

Real-World Implementation of a Standardized Handover Program (I-PASS) on a Pediatric Clinical Teaching Unit

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Received for publication October 1, 2015; accepted May 7, 2016.

ABSTRACT

OBJECTIVE: A standardized handover curriculum (I-PASS) has been shown to reduce preventable adverse events in a large multicenter study. We aimed to study the real-world impact of the implementation of this curriculum on handover quality, duration, and identification of unstable patients.

METHODS: A prospective intervention study was conducted. We implemented the I-PASS curriculum via faculty education and resident workshops. Resident handover on the clinical teaching unit was videorecorded, and written handover documents were collected for 2 weeks before and after the intervention. We examined the inclusion of key elements on handover documents before and after intervention using logistic regression models accounting for multiple handovers per patient. Duration of handover was compared using a linear regression model adjusting for number of patients. Qualitative content analysis was used to describe observable differences in verbal handover recordings and written critical care consultations.

RESULTS: A total of 1275 handovers were included, comprising 364 inpatients. There was a significant increase

($P < .05$) in 7 of 11 key elements and a significant decrease in written physical examination findings after the intervention. No significant change was found in handover duration. Qualitative video analysis revealed observable differences in handover collaboration and organization. After the intervention, patients with critical care needs overnight were correctly identified as requiring close monitoring during handover.

CONCLUSIONS: Handover training resulted in consistent inclusion of key elements and was characterized by collaboration between participants and improved organization without significant increase in handover duration. Appropriate identification and response to clinically deteriorating patients was also found using the I-PASS model.

KEYWORDS: handoff; handover; pediatrics; residency education; transitions in care

ACADEMIC PEDIATRICS 2016;16:532–539

WHAT'S NEW

This study describes a pediatric center's experience implementing a handover curriculum associated with collaborative dialogue in the form of advocacy and teaching, and organized structure. It provides insight into trainees' ability to appropriately identify and respond to clinically deteriorating patients based on prospective handover content.

HANDOVER, OR THE transfer of responsibility of a patient's care, is vulnerable to miscommunication and medical error.^{1,2} Yet physician trainees receive little formal education on handover skills and standardized communication of clinical information.^{2–6}

Handover is a teachable skill that has the potential to affect patient care. The ability to safely transfer care through verbal and written communication has been

recognized as an essential physician competency by the Royal College of Physicians and Surgeons of Canada,⁷ and the Accreditation Council for Graduate Medical Education requires that residents receive dedicated training in handover communication.⁸ A number of tools or mnemonics have been developed in an attempt to standardize information transfer, as outlined in systematic reviews.^{2,9,10} There is little evidence to suggest that one tool may be more beneficial than another; thus, studies showing improvement in clinical outcomes have been sought.²

Implementation of a handover “bundle” was shown to be associated with a significant reduction in medical errors on the clinical teaching unit in a recent multicenter North American study.¹¹ The bundle of interventions included team communication training, use of the mnemonic I-PASS, and standardization of handover documentation. Given the potential for I-PASS training to improve communication and patient care, we sought to implement the

curriculum in our institution. The original I-PASS study was conducted in 9 tertiary-care centers with extensive resources available for simulation training, small faculty-to-resident ratios, and close monitoring and assessment of handover. It is unclear whether implementing the handover bundle in a clinical teaching unit without these dedicated resources will result in improved communication similar to the formal I-PASS study. As more centers seek to institute standardized handover, insight into real-world application of I-PASS will be highly relevant.

I-PASS training teaches residents to identify a patient's level of illness severity, in addition to highlighting specific actions to be taken overnight and contingency planning for changes in clinical status. To our knowledge, there is no previous study showing whether this training results in appropriate identification of unstable patients during handover, preparing cross-covering residents to monitor these patients closely and provide timely management.

Our main research questions were as follows:

1. How does the I-PASS curriculum impact the quality of verbal and written communication during handover?
2. Does using the I-PASS format for verbal handover increase handover duration in real-world implementation?
3. Are patients with potential for clinical deterioration appropriately identified during handover before and after implementation of the I-PASS curriculum?

METHODS

SETTING AND BACKGROUND

This study was conducted on 3 general pediatrics inpatient wards at an academic tertiary-care institution in Ottawa, Ontario, Canada, from January to February 2014.

In our center, a cross-covering senior resident provides overnight coverage for all inpatient wards. This "night float" resident receives 3 separate team handovers from the respective ward senior residents in the late afternoon. A written handover document, manually updated by multiple residents throughout the day on a word processor, is provided with in-person verbal handover. In the preintervention period, senior residents completed handover without a standardized tool or previous residency training on handover communication.

The I-PASS curriculum materials, which are publicly available by request, were accessed through the study Web site (<http://www.ipasshandoffstudy.com>). The original curriculum, as described by Starmer et al,¹² was modified on the basis of resource limitations in our center, particularly a lack of access to the recommended degree of faculty support for coaching, observation, and training. We adapted the faculty development to include fellows and senior residents as facilitators, used a larger facilitator-to-trainee ratio (1 facilitator overseeing 3 groups of trainees, vs a dedicated faculty member per group), and eliminated a team activity to allow feasibility of the training program. Members of the research team (KH, KB, and KP) led a 90-minute facilitator development

session and a 3-hour core resident workshop with simulation exercises. Our center hosted hospital-wide grand rounds emphasizing handover communication failures as a patient safety issue and launched a promotional campaign with lanyard cards and posters. I-PASS-trained faculty members provided real-time observation and feedback to residents on each ward twice a week during the study period. The written handover document was reformatted according to the I-PASS mnemonic: illness severity, patient summary, action list, situation awareness and contingency planning, and synthesis by receiver.¹³

In our center, a critical care response team (CCRT) comprising an intensive care nurse, respiratory therapist, and physician can be called for urgent inpatient consultation if a patient's clinical status deteriorates, requiring rapid intervention. A CCRT record is written and added to the patient's chart outlining the team's assessment and recommendations for management.

STUDY DESIGN

This prospective intervention study was composed of quantitative and qualitative components in pre and post phases. I-PASS resident training was delivered during one academic half-day. Data were collected daily for 2 weeks immediately before and after the intervention, excluding weekends.

Copies of the written handover documents were collected on each inpatient ward. Late afternoon handover from the ward senior resident to the night float senior resident on each inpatient ward was videorecorded and timed. All CCRT records during the pre- and postintervention periods were collected and reviewed. We excluded records for all inpatients who were not included in the ward handover, as well as all daytime consultations while under the primary team's care. For all remaining records, we extracted the previous afternoon's written handover entry for analysis.

This study was approved by the Children's Hospital of Eastern Ontario institutional research ethics board. Written informed consent was obtained from all observed residents. No financial incentives were provided for any part of the study.

DATA ANALYSIS

QUANTITATIVE ANALYSIS

Study data were managed using REDCap (Research Electronic Data Capture), a secure, Web-based application designed to support data capture for research studies.¹⁴ All statistical analyses were conducted by SPSS 23.0 (IBM SPSS, Chicago, Ill) and R 3.0.2 (R Foundation for Statistical Computing, Vienna, Austria).

Handover entries.—To examine written handover quality, rates of omission of 11 data elements identified in previous studies to be important components of written handover were compared.¹⁵ A physician investigator (KH) and medical education researcher (FH) independently reviewed a sample of 10 ward handover documents to ensure consistent identification (>90% agreement) of

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