Clinical Safety & Effectiveness
Cohort # 21 Team 5
Ordering Body Fluids for Laboratory Testing

University Health System

Educating for Quality Improvement & Patient Safety
The Team

• **Division**
  – Ashley Schutz, MLS (ASCP) CM
  – Joy Wortham, MD, Hospitalist
  – Stephanie Knight, MSN, RN, CCTN, CVRN

**Ancillary Team members**
  – Jennifer Reed RN
  – Norma Pena, MT (ASCP)
  – Hazel Lee, RN, EMR
  – Michael Shoffeit, MD, Internal Medicine
  – Michelle Ogunwole, MD, VA Chief Resident
  – Edna Cruz, M.Sc., RN, CPHQ, CPPS

• **Sponsor Department**
  – Stephanie Whitehead
  – Dr. Emily Volk
Body Fluid specimens are sent for laboratory testing to be used as part of the diagnostic process for patients.

Body fluids that are missing or have incorrect orders risk laboratory testing not being performed and/or being delayed and affecting the accuracy of results.

Body fluids often are considered “irretrievable specimens” and are difficult to recollect. Correct ordering is imperative for proper patient care.
What do these errors cost?

**Background:**
- Hospital-based errors are 8th leading cause of death in US
  - 1 million injuries
    - 11% patients – received potentially harmful care
    - 46% patients – didn’t receive recommended care
  - 1.5 million preventable adverse drug events
  - 2.4 million extra days of hospitalization
  - Increased hospital costs of $17 billion
- 75% of clinical lab errors are part of the pre-analytical process

**Average cost of a preanalytical error: $208.00**
*Up to 1.2% of total hospital operating costs*
*Average hospital of 650 beds = approximately $1,199,122 per year*

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Our Aim Statement

To Decrease the amount of incorrectly ordered and collected body fluid specimens from 75% to 30% by January 5, 2018.
Process:
(Sort, Order, Shine, Standardize, Sustain)

No Standard Process → No defined Process → Provider falsely marking collected → Provider falsely marking NOT collected → Lab unable to communicate w/owner for F/U questions/concers → Incorrectly ordered/collected body fluid specimens

People/Education:

No defined Process → No Accountability → No ordering/collection owner identified

No process to disseminate provider education → Lack knowledge of specimen requirements → Change resistors

No consequence for not following/changing process → Lack knowledge of appropriate order for desired test

Lack knowledge of test priority when several test desired → Lack knowledge of test priority when several test desired

Multiple varying order set → Duplicate orders → Incomplete order info.

Confusing order options → IT (Standardize, Calibrate,
p-Chart -- # of Samples with Errors / Total # of Samples

- UCL: 100%
- LCL: 48.2%
- CL: 75.2%

<table>
<thead>
<tr>
<th>Date</th>
<th># of Samples with Errors</th>
<th>Total # of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/28/2017</td>
<td>76.9%</td>
<td></td>
</tr>
<tr>
<td>8/29/2017</td>
<td>75.9%</td>
<td></td>
</tr>
<tr>
<td>8/30/2017</td>
<td>76.2%</td>
<td></td>
</tr>
<tr>
<td>8/31/2017</td>
<td>81.8%</td>
<td></td>
</tr>
<tr>
<td>9/1/2017</td>
<td>75.2%</td>
<td></td>
</tr>
<tr>
<td>9/2/2017</td>
<td>65.2%</td>
<td></td>
</tr>
</tbody>
</table>

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# of Samples with Errors - Total # of samples

p-Chart -- # of Samples with Errors / Total # of Samples
<table>
<thead>
<tr>
<th>Action Strength</th>
<th>Action Driver (Taken from Flow, Fishbone or Pareto)</th>
<th>Action</th>
<th>Who?</th>
<th>Why? (Choose one)</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Pareto by Error &amp; Specimen type</td>
<td>Gather pre-implementation data to categorize error types</td>
<td>Ashley Schutz</td>
<td>Standardize, Correct, Simplify</td>
<td>8/25/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Standardize the Process</td>
<td>Assess current order sets available in Sunrise</td>
<td>Team &amp; Norma Pena</td>
<td>Standardize</td>
<td>9/17/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Standardize the Process</td>
<td>Meet with Internal Medicine (owner of order sets) to update sets according to their needs</td>
<td>Team &amp; Dr. Michael Shoffeit</td>
<td>Standardize</td>
<td>10/30/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Process fails to proceed next step</td>
<td>Reorganize &quot;flow&quot; of ordersets</td>
<td>Team &amp; Norma Pena</td>
<td>Correct &amp; Simplify Flow</td>
<td>10/31/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Reduce multiple, varying, duplicative, incomplete, confusing order sets</td>
<td>Determine best format to create user-friendly ordering processes</td>
<td>Team &amp; Norma Pena</td>
<td>Correct &amp; Simplify Flow</td>
<td>10/31/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Reduce multiple, varying, duplicative, incomplete, confusing order sets</td>
<td>Submit changes to IT via footprints</td>
<td>Norma Pena / IT</td>
<td>Correct &amp; Simplify Flow</td>
<td>11/7/2017</td>
</tr>
<tr>
<td>Strong</td>
<td>Create Accountability of order sets</td>
<td>Review changes in test-system to adjust accordingly</td>
<td>Team &amp; Internal Medicine</td>
<td>Correct &amp; Simplify Flow</td>
<td>Not Started</td>
</tr>
<tr>
<td>Strong</td>
<td>Change Resisters</td>
<td>Go-Live with new order sets</td>
<td>IT</td>
<td>Standardize</td>
<td>Not Started</td>
</tr>
<tr>
<td>Strong</td>
<td>Create Accountability of order sets Address change resisters</td>
<td>Follow-up with general medicine after Go-Live</td>
<td>Team &amp; Internal Medicine</td>
<td>Standardize Correct &amp; Simplify Flow</td>
<td>Not Started</td>
</tr>
<tr>
<td>Strong</td>
<td>Reduce error types on Pareto</td>
<td>Gather post-implementation data and take next steps</td>
<td>Ashley Schutz</td>
<td>Standardize Correct &amp; Simplify Flow</td>
<td>Not Started</td>
</tr>
</tbody>
</table>
Proposed New Orders

- All order sets standardized to be organized by performing laboratory department with most commonly ordered tests pre-checked and appearing in bold at the top of the category they belong to.
- Body Fluid Cell Count & Body Fluid Path Review merged into 1 order to avoid confusion of ordering the path review instead of cytology.
- Procedural Order sets now will have auto-populated sources.

**Proposed New Orders Diagram**

**Current Thoracentesis Order Set**
- Hematology
  - Bodily fluid cell count
  - Albumin Miscellaneanous fluid
- Cytology
  - Cytology, Non Gynecologic
- Chemistry
  - Albumin Miscellaneous fluid
  - Protein Total Misc Fluid
  - Amylase Miscellaneous fluid
  - Bilirubin Total Misc Fluid
  - Triglyceride Miscellaneous fluid
  - CEA Miscellaneous fluid
- Microbiology
  - Aerobic Culture
  - Anaerobic Culture
  - Fungal Culture with Stain
  - AFB Culture with Stain
- Other
  - Albumin Serum

**Updated Thoracentesis Order Set**
- Hematology
  - Bodily fluid cell count with reflex to path review
- Cytology
  - Cytology, Non Gynecologic
- Chemistry
  - Albumin Miscellaneous fluid
  - Protein Total Misc Fluid
  - Amylase Miscellaneous fluid
  - Bilirubin Total Misc Fluid
  - Triglyceride Miscellaneous fluid
  - Adenosine Deaminase, Pleural fluid
  - Anti-Nuclear Antibody
  - Hematocrit Misc Fluid
- Associated Serum Studies
  - Protein Total Misc Fluid
  - LDH Misc Fluid

**Missing tests added:** based on procedural needs
**Alternate tests used:** example: pH misc fluid instead of blood gas arterial

- *All tests sources will default to Pleural fluid*
Proposed New Orders

- New tests updated to be available to order: Gonorrhoeae
- Generic BF order set updated to include more options and organized

- Current order sets all have different formatting
- All will be updated to “grid” format
- No more pop-up windows to fill out individual orders

*All tests sources will default to Synovial Fluid

*Tests will NOT have a default source.
1. Each order would have to be selected and opened individually to edit sources/sites.
2. Nothing is pre-checked to aid in consistent ordering.
3. Missing essential tests such as glucose and total protein.
Pre/Post Intervention

p-Chart -- # of Samples with Errors / Total # of Samples

# of Samples with Errors - Total # of samples

0% 20% 40% 60% 80% 100%
Pre-Implementation: University Health System
Average of 18.2 body fluid samples with errors per day
18.2 errors x $208.00 = $3785.60 per day
$3785.60 x 365 days per year = $1,381,744 per year

Post-Implementation: University Health System
Average of 10.8 body fluid samples with errors per day
10.8 errors x $208.00 = $2,246.40 per day
$2,246.40 x 365 days per year = $819,936 per year

By reducing our errors from 75% to 53% we were able to see a ROI

$561,808
Maintaining the Gains

• Continue to monitor number of errors
  • Monthly for the next 6 months
  • Every 3 months for the next year
• Reconvene with internal medicine team to gather feedback on the usefulness of the new order sets and adjust as needed
• Follow up with other errors that are still occurring
  • Delays in Transport
  • Not marking specimens as collected
Next Steps

1. Create “dummy order” for cytology orders

2. Work with Endoscopy (Pulmonary) to reduce the amount of errors related to bronchial specimens

3. Focus on collection and transport errors that were not resolved with the order sets

4. Begin evaluating other non-body fluid order sets and processes