Multi-disciplinary Team Communication and Effective Handoffs

Lauren Destino, MD
Clinical Associate Professor
Associate Medical Director of the Pediatric Hospital Medicine Division
Stanford University, Lucile Packard Children’s Hospital
Disclosures

Dr. Lauren Destino has

• Identified that she has no conflicts of interest to disclose
• Documented that this presentation will not involve discussion of unapproved, off-label, experimental or investigational use materials or protocols

Dr. Lauren Destino will

• Present copyrighted materials and has obtained permission from Children’s Hospital Boston and the I-PASS Study Group

The I-PASS Handoff Study Curriculum includes materials adapted from TeamSTEPPS™, an evidence-based teamwork curriculum developed by the Department of Defense and the Agency for Healthcare Research and Quality. All materials are used with permission.
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 I-PASS evidence-based handoff bundle and its impact on medical errors and patient safety

• Navigate communication and/or cultural barriers which can impact handoffs
Question For The Audience

• How many of you have received handoff training during your career?
Agenda

• Background
  ▪ Patient safety & handoffs

• The I-PASS Study
  ▪ Educational Intervention
  ▪ Methods & Findings

• Dissemination and ongoing work

• Improving transitions of care across hospital settings
Background

Patient Safety & Handoffs
Patient Safety Movement

• IOM Report (1999)
• Estimated 98,000 preventable deaths per year due to medical errors
  ▪ More common reason for death than
    • Breast Cancer
    • AIDS
    • Motor Vehicle Accidents
No Change in Adverse Event Frequency

North Carolina Patient Safety Study

- Study of 2341 randomly selected admissions from 10 randomly selected hospitals statewide

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
  ▪ Duty hours restrictions
    • Landrigan et al
Communication Failures

Communication Failures and the EMR

We need to talk: an observational study of the impact of electronic medical record implementation on hospital communication.

EMR was associated with:
1. Decrease face to face communication
2. Worsened overall agreement about the plan of care
Questions For The Audience

• Have you witnessed a handoff like this, either between colleagues or trainees, in the past 6 months?

• Why was this a poor handoff?
Handoffs Are A Complex Skill

Concept Model For Handoffs

We need standardized handoffs!!!
The I-PASS Study
I-PASS Pilot Study

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

## Results

### Medical Errors & Preventable Adverse Events

Rates per 100 admissions

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post-</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Errors</td>
<td>33.8</td>
<td>18.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Preventable Adverse Events</td>
<td>3.3</td>
<td>1.5</td>
<td>0.04</td>
</tr>
</tbody>
</table>

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

IIPE-PRIS Accelerating Safe Sign-outs

• 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 $3 million grant from U.S. Dept of Health and Human Services (ARRA funding) September 2010
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

# The I-PASS Mnemonic

<table>
<thead>
<tr>
<th>I</th>
<th>Illness Severity</th>
<th>• Stable, “watcher,” unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Patient Summary</td>
<td>• Summary statement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Events leading up to admission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hospital course</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ongoing assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Plan</td>
</tr>
<tr>
<td>A</td>
<td>Action List</td>
<td>• To do list</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Timeline and ownership</td>
</tr>
<tr>
<td>S</td>
<td>Situation Awareness and Contingency Planning</td>
<td>• Know what’s going on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Plan for what might happen</td>
</tr>
<tr>
<td>S</td>
<td>Synthesis by Receiver</td>
<td>• Receiver summarizes what was heard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Asks questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restates key action/to do items</td>
</tr>
</tbody>
</table>

• 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**

<table>
<thead>
<tr>
<th>To Do:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Check respiratory exam now; if still tachypneic get CXR</td>
</tr>
<tr>
<td>☐ Monitor withdrawl scores at 5pm; if still high increase ativan gtt to 3mg/hour</td>
</tr>
<tr>
<td>☐ Check ins and outs at midnight; if less than 500mL UOP give 1L</td>
</tr>
<tr>
<td>☐ Follow up 6PM electrolytes; if K still low please replace with KCl 40 Meq IVPB</td>
</tr>
</tbody>
</table>
**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

It is **not** a re-stating of entire verbal handoff!
Intervention: More Than Just A Mnemonic
I-PASS Handoff Bundle Components

I-PASS Mnemonic
I-PASS Campaign
Introductory Workshop
TeamSTEPPS Training
Simulation Exercises
I-PASS Printed Handoff Document
Faculty Development
Faculty Observations & Feedback

All Handoff Bundle Components Available at www.ipasshandoffstudy.com
I-PASS Communication Training: TeamSTEPPSTM

Team Strategies and Tools to Enhance Performance and Patient Safety

<table>
<thead>
<tr>
<th>Technique</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief</td>
<td>Plan team activities</td>
</tr>
<tr>
<td>Debrief</td>
<td>Analyze an interim event</td>
</tr>
<tr>
<td>Huddle</td>
<td>Solve a problem</td>
</tr>
<tr>
<td>Assertive statement</td>
<td>Identify potential errors</td>
</tr>
<tr>
<td>Check-back</td>
<td>Ensure accurate information transfer</td>
</tr>
</tbody>
</table>
Simulation
An Integral Component Of The Curriculum
**I-PASS Printed Handoff Tools**

- **Illness Severity:** Watcher
- **Patient Summary (summary statement):** 4 year old female with a PMH of diabetes type 1 and moderate persistent asthma who presents with two days of progressively...

<table>
<thead>
<tr>
<th>Event Prior to Admission</th>
<th>Action List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two days of right lower quadrant abdominal pain</td>
<td></td>
</tr>
<tr>
<td>Also with fever, nausea, emesis, and hyperglycemia</td>
<td></td>
</tr>
<tr>
<td>No sick contacts</td>
<td></td>
</tr>
<tr>
<td><strong>Hospital Course:</strong></td>
<td></td>
</tr>
<tr>
<td>Evaluation in the ED revealed a WBC of 26 K with 8% band neutrophils, anemia, metabolic acidosis, dehydration and blood sugars in 200-300s. CT of abdomen revealed acute appendicitis without rupture or perforation. Evaluated by surgery, plan for OR after fluids and blood sugars stabilized.</td>
<td></td>
</tr>
<tr>
<td><strong>Problem List:</strong></td>
<td></td>
</tr>
<tr>
<td>1. Acute appendicitis without mention of perforation: Plan for IV resuscitation and IV antibiotics for now. Once blood sugars stabilize plan for OR in the AM. Surgery following with us, plan for serial abd exams and Labs.</td>
<td></td>
</tr>
<tr>
<td>2. DM (diabetes mellitus): Have started insulin drip per protocol. Q2 hour blood sugars. Last blood sugar in 180s and gap has closed. Endocrine is following with the team. On insulin pump as an outpatient. Have added ES 1/2 NS while NPO on insulin gtt.</td>
<td></td>
</tr>
<tr>
<td>3. Asthma: Stable at present time. On Hoven inhaler as an outpatient, will continue this medication while admitted.</td>
<td></td>
</tr>
</tbody>
</table>

**Situation Awareness/Contingency Planning:**
- If blood sugars go above 200 or AG increases above 15 call endocrine fellow for insulin titration.
- If abd pain to worsen or HR to increase contact PICU attending and surgery fellow.
- While she is stable now, she is at risk for appendiceal rupture and perforation – watch closely for increases in HR: fever, decreases in blood pressure, or derangements in her blood sugars (high or low)

**Synthesis by Receiver:** Don't forget!
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
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

<table>
<thead>
<tr>
<th>Site Name</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
</tr>
<tr>
<td>UCSF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stanford</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington University</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cincinnati</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utah</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Christopher’s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Capital Consortium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick Kids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OHSU</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **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 Measure

Time Motion Study
Results – Process Measures

% Of Verbal Handoffs With Key Elements Present

All p-values < 0.001

N = 267 verbal handoff sessions, 2281 unique patient handoffs

Results – Process Measures

% Of Written Handoffs With Key Data Elements

All p-values < 0.001

N = 432 written handoff documents, 5752 unique patient entries

### Results – Primary Outcome

#### Medical Error Rates

<table>
<thead>
<tr>
<th></th>
<th>Number of errors (rate per 100 patient admissions)</th>
<th>Pre (n=5516 admissions)</th>
<th>Post (n=5571 admissions)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall rate of medical errors</td>
<td>24.5</td>
<td>18.8</td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Preventable adverse events</td>
<td>4.7</td>
<td>3.3</td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Near misses / non harmful medical errors</td>
<td>19.7</td>
<td>14.5</td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Non-preventable Adverse Events</td>
<td>3.0</td>
<td>2.6</td>
<td></td>
<td>0.48</td>
</tr>
</tbody>
</table>


30% reduction

23% reduction
## Results – Balancing Measures

### Workflow

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

<table>
<thead>
<tr>
<th>Mean duration of verbal handoff per patient</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.4 min</td>
<td>2.5 min</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Quality Improvement Nested Within The Research Study

- QI methodology was embraced in order to enhance the implementation and sustainment of the handoff bundle.

I-PASS Faculty Champion MOC Project: Percent of Residents Adhering to 5 Elements of I-PASS Mnemonic

- Monthly Averages
- Median
- Goal (90)
The Dissemination Of I-PASS

I-PASS Study Website

AAMC’s MedEdPORTAL
Dissemination To Other Groups & Specialties

Providers:
- Physicians: 16.5%
- Nurses: 5.3%
- Medical students: 4.9%
- Other: 17.9%
- Unspecified: 71.0%

Clinical Settings:
- Pediatrics: 24.7%
- Internal Medicine: 20.9%
- Emergency Medicine: 8.1%
- Obstetrics Gynecology: 4.4%
- Intensive Care: 9.6%
- Other: 16%
- Psychiatry: 2.5%
- Orthopedics: 1.4%
- Neurology: 2.3%
- Family Medicine: 9.1%
Ongoing Work

• AHRQ and SHM mentored implementation of I-PASS across 32 institutions
  ▪ Adaptation for adult providers
  ▪ Online learning
• Integration into Family Centered Rounds
• Consultation Program
  ▪ MD Anderson
  ▪ MGH
AHRQ and SHM Mentored Implementation

Giver: Adherence to ALL 5 elements of the IPASS mnemonic

<table>
<thead>
<tr>
<th>All 5 elements</th>
<th>0</th>
<th>5</th>
<th>43</th>
<th>111</th>
<th>95</th>
<th>69</th>
<th>102</th>
<th>57</th>
<th>117</th>
<th>96</th>
<th>111</th>
<th>69</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>11</td>
<td>59</td>
<td>125</td>
<td>217</td>
<td>160</td>
<td>166</td>
<td>184</td>
<td>121</td>
<td>180</td>
<td>127</td>
<td>164</td>
<td>96</td>
<td>9</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>8%</td>
<td>34%</td>
<td>51%</td>
<td>59%</td>
<td>42%</td>
<td>55%</td>
<td>47%</td>
<td>65%</td>
<td>76%</td>
<td>68%</td>
<td>72%</td>
<td>89%</td>
</tr>
<tr>
<td>Goal</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
</tbody>
</table>
AHRQ and SHM Mentored Implementation

Receiver: Quality of syntheses by receiver *

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>31</td>
<td>104</td>
<td>211</td>
<td>151</td>
<td>128</td>
<td>192</td>
<td>119</td>
<td>167</td>
<td>138</td>
<td>159</td>
<td>102</td>
</tr>
<tr>
<td>%</td>
<td>23%</td>
<td>51%</td>
<td>54%</td>
<td>74%</td>
<td>62%</td>
<td>75%</td>
<td>77%</td>
<td>70%</td>
<td>86%</td>
<td>87%</td>
<td>91%</td>
</tr>
<tr>
<td>Goal</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
</tbody>
</table>
AHRQ and SHM Mentored Implementation

Front-line Provider: Overall quality of verbal handoff *

<table>
<thead>
<tr>
<th>Percent</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good and Excellent</td>
<td>11</td>
<td>25</td>
<td>45</td>
<td>71</td>
<td>67</td>
<td>50</td>
<td>82</td>
<td>48</td>
<td>82</td>
<td>61</td>
<td>10</td>
</tr>
<tr>
<td>N</td>
<td>22</td>
<td>48</td>
<td>75</td>
<td>89</td>
<td>91</td>
<td>70</td>
<td>110</td>
<td>67</td>
<td>107</td>
<td>81</td>
<td>12</td>
</tr>
<tr>
<td>%</td>
<td>50%</td>
<td>52%</td>
<td>60%</td>
<td>80%</td>
<td>74%</td>
<td>71%</td>
<td>75%</td>
<td>72%</td>
<td>77%</td>
<td>75%</td>
<td>83%</td>
</tr>
<tr>
<td>Goal</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
</tbody>
</table>
AHRQ and SHM Mentored Implementation

Front-line Provider: Mean number of patients per rotation who experience a major harm

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.27</td>
<td>0.01</td>
<td>0.09</td>
<td>0.02</td>
<td>0.04</td>
<td>0.11</td>
<td>0.04</td>
<td>0.27</td>
<td>0.03</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>N</td>
<td>22</td>
<td>48</td>
<td>75</td>
<td>89</td>
<td>91</td>
<td>70</td>
<td>110</td>
<td>67</td>
<td>107</td>
<td>82</td>
<td>12</td>
</tr>
</tbody>
</table>
Further Evidence of I-PASS
I-PASS Beyond the I-PASS Study Group

• Variety of specialties
  ▪ Emergency Medicine
  ▪ Surgical Oncology
  ▪ Internal Medicine
  ▪ Pediatrics
  ▪ Hospital Wide

• Evidence of adaption with improvements in various handoff elements and adverse events

Shahian DM. *BMJ Qual Saf* 2017
Fryman C. *BMJ Qual Improv Rep* 2017
Clarke CN. *Surgery* 2017
Huth K. *Acad Pediatr* 2016
Walia J. *Acad Pediatr* 2016
Transitions Throughout a Hospital: Lucile Packard Children’s Hospital Stanford

- Focus on high risk transitions
  - ICU to OR
  - CVICU to Floor
  - OR to Post op recovery areas
  - OR to ICU

- Utilized I-PASS format
  - **Increased information** transferred
  - **Increased satisfaction** among providers
  - No change in length of handoffs
  - **Decreased hand off related care failures**

Bigham MT et al. *Pediatrics* 2014
Caruso TJ et al. *Int J Health Care Qual Assur* 2017
Key Considerations to Starting Handoff Improvement Work

• Multidisciplinary group
• Identify areas of high risk
• Identify areas that amenable to change
• Start small
• Long process but worth the effort for provider satisfaction and patient safety
In Closing
Summary & Take Home Points

• High frequency of communication and handoff errors
• Multi-faceted approach needed to standardize and improve patient handoffs
• I-PASS Handoff Bundle → Decreased rates of medical errors and adverse events
  ▪ No impact on physician workflow
Acknowledgements
The I-PASS Study Group
Funding & Resources

• Primary funding
  ▪ Department of Health and Human Services

• Additional funding for I-PASS 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)

• Pediatric Research in Inpatient Settings (PRIS) Network
• Initiative for Innovation in Pediatrics Education (IIPE)
References

- [http://www.acgme.org/acWebsite/home/Common_Program_Requirements_07012011.pdf](http://www.acgme.org/acWebsite/home/Common_Program_Requirements_07012011.pdf)
- Shahian DM. BMJ Qual Saf 2017 Mar 9 Epub ahead of print
- Fryman C. BMJ Qual Improv Rep 2017 Apr 6;6(1)
- Clarke CN. Surgery 2017 Mar;161(3):869-875
- Sheth S et al. Pediatrics 2016 Feb;137(2):e20150166
Thank You!!

Questions or Comments?