



## Gap #1: Transitions in Care

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Children's Hospital

*June 9, 2016*

# Mind the Gaps

crico

# Inpatient Transitions of Care

The average 500-bed hospital **loses \$4M/yr** as the result of communication inefficiencies

*(j healthcare management)*

**80% of serious medical errors** involve miscommunication between caregivers during patient transfers

*(joint commission ctr for transforming healthcare)*



# 44% of communication cases occurred in the inpatient setting

65% of those cases involved communication issues **among providers**

- Nursing
- OB/Gyn
- General Surgery
- Orthopedics
- General Medicine

45% of those cases involved communication **between a provider and the patient/family**

- OB/Gyn
- Orthopedics
- Nursing
- General Surgery
- General Medicine

(10% of cases involved both)



19% of cases with a provider-patient/family communication event resulted in a high-severity injury

**Key provider-patient factors:**

- Poor rapport or unsympathetic responses to patient concerns
- Inadequate informed consent
- Inadequate education (e.g., medication management, discharge teaching)



# 41% of cases with a provider-provider communication event resulted in a high-severity injury

## Key provider-provider factors:

- Lack of communication re: patient clinical status
- Lack of role clarity
- Hierarchical and team barriers
- Failure to document *and* read record





# Addressing Communication Gaps in Transitions of Care

*CRICO*

*Mind the Gaps Symposium : Avoiding the Risks of  
Communication Failures in Patient Care*

*June 9, 2016*

**Christopher P. Landrigan, M.D., M.P.H.**

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Director, Sleep and Patient Safety Program, Brigham and Women's Hospital

Associate Professor of Pediatrics and Medicine, Harvard Medical School

Principal Investigator, I-PASS Study Group

# Disclosures

- Dr. Landrigan has consulted with multiple academic medical centers regarding work schedule design and handoff programs, through the I-PASS Institute
- Dr. Landrigan has consulted with Virgin Pulse on development of a Sleep Health program, and has served as an expert witness in cases regarding sleep deprivation and safety
- The presentation will not involve discussion of unapproved or off-label, experimental or investigational use
- The presentation will show copyrighted materials for which permission has been obtained from Boston Children's Hospital and the I-PASS Study Group

# Objectives

- Describe the role of communication failures in medical errors and preventable adverse events
- Articulate the need for high quality patient handoffs to reduce the likelihood of communication failures
- Describe the implementation of the evidence-based I-PASS handoff bundle and its impact on medical errors and patient safety





# Background

**Duty Hours, Patient Safety & Handoffs**

# Patient Safety in the U.S.:

## Ongoing Problems

Institute of Medicine, 1999

- *44,000-98,000 deaths per year due to adverse events*

Office of the Inspector General, 2010

- *180,000 deaths per year due to adverse events*

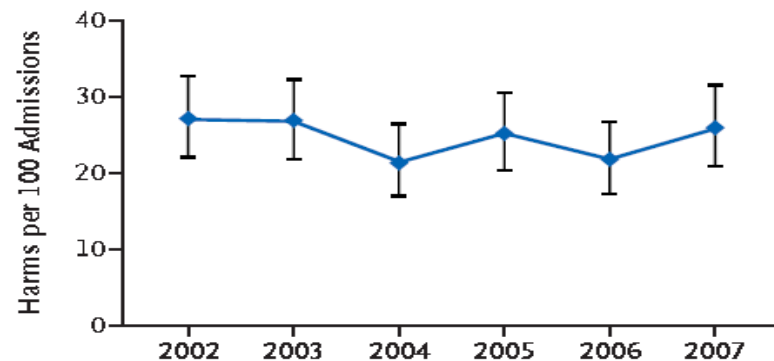
Makary et al, BMJ, 2016

- *251,000 U.S. deaths per year due to medical error*
- ***3<sup>rd</sup> leading cause of death***

North Carolina Pt Safety Study

- 2341 randomly selected admissions from ten randomly selected hospitals statewide

A Internal Reviewers, All Harms



Landrigan et al., NEJM 2010: 363:2124-34

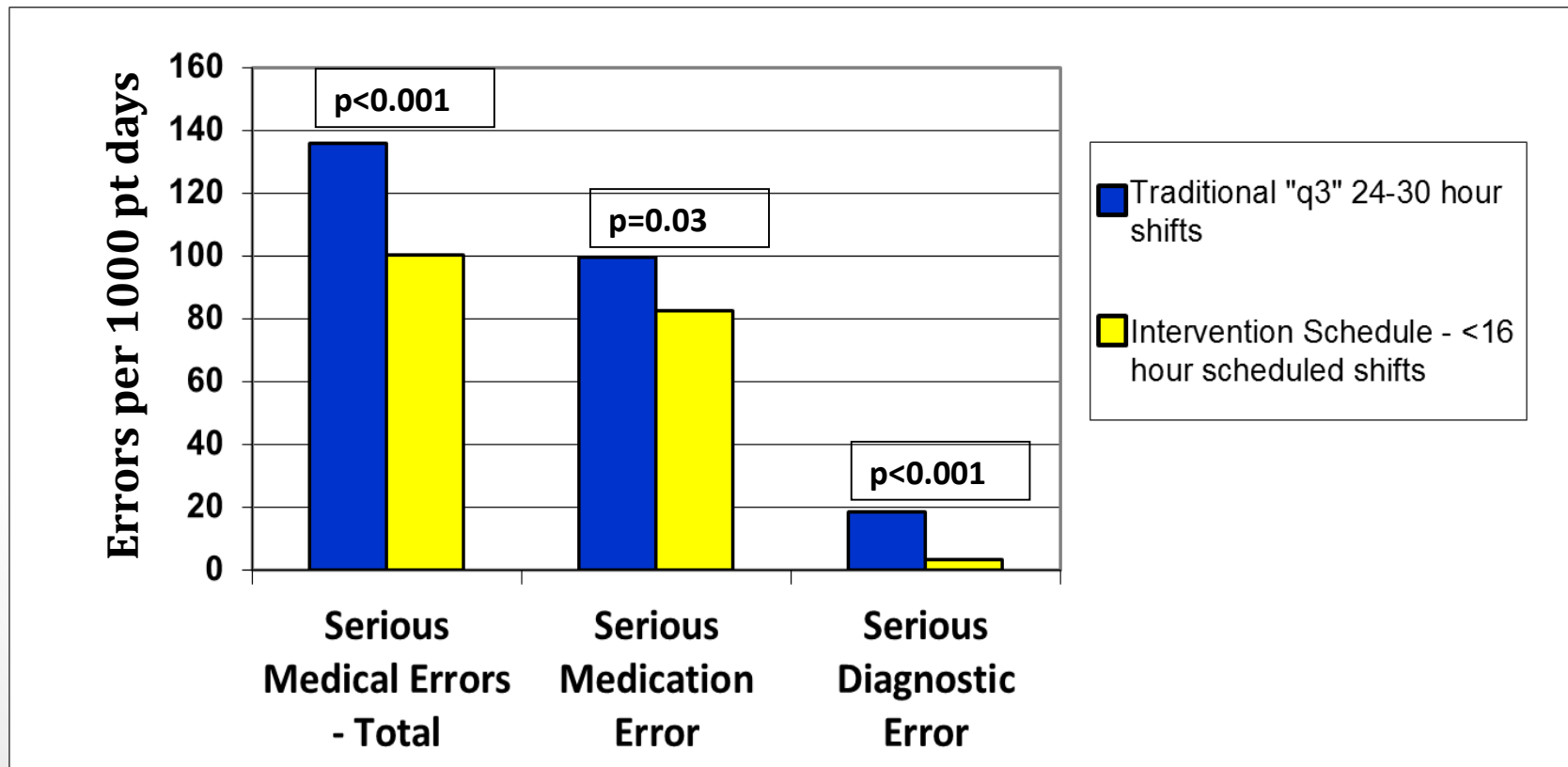
# Advances in Patient Safety

- Progress reducing specific types of adverse events
  - Catheter related bloodstream infections
    - Pronovost et al
  - Surgical Safety Checklists
    - Gawande et al



# Intern Sleep and Patient Safety Study

Randomized Controlled Trial of extended shifts (24-30h) vs. 16h limit



Landrigan. NEJM 2004; 351: 1838-1848

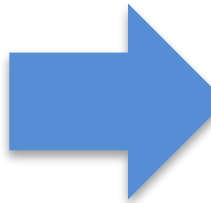
# 2011 ACGME Duty Hour Standards

- Imposed 16h consecutive work limit for interns
- Allowed PGY2s and higher continue to work 24h shifts
  - Plus an additional 4h to transfer care
- Required programs to
  - Ensure and monitor structured handoff processes
  - Teach resident handoff skills and ensure competence



[http://www.acgme.org/acWebsite/home/Common\\_Program\\_Requirements\\_0701\\_2011.pdf](http://www.acgme.org/acWebsite/home/Common_Program_Requirements_0701_2011.pdf)

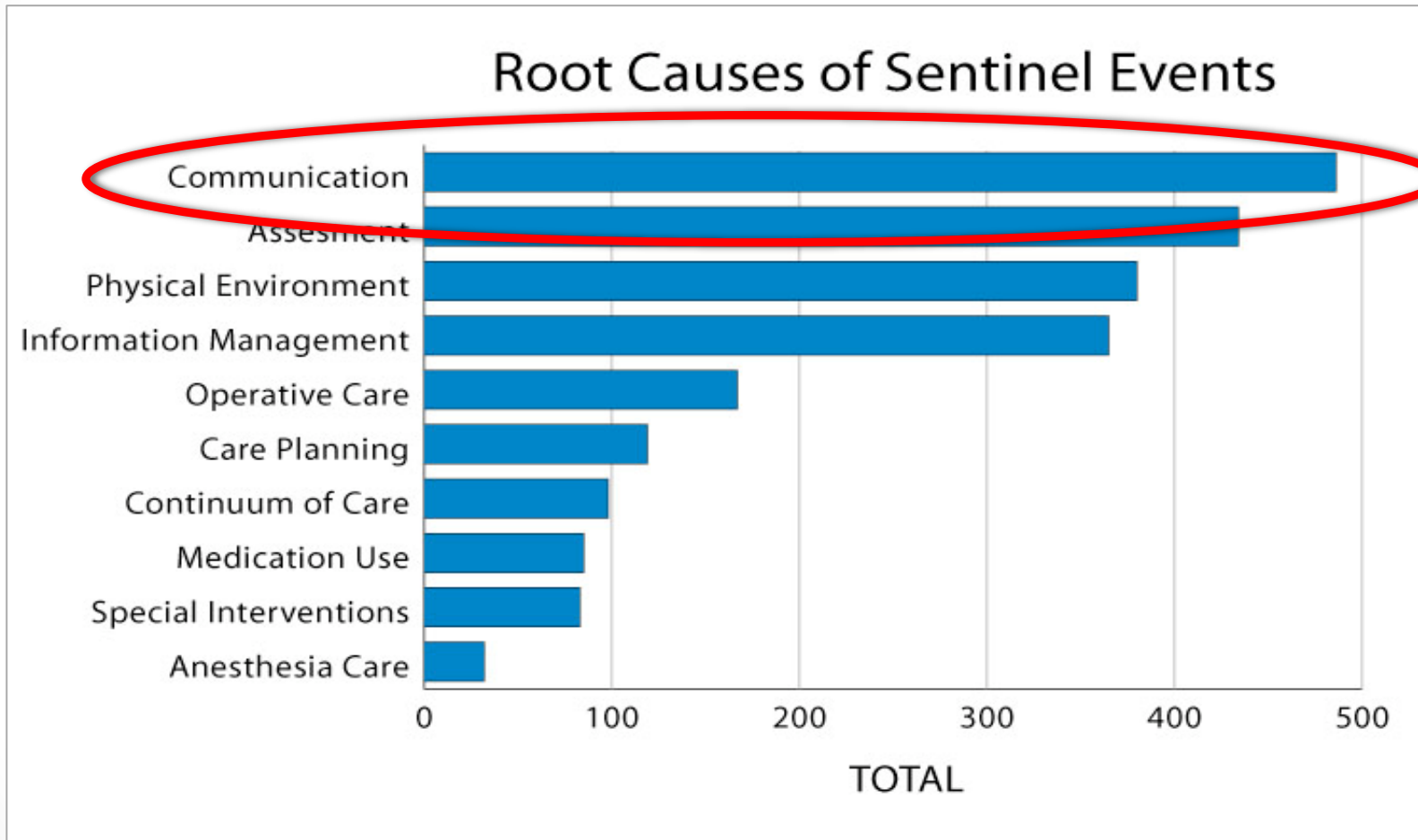
# Consequences of Shorter Shifts



**Shorter  
shifts**

**Increased  
frequency of  
handoffs**

# Communication Failures



Joint Commission. (2011). Sentinel Event Statistics Data - Root Causes by Event Type (2004 - Third Quarter 2011)

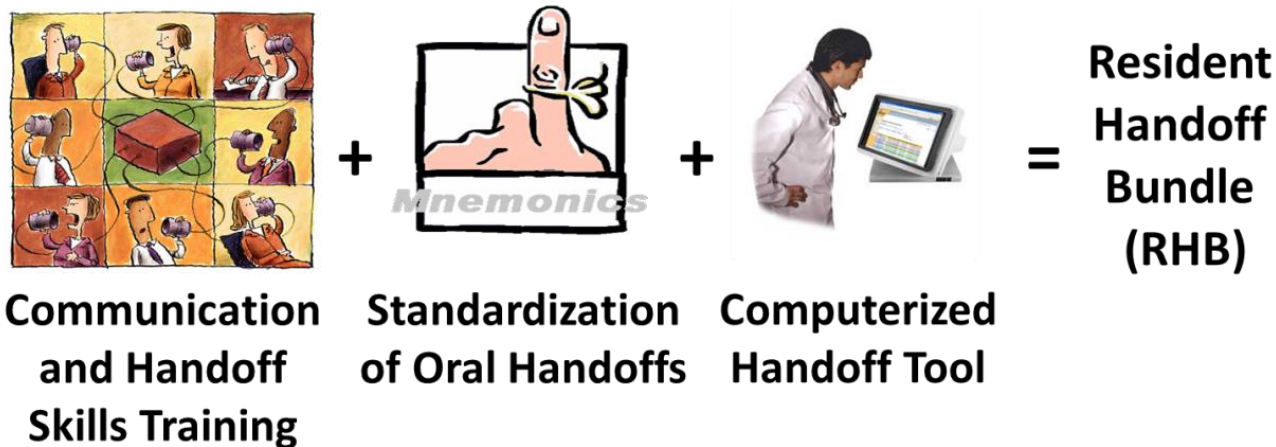


# The I-PASS Pilot Study



# I-PASS Pilot Study

- Boston Children's Hospital in 2009-2010
- Involved the implementation of a resident handoff bundle



Starmer et al. JAMA. 2013 Dec 4;310(21):2262-70.

# Results

## Medical Errors & Preventable Adverse Events

Rates per 100 admissions

	Pre-	Post-	p-value
Medical Errors	33.8	18.3	<0.001
Preventable Adverse Events	3.3	1.5	0.04

Starmer et al. JAMA. 2013 Dec 4;310(21):2262-70.

# Limitations Of The Pilot Study

- Single institution: Unclear generalizability
- Limited ability to control for confounding factors
  - Learning over time
  - Seasonal variation
- Mnemonic (SIGNOUT) not memorable or sustained after research period
- Challenges with sustainability
- Lack of faculty engagement

# Pilot Study → Multisite Study



- Multisite study at 9 Children's Hospitals
- Implemented I-PASS handoff bundle for resident physician change of shift handoffs
- Supported by
  - Initiative for Innovation in Pediatric Education (IIPE)
  - Pediatric Research in Inpatient Settings (PRIS)
- Funded by grant from U.S. Dept of Health and Human Services (ARRA funding) September 2010



# The I-PASS Study

## Educational Intervention

# 6-Step Approach To Curriculum Development



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.

# Challenges To Improving Handoffs

Handoffs are

- Non-standardized processes currently
- Not formally taught
- Variable
  - Institution to institution
  - Within institutions
- Implementing a change in handoff practice is a transformational change

**Starmer AJ et al. Resident Sign-out Practices: Results from a Multisite Needs Assessment. 2011 Association of Pediatric Program Directors Annual Meeting.**

# The I-PASS Mnemonic

<b>I</b>	<b>Illness Severity</b>	<ul style="list-style-type: none"> <li>• Stable, “watcher,” unstable</li> </ul>
<b>P</b>	<b>Patient Summary</b>	<ul style="list-style-type: none"> <li>• Summary statement</li> <li>• Events leading up to admission</li> <li>• Hospital course</li> <li>• Ongoing assessment</li> <li>• Plan</li> </ul>
<b>A</b>	<b>Action List</b>	<ul style="list-style-type: none"> <li>• To do list</li> <li>• Timeline and ownership</li> </ul>
<b>S</b>	<b>Situation Awareness and Contingency Planning</b>	<ul style="list-style-type: none"> <li>• Know what’s going on</li> <li>• Plan for what might happen</li> </ul>
<b>S</b>	<b>Synthesis by Receiver</b>	<ul style="list-style-type: none"> <li>• Receiver summarizes what was heard</li> <li>• Asks questions</li> <li>• Restates key action/to do items</li> </ul>

Starmer. Pediatrics. 2012 Feb;129(2):201-4.



# I – Illness Severity

## A Continuum



- Watcher: Any clinician’s “gut feeling” that a patient is at risk of deterioration or “close to the edge”

# P – Patient Summary

- High quality patient summaries
  - Include a summary statement/one-liner
  - Describe unique features of the patient's presentation
  - Create a shared mental model
  - Facilitate the transfer of information and responsibility
  - Transmit information concisely

# A – Action List

## To Do:



Check respiratory exam now; if still tachypneic get CXR



Monitor withdrawal scores at 5pm; if still high increase Ativan gtt to 3mg/hour



Check ins and outs at midnight; if less than 500mL UOP give 1L



Follow up 6PM electrolytes; if K still low please replace with KCl 40 Meq IVPB

# S – Situation Awareness & Contingency Planning

## Situation Awareness

### Patient level

- “Know what’s going on with your patient”
  - Status of patient’s disease process
  - Team members’ roles in patient’s care
  - Environmental factors
  - Progress toward goals of hospitalization

### Team level

- “Know what is going on around you”
  - Status of patients
  - Team members
  - Environment
  - Progress toward team goals

# S – Situation Awareness & Contingency Planning

## Contingency Planning

- Problem solving before things go wrong



- “If this happens, then . . . .”

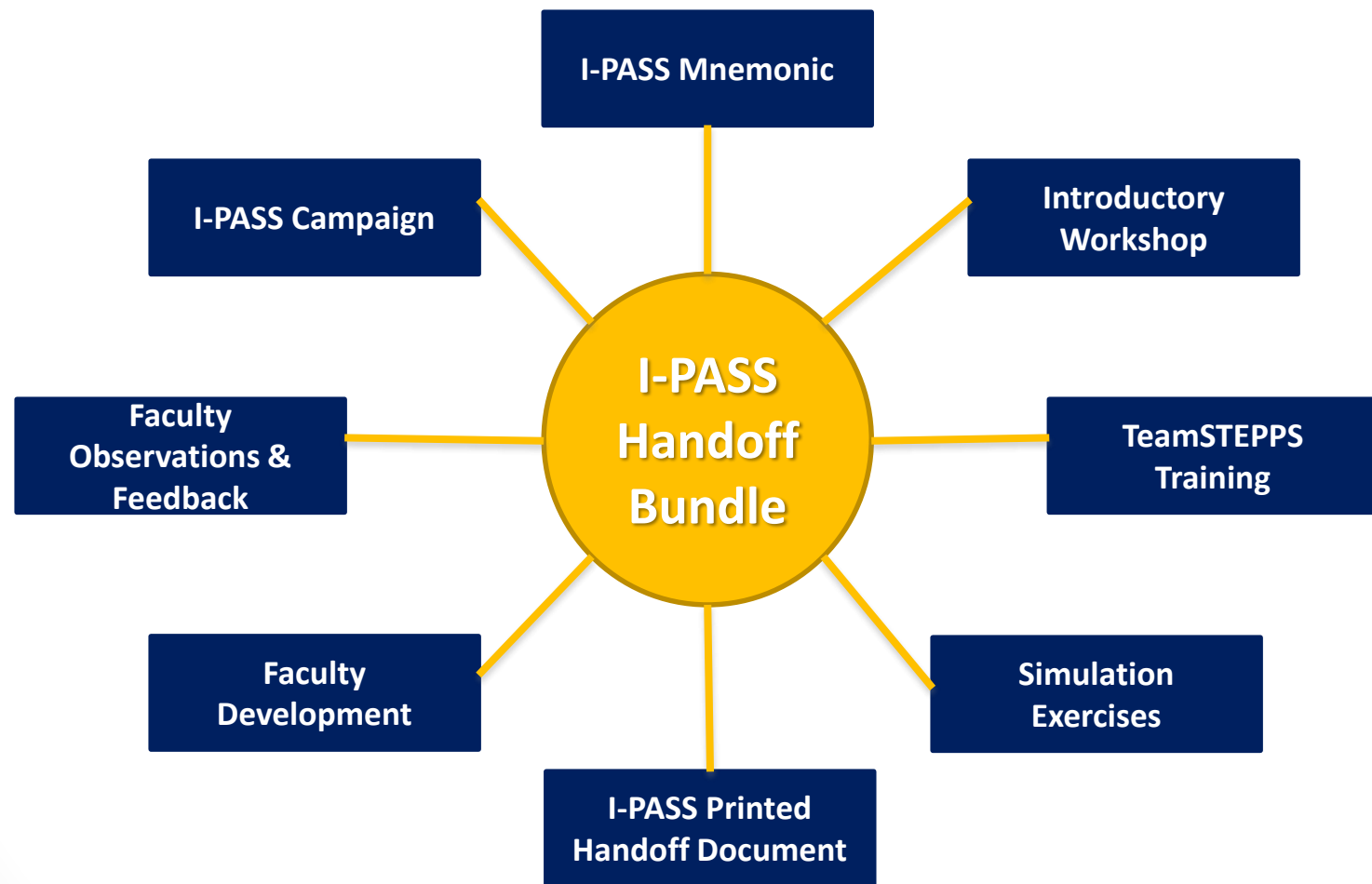
# S – Synthesis By Receiver

- Provides an opportunity for receiver to
  - Clarify elements of handoff
  - Ensure there is a clear understanding
  - Have an active role in handoff process
- Varies in length and content
  - More complex, sicker patients require more detail
  - At times may focus more on action items, contingency planning

It is not a re-stating of entire verbal handoff!

# Intervention: More Than Just A Mnemonic

## I-PASS Handoff Bundle Components



All Handoff Bundle Components Available at [www.ipasshandoffstudy.com](http://www.ipasshandoffstudy.com)

# Core I-PASS Workshop

## 1 Hour Session of Didactic and Interactive Exercises

- **TeamSTEPPS™ training**
  - **Communication skills**
- **Handoff skills training**
  - **Verbal Mnemonic**
  - **Written Handoff Document**

**Followed by**

## 1 Hour Session of Handoff Simulation Exercises

- **3 role play scenarios, allows residents the opportunity give, receive and observe a handoff**
- **Faculty facilitators provide feedback and guide discussion**



# I-PASS Communication Training:

## *TeamSTEPPS™*

Team Strategies and Tools to Enhance Performance  
and Patient Safety

Technique	Function
Brief	Plan team activities
Debrief	Analyze an interim event
Huddle	Solve a problem
Assertive statement	Identify potential errors
Check-back	Ensure accurate information transfer

# I-PASS Faculty Development

## Faculty Are Key To Success!

- Development of “I-PASS Faculty Champions”
  - I-PASS Champions Guide
  - Opportunity for participation at multiple levels
  - Physicians received Maintenance of Certification credit to encourage participation

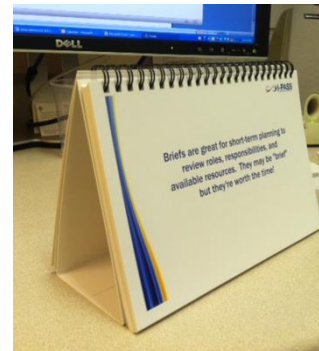
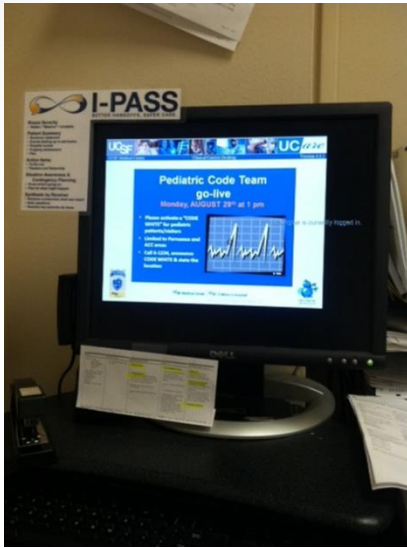
# I-PASS Handoff Assessment Tools


## Development Process

- Expert panel identified key elements of effective handoffs
- Reviewed published literature for examples, items, and rating scales
- Created handoff assessment tool
  - Multiple revisions
  - Pilot tested and further revised
- Generated evidence to demonstrate and confirm tool validity

# I-PASS Campaign Materials

- Study logo
- Posters
- Screen frames
- Pocket cards
- Badge clips
- I-PASS “tips of the day”
- “Just-in-Time” refresher training sessions





**I-PASS**  
BETTER HANDOFFS. SAFER CARE.

<b>I</b>	Illness Severity	<ul style="list-style-type: none"> <li>• Stable</li> <li>• “Watcher”</li> <li>• Unstable</li> </ul>
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**Pediatrics**  
**MD/DO**  
**Resident**





# The I-PASS Study

## Methods & Findings




# I-PASS Study Aims

- To determine if implementation of I-PASS Handoff Bundle is associated with:
  - Reduction in overall error rates and preventable adverse events (primary outcome)
  - Improved written and verbal handoff communication (process outcomes)
  - Change in resident workflow patterns (balancing measure)

# Study Design

General inpatient units at 9 North American pediatric residency training programs

Site Name	2011												2012												2013			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
UCSF	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue										
Stanford	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue										
Washington University						Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue					
Cincinnati						Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue					
Utah						Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue					
St. Christopher's													Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue
National Capital Consortium													Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue
Sick Kids													Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue
OHSU													Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue

-  Pre-intervention data collection
-  I-PASS bundle implementation
-  Post-intervention data collection

# Methods – Primary Outcome

## Measurement Of Error Rates

- Standardized error surveillance methodology
- Study nurse reviews patient charts
  - Medication orders, MAR, progress notes, nursing notes, and discharge summary
  - Hospital incident reports
  - Daily solicited error reports from physicians
- Potential medical errors categorized
  - Two MDs blinded to pre- vs. post- status
  - Severity, preventability, type, non-error



# Methods – Process Outcomes

## Verbal & Written Handoff Miscommunications

- Audio recordings of evening verbal handoffs
  - Random selection of 12 per study period per site
  - Review all patients for presence or absence of 5 key data elements
- Electronic copies of printed handoff documents
  - Random selection of 24 handoff documents per study period per site
  - Review all patients for presence or absence of 9 key data elements

# Methods – Balancing Measures

## Time Motion Study

The image shows a screenshot of a software interface for a time motion study. The interface includes a form for recording observations, with fields for Research assistant, ResID, Subject Type, Location, and Comment. There are buttons for 'Start Observation' and 'Stop Observation'. The main part of the interface is a list of activities, categorized into several groups: Computer - read, Computer - writing, Patient/family contact, Physically looking for, Communication (in person), Education, and Phone. Two yellow callout boxes are overlaid on the screenshot. The first callout box, titled 'Computer - read', lists activities such as Sign out, Patient record, Email, Article, Drug reference, Textbook, Literature search, Search engine, ECG, Radiograph, and Other. The second callout box, titled 'Patient/family contact', lists activities such as Patient history, Casual conversation, Physical exam, Explaining plan, Educating patient, Obtaining consent, Advance directives, IV, Phlebotomy, Other procedure, Unspecified/RA outside room, and Other. A third callout box, titled 'Patient/family contact', lists activities such as Patient history, Casual conversation, Physical exam, Explaining plan, Educating patient, Obtaining consent, Advance directives, IV, Phlebotomy, Other procedure, Unspecified/RA outside room, and Other. The screenshot also shows a 'Morning Rounds' section with 'Start' and 'Stop' buttons, and an 'Evening Signout' section with a 'Start time' field and 'Start' and 'Stop' buttons.

**Computer - read**

- Sign out
- Patient record
- Email
- Article
- Drug reference
- Textbook
- Literature search
- Search engine
- ECG
- Radiograph
- Other

**Computer - writing**

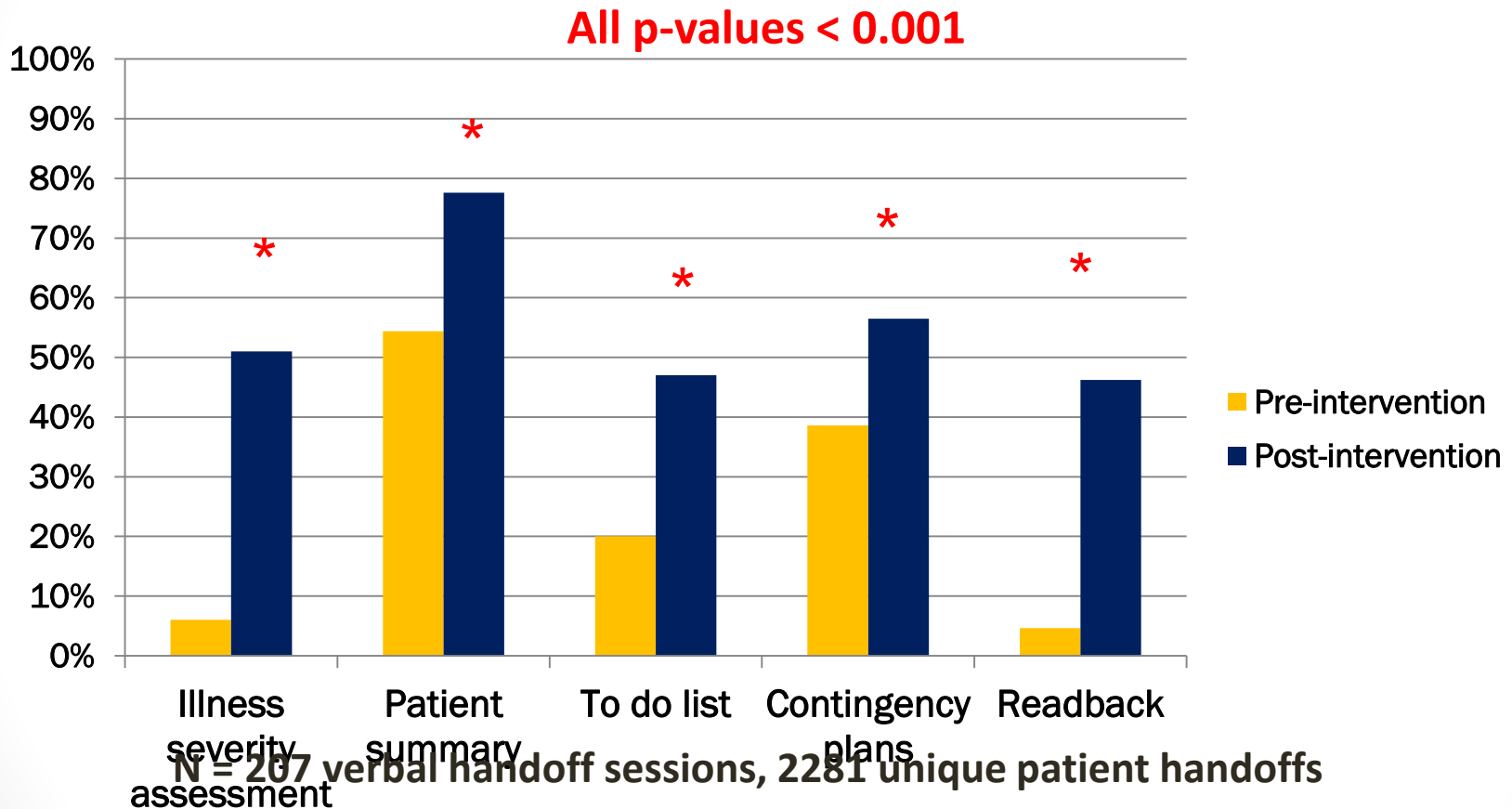
- Sign out (EMR based)
- Sign out (Other)
- Email
- Paging colleague
- History/physical
- Progress note
- Discharge summary
- Order
- Prescription
- Event note
- Incident report
- Consult
- Other

**Patient/family contact**

- Patient history
- Casual conversation
- Physical exam
- Explaining plan
- Educating patient
- Obtaining consent
- Advance directives
- IV
- Phlebotomy
- Other procedure
- Unspecified/RA outside room
- Other

# Results – Process Measures

## % Of Verbal Handoffs With Key Elements Present



Starmer AJ, et al. Changes in Medical Errors After Implementation of a Handoff Program. NEJM.

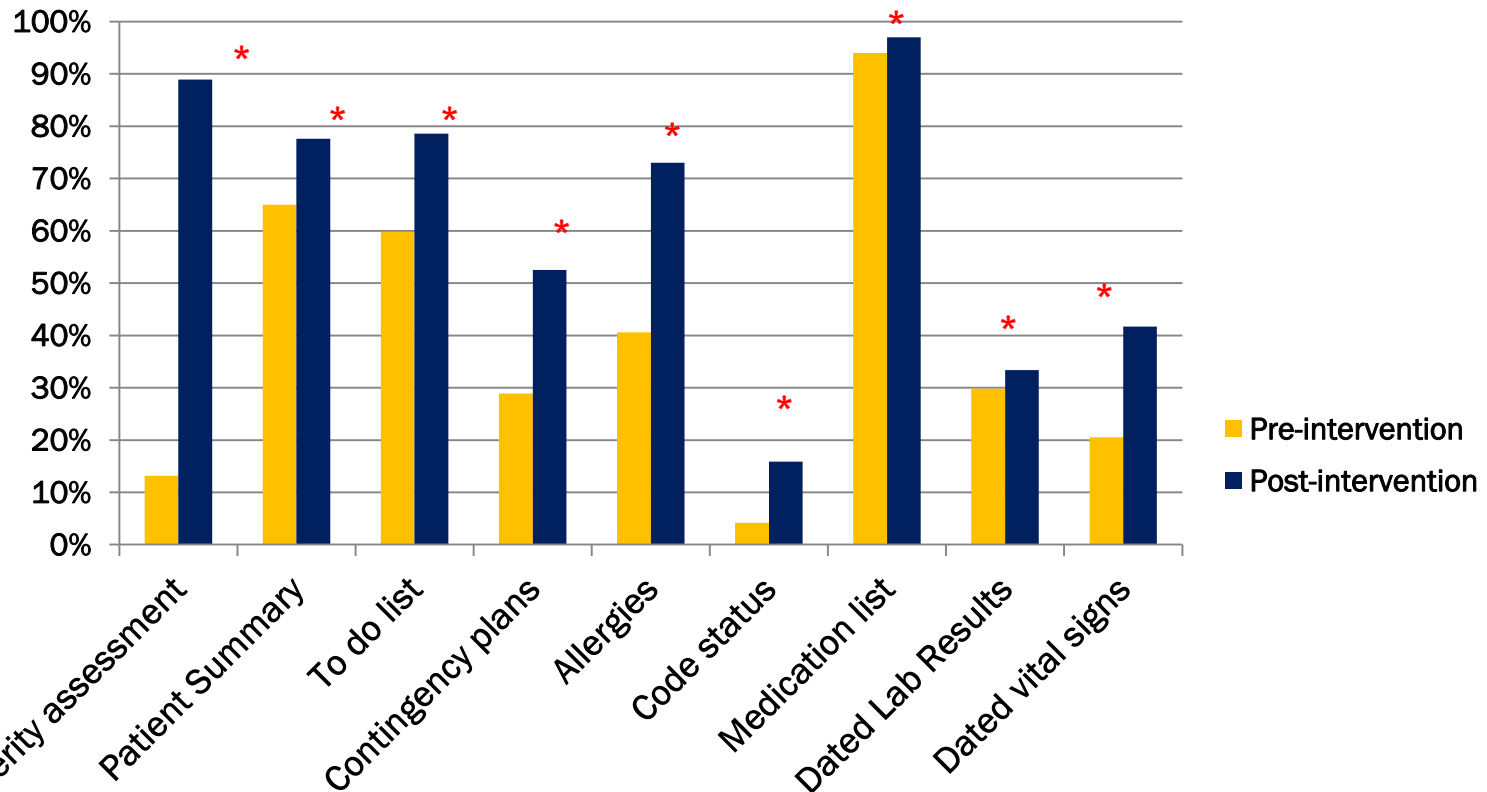
2014 Nov 6; 371(19):1803-12



# Results – Process Measures

## % Of Written Handoffs With Key Data Elements

All p-values < 0.001



N = 432 written handoff documents, 5752 unique patient entries

Starmer AJ, et al. Changes in Medical Errors After Implementation of a Handoff Program. NEJM.

2014 Nov 6; 371(19):1803-12

# Results – Primary Outcome

## Medical Error Rates

30% reduction

23% reduction

	Number of errors (rate per 100 patient admissions)		
	Pre (n=5516 admissions)	Post (n=5571 admissions)	P value
Overall rate of medical errors	24.5	18.8	<.0001
Preventable adverse events	4.7	3.3	<.0001
Near misses / non harmful medical errors	19.7	14.5	<.0001

Non-preventable Adverse Events	3.0	2.6	0.48
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Starmer AJ, et al. Changes in Medical Errors After Implementation of a Handoff Program. NEJM.

2014 Nov 6; 371(19):1803-12

# Results – Balancing Measures

## Resident Workflow

Activity	% of Time per 24 hr Period Spent in Activity		P-Value
	Pre-Intervention N = 3510 hours	Post-Intervention N = 4618 hours	
Patient Family Contact	11.8%	12.5%	0.41
Creating written or computerized handoff document	1.6%	1.3%	0.54
Other Computer Time	16.2 %	16.5%	0.81

	Pre-Intervention	Post-Intervention	P-Value
Mean duration of verbal handoff per patient	2.4 min	2.5 min	0.55

Starmer AJ, et al. Changes in Medical Errors After Implementation of a Handoff Program. NEJM.

2014 Nov 6; 371(19):1803-12





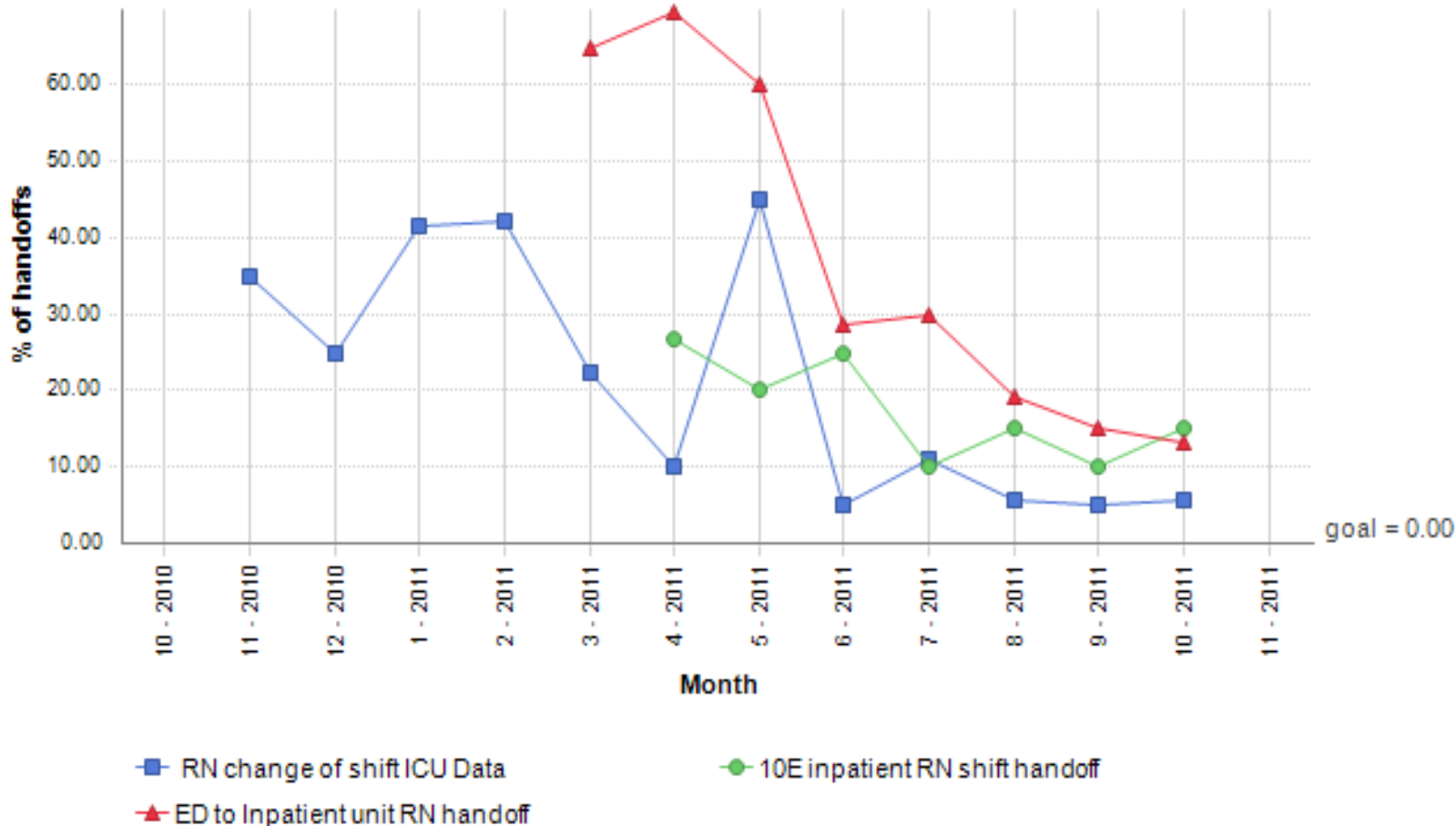
**I-PASS for Nurses**

# Handoff Related Care Failures

*Bigham et al., Pediatrics 2014; 134: e572-579*

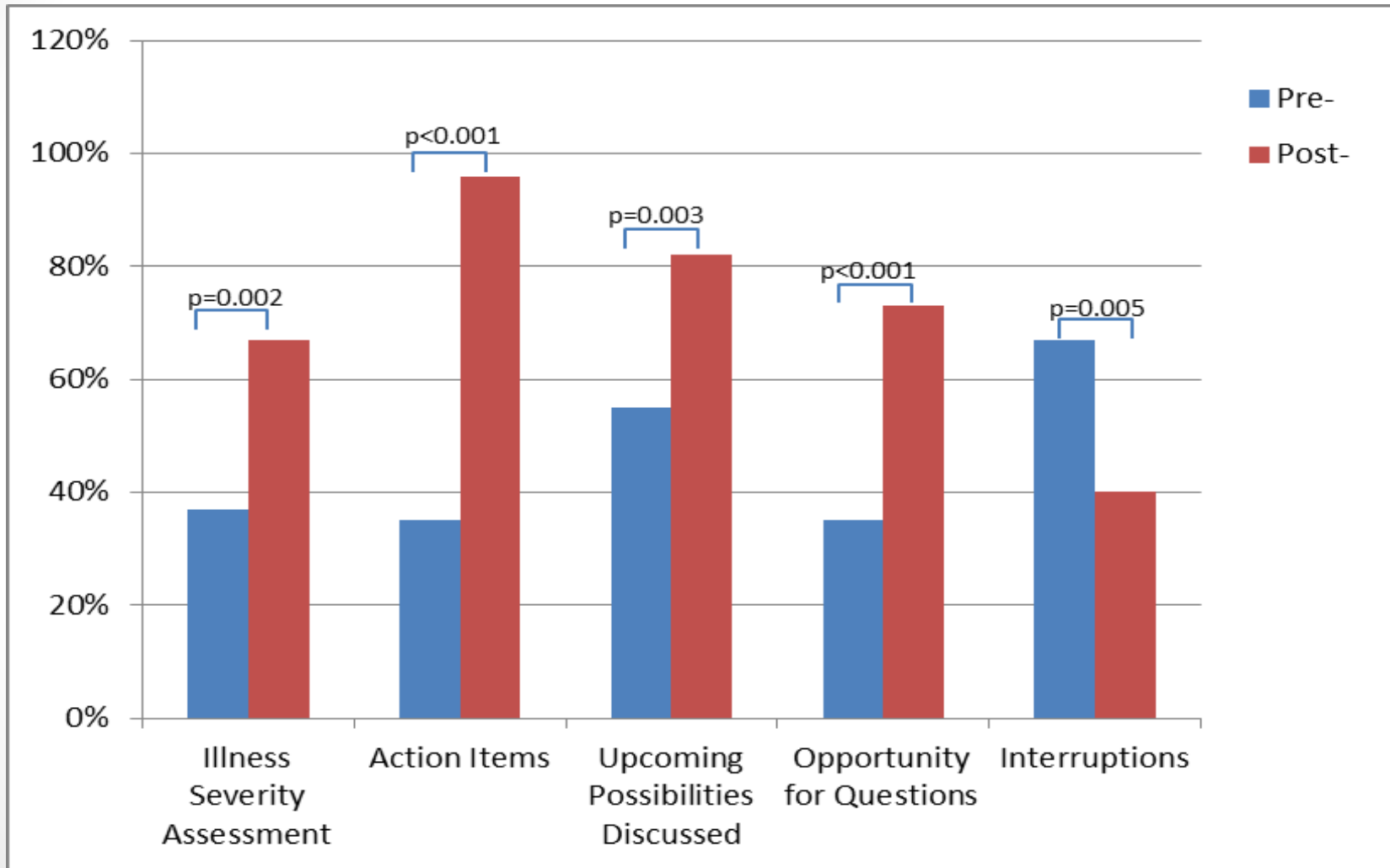
Boston

O1. Handoff-related care failures - Boston





# Quality of Verbal Handoff





# Ongoing Work & Future Directions

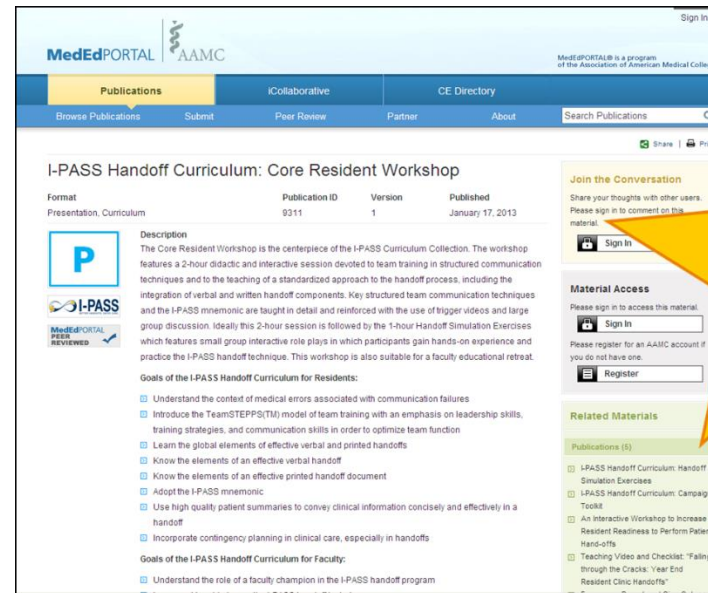
# The Dissemination Of I-PASS

## I-PASS Study Website



The screenshot shows the I-PASS Study Website in a Windows Internet Explorer browser. The website features a blue and white color scheme with a prominent I-PASS logo at the top left, which includes the text "I-PASS BETTER HANDOFFS. SAFER CARE." Below the logo is a photograph of four healthcare professionals in a clinical setting. The navigation menu includes links for HOME, ABOUT, LEADERSHIP, PARTNERS, MATERIALS, PUBLICATIONS, UPCOMING EVENTS, and FUNDING. The main content area contains a detailed description of the I-PASS study, its goals, and a list of participating hospitals. A sidebar on the right highlights "I-PASS EVENTS" with a calendar icon and mentions a Pediatric Hospital Medicine meeting on July 20, 2012, in Cincinnati, OH. The footer includes terms of use and privacy policy information.

## AAMC's MedEdPORTAL



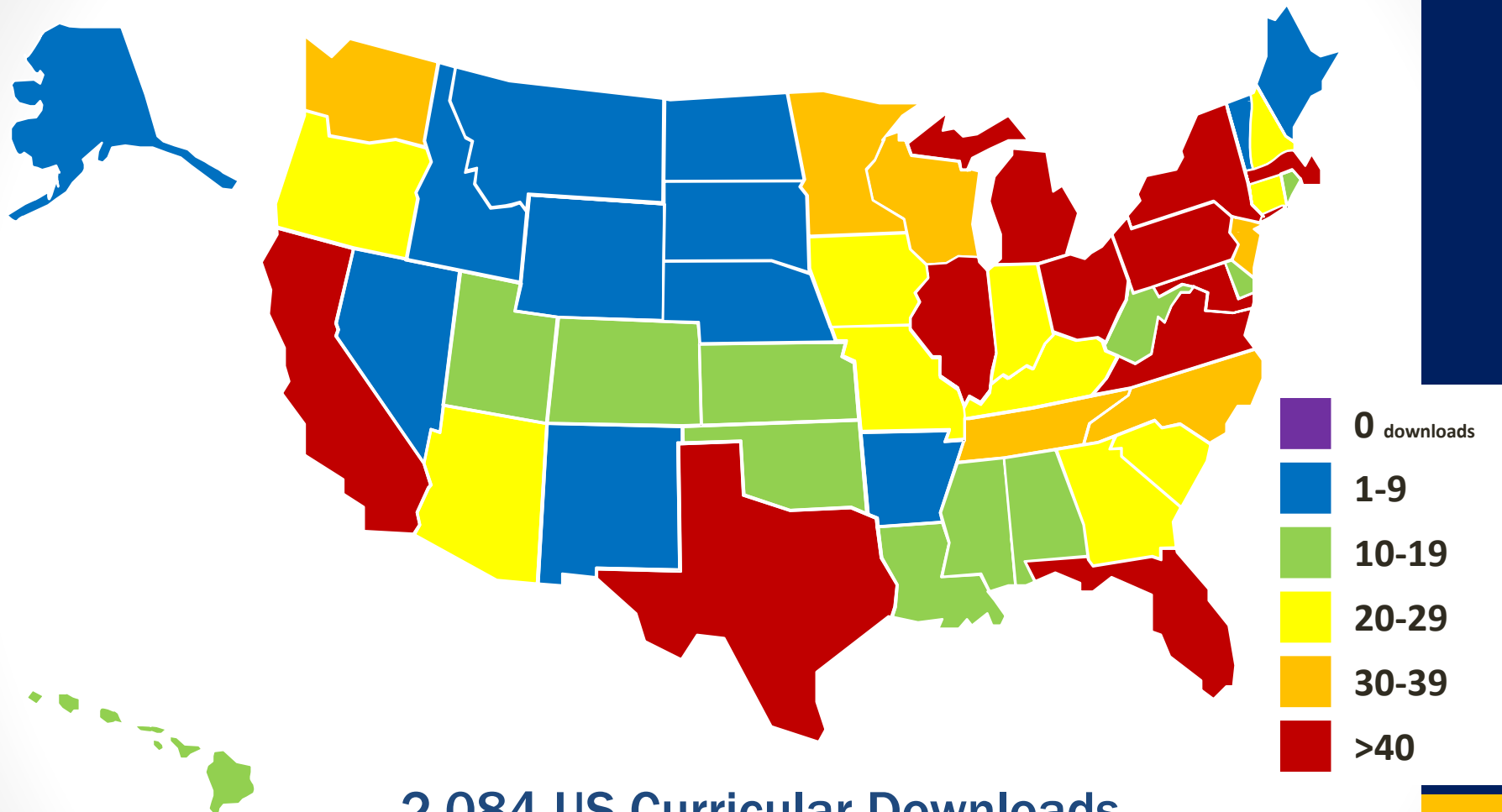
The screenshot displays the AAMC's MedEdPORTAL website. The header features the MedEdPORTAL and AAMC logos, along with a search bar and navigation tabs for Publications, Collaborative, and CE Directory. The main content area is titled "I-PASS Handoff Curriculum: Core Resident Workshop" and includes a table with the following information:

Format	Publication ID	Version	Published
Presentation, Curriculum	9311	1	January 17, 2013

Below the table, there is a description of the workshop, a list of goals for residents, and a list of goals for faculty. The right sidebar contains sections for "Join the Conversation" (with a sign-in button), "Material Access" (with a sign-in button and a register button), and "Related Materials" (listing several publications).

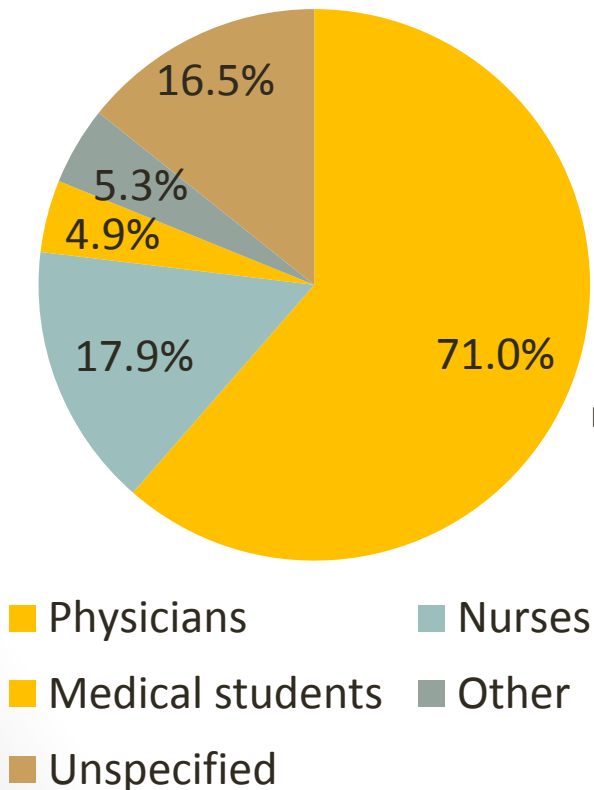
1 of Top 10 Downloaded Resources

# United States I-PASS Downloads

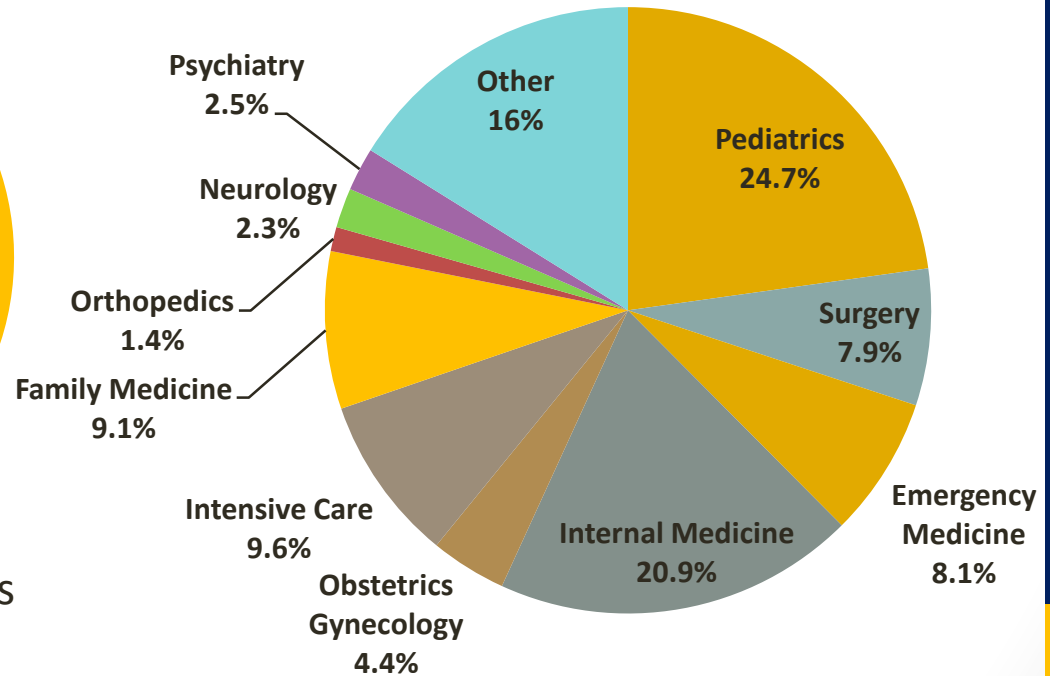


# I-PASS Use by Providers and Clinical Settings

**Providers**



**Clinical Settings**



# Scholarship To Date

- 20 peer-reviewed articles
- 148 presentations
  - Research presentations
  - Plenaries
  - Grand Rounds
  - Workshops
  - Posters
  - Other invited talks



The NEW ENGLAND  
JOURNAL of MEDICINE

# Adapting I-PASS For Patient & Family Centered Rounds

- Patient and Family I-PASS Study
  - Funded by a grant from PCORI
  - Aim: To determine if improving communication and integrating patients/families into all aspects of decision making during hospitalization will
    - Improve patient safety
    - Improve patient and family experience



# SHM-IPASS Mentored Implementation



## 16 Academic Institutions: Phase 1

- Virginia Commonwealth University Hospital
- Mayo Clinic
- New York Hospital Queens
- Maimonides Medical Center
- Intermountain Medical Center
- UCSD/University of California Medical Center
- Arkansas Children's Hospital
- University of Cincinnati
- Brigham and Women's Hospital (IM and Surgery)
- Levine Children's Hospital at Carolinas HealthCare System
- Hurley Medical Center
- Children's Hospital of Michigan
- Trident Medical Center
- University of Hawaii John A Burn School of Medicine
- Sunnybrook Hospital-Ontario
- Boston Medical Center

## 16 Academic Institutions: Phase 2

- CHOP
- New Hanover
- Lankenau Medical Center
- Children's Hospital Montefiore, NY
- Children's Hospital Colorado
- University of New Mexico
- Hackensack UMC Mountainside
- Medical University of South Carolina
- Sparrow Hospital / Michigan State University
- Johns Hopkins, Baltimore
- Children's National, DC
- Toledo Children's Hospital
- AtlantiCare, New Jersey
- Sanford Children's Hospital, South Dakota
- Gwinnett Medical Center, Georgia
- Children's Mercy, Kansas City



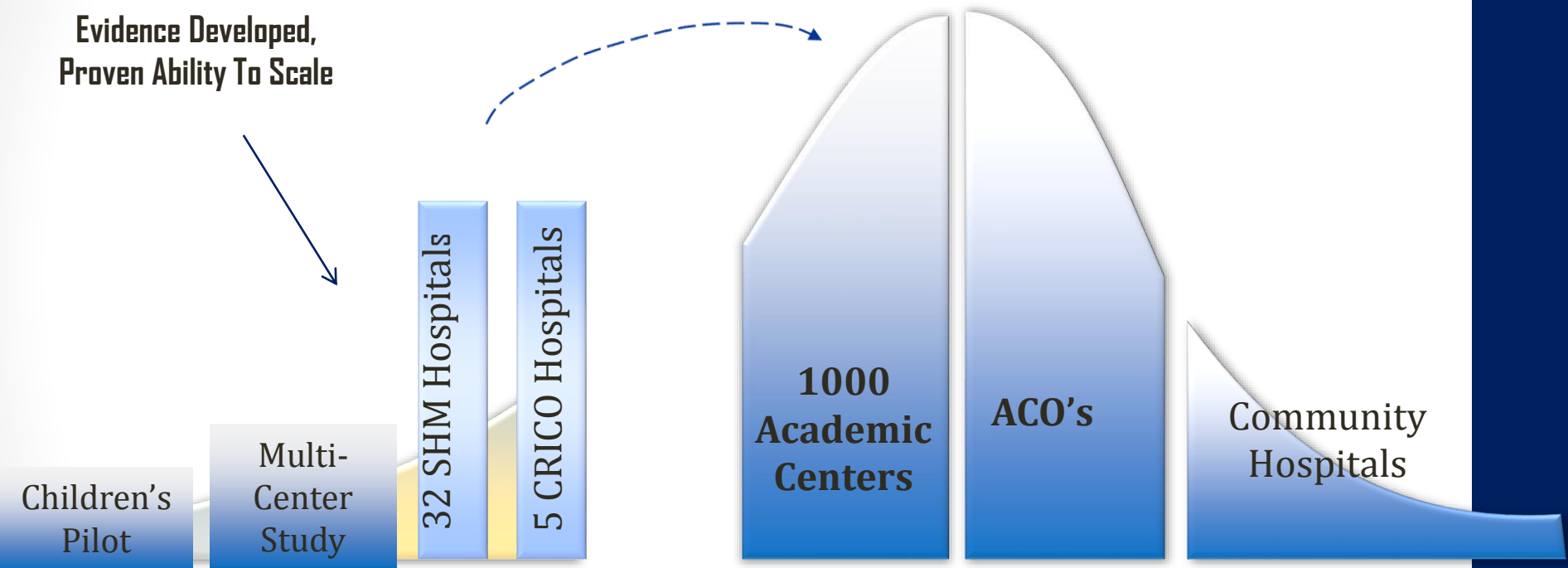
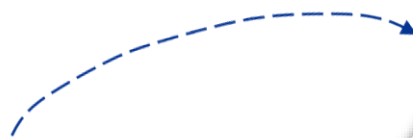
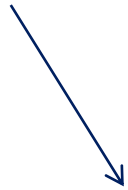
# MGH / CRICO



- MGH asked for aid in institution wide adoption in 2014
  - Longitudinal consultation
  - Have now trained over 4500 nurses, over 1500 physicians in I-PASS
  - Working to achieve consistent implementation
- CRICO provided support to implement in 5 more Harvard-affiliated hospitals

# Crossing The Dissemination Chasm...

Evidence Developed,  
Proven Ability To Scale



CRICO

DHSS

AHRQ

CRICO

# Harvard Business School Health Acceleration Challenge

- Question: How do we continue to spread?
- Selected as finalist in HAC
  - Access to healthcare business community
  - Identified CEO / VP Business Development
- Formed I-PASS Institute
  - Patient Safety Improvement Company
  - Training and Consulting

# Summary & Take Home Points

- Communication and handoff errors are common
- Training and multi-faceted approach needed to standardize and improve patient handoffs
- I-PASS Handoff Bundle → Decreased rates of medical errors and adverse events
  - No negative impact on physician workflow once hardwired
- I-PASS can be adapted for use in diverse settings and scaled for institution-wide adoption

# Funding Sources

- Department of Health and Human Services (I-PASS Study)
  - Additional funding for I-PASS Study provided by:
    - Oregon Comparative Effectiveness Research K12 Program, Agency for Healthcare Research and Quality (AHRQ)
    - Medical Research Foundation of Oregon
    - Physician Services Incorporated Foundation (of Ontario)
    - Pfizer (unrestricted medical education grant)
- CRICO (Pilot Study and CRICO 5-hospital implementation project)
- AHRQ (Mentored Implementation I-PASS)
- PCORI (Patient and Family Centered I-PASS)



**Thank you!!**

**Questions? [clandrigan@partners.org](mailto:clandrigan@partners.org)**

**All handoff materials are available at  
[www.ipasshandoffstudy.com](http://www.ipasshandoffstudy.com)**