Project Title: Standardizing early identification and treatment of Febrile Neutropenia (FN)

Presenter’s Name:

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Frederick Bailey III, MA PTA MBA

Institution: Hartford Healthcare Cancer Institute (HHC-CI)

Date: June 29, 2018
Institutional Overview

Name: The Hospital of Central Connecticut (HOCC)
Location: New Britain, Connecticut
Patient Volume: 935 cancer patients per year
Practice Setting: Community Hospital
Med Onc: 6; Gyn-Onc: 2

- HHC-CI is an integrated delivery network comprised of 6 hospitals
- The Cancer Institute is a member of the Memorial Sloan Kettering Cancer Alliance through which clinical trials and quality improvement activities occur
- 6,000 analytic cancer patients are seen each year
- 25% of Connecticut’s cancer population receives their care through HHC-CI
Patients undergoing treatment with chemotherapy are at risk for neutropenic fever which can lead to severe sepsis and death if not treated properly.

The goal of this project is to standardize the treatment of neutropenic fever in the first 48 hours at HOCC to reduce variation and improve outcomes.

The literature recommends a triage to antibiotic time of less than one hour in patients with neutropenic fever.
<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Job Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td>Peter Yu, MD</td>
<td>Physician-In-Chief</td>
</tr>
<tr>
<td>Core Team Leader</td>
<td>Brian Byrne, MD</td>
<td>Medical Oncologist</td>
</tr>
<tr>
<td>Core Team Operations Lead</td>
<td>Fred Bailey</td>
<td>Director, East Region</td>
</tr>
<tr>
<td>Core Team Member</td>
<td>Pat Montanaro</td>
<td>Director, IT Cancer Institute</td>
</tr>
<tr>
<td>Core Team Member</td>
<td>Pat DeFusco, MD</td>
<td>Medical Oncologist</td>
</tr>
<tr>
<td>Nursing Site Lead Bradley Hospital</td>
<td>Regina Ali</td>
<td>Charge Nurse</td>
</tr>
<tr>
<td>Oncology Operations Lead</td>
<td>Stacey Barber</td>
<td>Oncology Operations Manager</td>
</tr>
<tr>
<td>Pharmacy Clinical Lead</td>
<td>Kelly Brennan</td>
<td>Pharmacist</td>
</tr>
<tr>
<td>Emergency Room Quality Physician</td>
<td>Michelle McDade, MD</td>
<td>Emergency Room</td>
</tr>
<tr>
<td>Emergency Services Site Lead</td>
<td>David Buono, MD</td>
<td>Physician, ED Lead</td>
</tr>
<tr>
<td>Inpatient Oncology Nursing Lead</td>
<td>Edwin Cordero</td>
<td>Oncology Nurse Manager</td>
</tr>
<tr>
<td>Pharmacy Administrative Lead</td>
<td>David Girouard</td>
<td>Senior Director</td>
</tr>
<tr>
<td>Clinical Specialist, Emergency Services</td>
<td>Ewelina Ledas</td>
<td>RN, Clinical Specialist</td>
</tr>
<tr>
<td>Epic Application Analyst, ASAP/ED</td>
<td>Michele Lefebvre</td>
<td>RN, Application Analyst</td>
</tr>
<tr>
<td>Oncology Account Support, Quest</td>
<td>Scott Osipiak</td>
<td>HHC Oncology Account Executive</td>
</tr>
<tr>
<td>Central Region Leadership</td>
<td>Kris Popovitch</td>
<td>Director of Oncology, Central Region</td>
</tr>
<tr>
<td>Emergency Services Nursing Lead</td>
<td>Shawnna Scirpo</td>
<td>Clinical Manager</td>
</tr>
<tr>
<td>CareConnect Lead – ASAP/ED</td>
<td>Beth Myers-Zern</td>
<td>ASAP Team Lead</td>
</tr>
</tbody>
</table>
| QTP Improvement Coach                  | Holley Stallings            | QTP team coach extraordinaire!
Start – Patient Arrival → Registration → Triage Assessment → Rooming → Provider Assessment → Orders placed

Labs / Blood Culture I Drawn → Lab specimens transported to lab → X-rays → Blood Culture II → Data Resulted/Reviewed → Provider Assessment

Antibiotic Ordered

Yes → Epic Antibiotic Order → Pharmacy verifies → Antibiotics given → Finish - Inpatient bed
No → Finish - Outpatient → Ancillary Treatment
Diagnostic Data

Reasons for Delay in Receiving Antibiotics Within 1 hour

<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
<th>Cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Draw to Results</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>ID Patients on Chemotherapy</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Registration to Lab</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Correct Antibiotic</td>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

Number of Patients

- Lab Draw to Results: 8
- ID Patients on Chemotherapy: 6
- Registration to Lab: 6
- Correct Antibiotic: 4

Count
Cumulative
By 12/1/2018, for patients undergoing chemotherapy in the outpatient setting who develop neutropenic fever, the objective is to reduce the time it takes to receive correct antibiotics from 176 to 120 minutes at HOCC.
Measure 1

- **Measure**: Arrival time to antibiotic administration
- **Patient population**:
  - Outpatients on chemotherapy who present to Emergency Room with neutropenic fever
- **Calculation methodology**: Time of registration to time of antibiotics
- **Data source**: Epic
- **Data collection frequency**: Every 2 weeks
- **Data quality (any limitations)**: Identifying all patients, Lack of definitive code
Measure 2

• Measure: Time of Lab Collection to Time Lab Resulted

• Patient population:
  − Outpatients on chemotherapy who present to Emergency Room with neutropenic fever

• Calculation methodology: Time from Lab draw to time of final result

• Data source: Epic

• Data collection frequency: Every 2 weeks

• Data quality (any limitations): Identifying all patients, Lack of definitive code
Measure 3

• Measure: Appropriate Antibiotic Prescribed*

• Patient population:
  – Outpatients on chemotherapy presenting to Emergency Room with neutropenic fever

• Calculation methodology: Patients who receive correct antibiotics divided by total patients who present to ER with neutropenic fever

• Data source: Epic

• Data collection frequency: Every two weeks

• Data quality (any limitations): Identifying all patients, Lack of definitive code

* As per NCCN Guidelines: https://www.nccn.org/professionals/physician_gls/default.aspx
Measure 4

- Measure: Appropriate Antibiotic Prescribed and Administered within 2 hours*

- Patient population:
  - Outpatients on chemotherapy presenting to Emergency Room with neutropenic fever

- Calculation methodology: Time from arrival in ED to time of administration of correct antibiotic

- Data source: Epic

- Data collection frequency: Every two weeks

- Data quality (any limitations): Identifying all patients, Lack of definitive code

* As per NCCN Guidelines: https://www.nccn.org/professionals/physician_gls/default.aspx
## Baseline Data

<table>
<thead>
<tr>
<th>Arrival</th>
<th>Campus</th>
<th>Fever</th>
<th>Labs Collect</th>
<th>Labs Resulted</th>
<th>Cefepime</th>
<th>Time to Med</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>21:03</td>
<td>NBGH</td>
<td>21:08</td>
<td>22:06</td>
<td>23:43</td>
<td>00:03</td>
<td>3:00</td>
<td>Multiple delays</td>
</tr>
<tr>
<td>11:31</td>
<td>NBGH</td>
<td>11:37</td>
<td>12:37</td>
<td>13:16</td>
<td>No</td>
<td></td>
<td>No antibiotic</td>
</tr>
<tr>
<td>17:13</td>
<td>BMH</td>
<td>17:20</td>
<td>17:32</td>
<td>18:56</td>
<td>21:49</td>
<td>4:36</td>
<td>Wrong antibiotic 17:59</td>
</tr>
<tr>
<td>16:47</td>
<td>NBGH</td>
<td>16:56</td>
<td>17:37</td>
<td>18:38</td>
<td>No</td>
<td></td>
<td>No antibiotic</td>
</tr>
<tr>
<td>4:08</td>
<td>NBGH</td>
<td>4:51</td>
<td>5:20</td>
<td>7:00</td>
<td>9:28</td>
<td>5:20</td>
<td>Wrong antibiotic (Unasyn)</td>
</tr>
<tr>
<td>10:32</td>
<td>BMH</td>
<td>10:39</td>
<td>11:11</td>
<td>12:09</td>
<td>12:06</td>
<td>1:34</td>
<td>Wrong dose (1g)</td>
</tr>
<tr>
<td>10:18</td>
<td>NBGH</td>
<td>10:18</td>
<td>11:09</td>
<td>12:46</td>
<td>11:49</td>
<td>1:31</td>
<td>Came in with fever</td>
</tr>
<tr>
<td>13:58</td>
<td>NBGH</td>
<td>14:07</td>
<td>14:29</td>
<td>15:55</td>
<td>16:00</td>
<td>2:15</td>
<td>Wrong antibiotic (Vanco)</td>
</tr>
<tr>
<td>22:13</td>
<td>BMH</td>
<td>22:18</td>
<td>22:56</td>
<td>24:00</td>
<td>00:28</td>
<td>2:15</td>
<td>Vanco 1st, wrong Cefepime dose</td>
</tr>
</tbody>
</table>

**Mean time to Antibiotics:** 176 minutes  
**Mean lab time from collection to results:** 77 minutes  
**Correct Antibiotic and dose:** 5 out of 10 patients
Baseline Data: Correct Antibiotic

Appropriate Antibiotic Administered

<table>
<thead>
<tr>
<th></th>
<th>Pass</th>
<th>Fail</th>
<th>n = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

ASCO Quality Training Program
Baseline Data: Time to Antibiotic

![Bar chart showing time to antibiotics distribution with the following breakdown:]

- < 2 hrs: 2 patients
- 2-3 hrs: 3 patients
- > 3 hrs: 3 patients
- No Med: 2 patients

Total patients: n = 10
<table>
<thead>
<tr>
<th>Prioritized List of Changes (Priority/Pay Off Matrix)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Impact</strong></td>
</tr>
<tr>
<td>- Standardize Antibiotics: Cefepime/Pip-Tazo</td>
</tr>
<tr>
<td>-Reduce time to lab draw</td>
</tr>
<tr>
<td>-Reduce Turnaround Time (TAT) lab results to provider</td>
</tr>
<tr>
<td>-Review Lab manual diff policy</td>
</tr>
<tr>
<td>-Institute lab call to alert FN concern</td>
</tr>
<tr>
<td>-Streamline Epic lab order sets</td>
</tr>
<tr>
<td><strong>Low Impact</strong></td>
</tr>
<tr>
<td>-Lab result to ED: total WBC/MD to follow</td>
</tr>
<tr>
<td>-Ensure antibiotics given in ED prior to transfer to floor</td>
</tr>
<tr>
<td>-Education on antibiotic ordering and administration start</td>
</tr>
</tbody>
</table>

**PDSA#1** April 25, 2018

- Lab education: TAT for oncology patients
- Registration education: Script for identifying oncology patients
- Patient education: Key points to mention when patient presents at ED
- Provider education: NCCN guidelines for appropriate antibiotics for FN
- Enhance lab transport time

**PDSA#2** May 3, 2018

- FN patient identified by MD
- Create triage pathway to reduce time to ID potential FN
- Create FN triage order set
  - Antibiotics
  - LDH

**PDSA#3** April 26, 2018

- Education on antibiotic ordering and administration start

**Ease of Implementation**

- **Easy**
- **Difficult**
<table>
<thead>
<tr>
<th>Date of PDSA Cycle</th>
<th>Description of Intervention</th>
<th>Results</th>
<th>Action Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 25, 2018</td>
<td>Education on antibiotic ordering and administration start</td>
<td>Staff education and Educational tip sheet</td>
<td>Brought problem to Nurse Educator &amp; communicated best practice</td>
</tr>
<tr>
<td>April 26, 2018</td>
<td>Create FN triage order set</td>
<td>In process awaiting approval</td>
<td>Met with IT Team Collaborated with sepsis team</td>
</tr>
<tr>
<td>May 3, 2018</td>
<td>Review Lab Manual Diff Policy</td>
<td>Allowed release of preliminary CBC with Diff results</td>
<td>Discussion with Lab Leadership and Infectious Disease</td>
</tr>
</tbody>
</table>
Educational Materials Developed

**Neutropenic Fever ED Initiative**

- **FACT:** If antibiotics are not administered within the first two hours of ED arrival, patients with neutropenic fever increase their length of stay by 8 hours for each hour that antibiotics are delayed.

- **What does this mean?**
  - Antibiotics should be administered within the first **TWO** hours of arrival to the ED for patients with neutropenia and fever.

- **How can we tell if a patient is neutropenic right away?**
  - We can’t until the CBC is resulted but we must screen the patient at triage! If the patient has a **FEVER** and is receiving **CHEMOTHERAPY**, the patient must be placed in a room **immediately** and a work up must be initiated as these patients are **high-risk**. They should **NOT** wait in the waiting room.

- **FACT:** Two sets of blood cultures are still required prior to antibiotic administration for patients with neutropenic fever.

- **What sites are appropriate for blood culture collection?**
  - One set **must** be obtained from a peripheral site.
  - The other set **may** be obtained from a port-a-cath or second peripheral site.

- **How are antibiotics administered?**
  - Cefepime should be administered **FIRST**, as gram negative coverage is most important, followed by any additional ordered antibiotics such as vancomycin.
Change Data: Measure 1

ED Arrival to Antibiotic Administration
I Chart (3 SD)

Began Education

Time (Minutes)

Date

1      2      3      4      5       6       7       8       9       10      11

Mean, 175

LCL, 0

UCL, 444
Change Data: Measure 2

Lab Collection to Lab Result
I Chart (3 SD)

Time (Minutes)

Date


1    2    3    4    5    6    7    8    9    10    11    12    13

UCL, 160
Mean, 81
LCL, 0

Began Education
Change Data: Measure 4

Appropriate Antibiotic Administered within 2 Hours

<table>
<thead>
<tr>
<th></th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>2</td>
</tr>
<tr>
<td>Fail</td>
<td>13</td>
</tr>
</tbody>
</table>

n = 13

ASCO Quality Training Program
Conclusions

• Although we were able to introduce a new process for HOCC outpatient chemotherapy patients with FN, we did not attain our aim of reducing our average time from arrival in the ED to administration of cefepime to 120 minutes.

• Although our data set was limited, we went from 50% alignment with national guidelines for appropriate antibiotics to 100% following PDSA for this measure.

• We were able to educate the ED staff on the evidence-based process for the treatment of our target patient population, and developed a staff education tip sheet as of April 25, 2018.

• We did obtain a policy review, and received approval from the laboratory to release preliminary lab results in lieu of waiting for the manual differential as of May 3, 2018.

• An Epic order set for FN is in process with an anticipated launch in August 2018.

• We will continue to use the PDSA methodology to optimize targeted processes.
Lessons Learned

• Difficult to navigate competing initiatives with limited resources

• Better access to relevant data following Epic implementation across the HHC-CI

• Earlier access to Epic report writing resources would have facilitated data analysis

• Although focusing on one HHC organization limited our data set, this enabled a manageable scope for introducing the QTP process – keep focus narrow
Next Steps/Plan for Sustainability

- Epic order set for FN
- Continued staff education; standard workflow
- Continued tracking of FN quality measures and utilization PDSA cycles with expanded team support
- Expand PDSA focus to include patient education
- Expand standard FN process across the HHC System
- Use results of this project to aid in development of predictive analytics for FN patients (active initiative between MIT and HHC-CI)
Thank You!

Questions??