sites in the future.

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#### Informed Consent

All identifiable persons in this resource have granted their permission.

#### Ethical Approval

Boston Children's Hospital Institutional Review Board approved this study.

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#### References

1. Landrigan C. The handoff: a critical point of vulnerability. *Forum*. 2007;25(1):6-7.
2. The Joint Commission. Improving hand-off communications: meeting National Patient Safety Goal 2E. *Jt Comm Perspect Patient Saf*. 2006;6(8):9-15.
3. Accreditation Council for Graduate Medical Education. ACGME common program requirements. Accreditation Council for Graduate Medical Education website. [http://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRs\\_2017-07-01.pdf](http://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRs_2017-07-01.pdf). Accessed May 24, 2018.
4. *Core Entrustable Professional Activities for Entering Residency: Curriculum Developer's Guide*. Washington, DC: Association of American Medical Colleges; 2014.
5. Gordon M, Hill E, Stojan JN, Daniel M. Educational interventions to improve handover in health care: an updated systematic review [published online ahead of print April 3, 2018]. *Acad Med*. <https://doi.org/10.1097/ACM.0000000000002236>
6. Starmer AJ, O'Toole JK, Rosenbluth G, et al; for I-Pass Study Education Executive Committee. Development, implementation, and dissemination of the I-PASS Handoff Curriculum: a multisite educational intervention to improve patient handoffs. *Acad Med*. 2014;89(6):876-884. <https://doi.org/10.1097/ACM.0000000000000264>
7. Kern DE, Thomas PA, Hughes MT, eds. *Curriculum Development for Medical Education: A Six-Step Approach*. 2nd ed. Baltimore, MD: Johns Hopkins University Press; 2009.
8. Calaman S, Spector ND, Starmer AJ, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: computer module. *MedEdPORTAL*. 2013;9:9337. [https://doi.org/10.15766/mep\\_2374-8265.9337](https://doi.org/10.15766/mep_2374-8265.9337)
9. Calaman S, Hepps J, Spector ND, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: handoff simulation exercises. *MedEdPORTAL*. 2013;9:9402. [https://doi.org/10.15766/mep\\_2374-8265.9402](https://doi.org/10.15766/mep_2374-8265.9402)
10. O'Toole J, Sectish T, Starmer AJ, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: faculty development resources. *MedEdPORTAL*. 2013;9:9540. [https://doi.org/10.15766/mep\\_2374-8265.9540](https://doi.org/10.15766/mep_2374-8265.9540)
11. O'Toole J, Calaman S, Everhart J, et al. I-PASS Handoff Curriculum: medical student workshop. *MedEdPORTAL*. 2014;10:9854. [https://doi.org/10.15766/mep\\_2374-8265.9854](https://doi.org/10.15766/mep_2374-8265.9854)
12. Rosenbluth G, Patel SJ, Destino LA, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: campaign toolkit. *MedEdPORTAL*. 2013;9:9397. [https://doi.org/10.15766/mep\\_2374-8265.9397](https://doi.org/10.15766/mep_2374-8265.9397)
13. Spector ND, Starmer AJ, Allen AD, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: core resident workshop. *MedEdPORTAL*. 2013;9:9311. [https://doi.org/10.15766/mep\\_2374-8265.9311](https://doi.org/10.15766/mep_2374-8265.9311)
14. Starmer AJ, Landrigan C, Srivastava R, et al; I-PASS Education Executive Committee. I-PASS Handoff Curriculum: faculty observation tools. *MedEdPORTAL*. 2013;9:9570. [https://doi.org/10.15766/mep\\_2374-8265.9570](https://doi.org/10.15766/mep_2374-8265.9570)
15. Starmer AJ, Sectish TC, Simon DW, et al. Rates of medical errors and preventable adverse events among hospitalized children following implementation of a resident handoff bundle. *JAMA*. 2013;310(21):2262-2270. <https://doi.org/10.1001/jama.2013.281961>
16. Sectish TC, Starmer AJ, Landrigan CP, Spector ND; I-PASS Study Group. Establishing a multisite education and research project requires leadership, expertise, collaboration, and an important aim. *Pediatrics*. 2010;126(4):619-622. <https://doi.org/10.1542/peds.2010-1793>
17. Starmer AJ, Spector ND, Srivastava R, et al; for I-PASS Study Group. Changes in medical errors after implementation of a handoff program. *N Engl J Med*. 2014;371(19):1803-1812. <https://doi.org/10.1056/NEJMsa1405556>

18. Society of Hospital Medicine's mentored implementation for quality improvement. Society of Hospital Medicine website. [http://www.hospitalmedicine.org/Web/Quality\\_Innovation/SHM\\_Signature\\_Programs/Mentored\\_Implementation/Web/Quality\\_\\_\\_Innovation/Mentored\\_Implementation/Landing\\_Page.aspx?hkey=29e55d16-7fb3-4b82-8e4d-1636ffc44695](http://www.hospitalmedicine.org/Web/Quality_Innovation/SHM_Signature_Programs/Mentored_Implementation/Web/Quality___Innovation/Mentored_Implementation/Landing_Page.aspx?hkey=29e55d16-7fb3-4b82-8e4d-1636ffc44695). Accessed July 5, 2016.
  19. I-PASS Study Group website. <http://ipasstudygroup.com/>. Accessed May 24, 2017.
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