ASCO’s Quality Training Program

Project Title: Reduction of Time from Admission to Initiation of Chemotherapy on Inpatient Hematology and Bone Marrow Transplant Services

Presenter’s Name: Ryan J. Mattison, MD and Rory J. Makielski, MD
Institution: University of Wisconsin Carbone Cancer Center

Date: October 8, 2015
Institutional Overview

• University of Wisconsin Carbone Cancer Center, an NCI designated comprehensive cancer center located in Madison, WI

• Roughly 45 hematologists/oncologists, 10 advanced practitioners and numerous trainees including fellows, residents, and medical students

• Approximately 150 stem cell transplants per year and 250 scheduled chemotherapy admissions per year
Problem Statement

• Patients admitted to the hematology and bone marrow transplant service for scheduled chemotherapy average 7 hours between arriving on the B6/6 inpatient unit and starting chemotherapy. This delay results in later chemotherapy start times leading to decreased patient satisfaction and prolonged hospitalization. Moreover, this lag also leads to a disproportionate amount of chemotherapy assigned to the evening shift. During these hours there is decreased pharmacy staffing and fewer clinicians readily available to clarify treatment orders. All of these factors affect patient safety and may result in increased chemotherapy related errors.
## Team Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryan Mattison, MD</td>
<td>Faculty</td>
</tr>
<tr>
<td>Ruth O’Regan, MD</td>
<td>Division Head and sponsor</td>
</tr>
<tr>
<td>Mike Fallon, PharmD</td>
<td>Pharmacist</td>
</tr>
<tr>
<td>Rory Makielski, MD</td>
<td>Fellow</td>
</tr>
<tr>
<td>Nicole Domask, MS</td>
<td>Quality and Process Engineer</td>
</tr>
<tr>
<td>Kurt Osterby</td>
<td>CCKM</td>
</tr>
<tr>
<td>Eva Allen, NP</td>
<td>Advanced Practice Nurse, Heme</td>
</tr>
<tr>
<td>Blythe Gage, NP</td>
<td>Advanced Practice Nurse, BMT</td>
</tr>
<tr>
<td>Gail Hettrick, RN</td>
<td>Nurse</td>
</tr>
<tr>
<td>Jessica Fischer, PharmD</td>
<td>Pharmacist</td>
</tr>
<tr>
<td>Andrew Brown</td>
<td>Health Unit Coordinator</td>
</tr>
<tr>
<td>Brianna Grahn, RN</td>
<td>Nurse</td>
</tr>
<tr>
<td>Brett Welhouse, RN</td>
<td>Nurse Case Manager</td>
</tr>
<tr>
<td>Hannah Drayers, RN</td>
<td>Nurse</td>
</tr>
<tr>
<td>Mark Juckett, MD</td>
<td>Faculty</td>
</tr>
<tr>
<td>Jean Ligocki,</td>
<td>Social Worker</td>
</tr>
<tr>
<td>Vicki Hubbard, RN</td>
<td>Nursing Manager</td>
</tr>
<tr>
<td>Laurie Kaufman, MSN, RN</td>
<td>QTP Coach</td>
</tr>
</tbody>
</table>
SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE

PROCESS MAP: PRE-INPATIENT ARRIVAL 6/10/2015

1 Decision to admit for chemo/Consent conference decision for BMT (MD)

2 Heme or BMT?

3 MD messages NP to put in reservation

4 NP checks to see how many patients are scheduled for that day

5 More than 3-4 patients?

6 Reschedule to a different day if possible (NP)

7 Put reservation in and put name on calendar (NP)

8 Coordinator schedules admission

9 Coordinator communicates arrival time to patient

10 From home or clinic?

11 Labs and assessment

12 Labs ok?

13 Patient goes home

14 Patient Arrives on B6/6

No standard arrival time

Arrival time not communicated to patients

Rework after consent confirmed

Inconsistency in how recent labs need to be

Last Revised: 12/23/2015

UW Health Process Map

Page 6 of 5
14 Patient Arrives on B6/6

15 Are beds available?

Yes

16 Patient assigned room

No

17 Patient sent to conference room or lounge

18 Provider paged

19a RPh assessment

19b RN begins assessment

19c Provider puts in orders

20 Orders released

21 PICC access needed?

Yes

22 PICC inserted by PICC team

23 PICC team releases order for chest X-ray

24 X-ray procedure

25 X-ray read by PICC RN and radiology

26 Provider changes order to ready to use

No

27 Pre-chemo testing

Prior auth done after admission

No room available

No consistent person paged

RN not notified of orders

No standard process for releasing orders

Wait for PICC team

Wait time for chest X-ray

Wait time for X-ray read

Wait time for order to be placed

Last Revised: 12/23/2015
36 RN notified of new med order

Yes

37 Ready from Pharmacist perspective?

No

34 Attending or Fellow modifies and signs order

38 Second Pharmacist verification

Yes

39 Pharmacist adds treatment note

No

40 RN starts treatment plan verification

Additional delays and issues after hours

RN has to check manually check for 2nd verification

41 Consent current?

Yes

43 BMT or high risk med?

No

42 Contact Fellow or Attending to obtain consent

Consent not always available

44 Charge RN verifies

45 Charge RN reviews with Pharmacist

Yes

46 Need clarification?

No

47 RN writes treatment plan verification note
**SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE**

**PROCESS MAP: Chemo Verification and Administration 6/10/2015**

- **47** RN writes treatment plan verification note

- **48** Chemo arrives on floor

- **49** Pharmacist verifies integrity and checks

  - **50** Pre-meds and pre-hydration complete?
    - **Yes**
      - **52** Vascular access patient?
        - **Yes**
          - **54** RN 1 obtains drug and scanner and takes to patient bedside
          - **55** RN 1 scans drug, hangs on IV pole, sets up pumps with drug and rate of admin, verifies 5 rights, and calls for 2nd RN
        - **No**
          - **53** Troubleshoot vascular access
      - **No**
        - **51** Finish pre-meds

  - **No**
    - **51** Finish pre-meds

- **56** BMT or HD MTX?
  - **Yes**
    - **57** Charge RN does 2nd verification
  - **No**
    - **58** Chemo RN does 2nd verification

- **59** Scan patient and verify

- **60** Start drug

**RN high workload at this time**

**Discharges and admissions occurring**
Unnecessary wait time in chemo admin process

**Causes**

- **Organization**
  - Inconsistency in how recent labs need to be
  - Inconsistency in criteria for signing orders
  - Varying comfort levels of whether or not they need to see patient
  - No standard time for MD to sign chemo order

- **Tasks/Process**
  - No standard arrival time
  - Wait time for lab draw and result
  - Variability in whether chemo should start when ready
  - No consistent person paged
  - Arrival time not communicated to patient or staff
  - Wait time caused by handoffs in line placement process
  - Competing demands (rounding, admission and discharge take priority 7a-12p)

- **Tools/Technology**
  - No dedicated pharmacy tech after 3:30
  - Scanning into record takes more than one day
  - Consent not always available

- **Person**
  - High RN workload at shift change
  - Room not always available

- **Environment**
  - Prior authorization done after admission
  - Arrival time not communicated to patient or staff
Diagnostic Data

• Derived from a retrospective review of charts from December 2014-March 2015 (collected June/July 2015)
• Included 69 patients
Aim Statement

We aim to decrease the average time between admission and initiation of chemotherapy from 7 hours to 5 hours on the inpatient hematology and bone marrow transplant services by 10/1/2015.
Measures

• Measure: Time from admission to the beginning of chemotherapy administration on the inpatient hematology and BMT services

• Patient population: Inpatient hematology and bone marrow transplant patients admitted for chemotherapy

• Data source: Electronic Medical Record

• Data collection frequency: Weekly

• Data quality: Good but not immediately accessible due to delays in coding
Baseline Data

**Time (Minutes) from PICC Placement request to Modification of Maintain PICC Order (Ready to Use)**

- 100.0% maximum: 495
- 99.5%: 495
- 97.5%: 493.85
- 90.0%: 417.6
- 75.0% quartile: 325
- 50.0% median: 236.5
- 25.0% quartile: 153.75
- 10.0%: 81.9
- 2.5%: 0.375
- 0.5%: 0
- 0.0% minimum: 0

**Summary Statistics**

- Mean: 239.95
- Std Dev: 119.42747
- Std Err Mean: 18.883141
- Upper 95% Mean: 278.14476
- Lower 95% Mean: 201.75524
- N: 40

**Time (Minutes) from Modification of PICC Order to Chemo Dose Administration**

- 100.0% maximum: 707
- 99.5%: 707
- 97.5%: 707
- 90.0%: 395.5
- 75.0% quartile: 321.75
- 50.0% median: 247.5
- 25.0% quartile: 99.75
- 10.0%: 28
- 2.5%: -144
- 0.5%: -144
- 0.0% minimum: -144

**Summary Statistics**

- Mean: 220.88235
- Std Dev: 161.68371
- Std Err Mean: 27.728528
- Upper 95% Mean: 277.29647
- Lower 95% Mean: 164.46824
- N: 34
Baseline Data

Time (Minutes) from B6/6 Admission to Physician Chemo Order

Time (Minutes) from Physician Chemo Order to RPH Signing

Quantiles

<table>
<thead>
<tr>
<th>Percentage</th>
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<th>Value</th>
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<tbody>
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Summary Statistics

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<tbody>
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<td>201</td>
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<tr>
<td>Lower 95% Mean</td>
<td>108</td>
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Quantiles

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Summary Statistics

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<tr>
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<td>Std Dev</td>
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<td>Std Err Mean</td>
<td>1.4</td>
<td>Upper 95% Mean</td>
<td>11.0</td>
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<tr>
<td>Lower 95% Mean</td>
<td>5.5</td>
<td>N</td>
<td>70</td>
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Baseline Data

Time (Minutes) from Physician Chemo Order to Chemo Dose Administration

Time (Minutes) from Chemo Start (Due) Time to Chemo Dose Administration

Quantiles

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<tr>
<th>Percentile</th>
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<tbody>
<tr>
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<td>0.5%</td>
<td></td>
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<tr>
<td>0.0%</td>
<td>minimum</td>
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Summary Statistics

- Mean: 258
- Std Dev: 175
- Std Err Mean: 21
- Upper 95% Mean: 300
- Lower 95% Mean: 216
- N: 70
Baseline Data

Time of Day – Admission to B6/6

Quantiles

<table>
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<th>Percentile</th>
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<tbody>
<tr>
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<tr>
<td>99.5%</td>
<td>4:54 PM</td>
</tr>
<tr>
<td>97.5%</td>
<td>4:37 PM</td>
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<td>90.0%</td>
<td>2:28 PM</td>
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<td>75.0%</td>
<td>12:58 PM</td>
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<tr>
<td>50.0%</td>
<td>10:44 AM</td>
</tr>
<tr>
<td>25.0%</td>
<td>9:43 AM</td>
</tr>
<tr>
<td>10.0%</td>
<td>8:36 AM</td>
</tr>
<tr>
<td>2.5%</td>
<td>8:11 AM</td>
</tr>
<tr>
<td>0.5%</td>
<td>7:29 AM</td>
</tr>
<tr>
<td>0.0%</td>
<td>7:29 AM</td>
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</table>

Summary Statistics

Mean: 11:20 AM
Std Dev: 132 MIN
N: 88
### Prioritized List of Changes (Priority/Pay-Off Matrix)

<table>
<thead>
<tr>
<th>Ease of Implementation</th>
<th>Impact</th>
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<tbody>
<tr>
<td>Easy</td>
<td>High</td>
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<tr>
<td>Venous access in advance</td>
<td></td>
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<tr>
<td>Low</td>
<td>Standardize Patient arrival times</td>
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<tr>
<td>Dedicated RN for chemo checks</td>
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<tr>
<td>Standardize time prior labs good for</td>
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</table>

- Sign chemo orders prior to admission
- Standardize Patient arrival times
<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>8/1/2015-present</td>
<td>Chemo orders signed in advance Patients told to come at 9AM</td>
<td>Details upcoming</td>
<td>Pending</td>
</tr>
</tbody>
</table>
Change Data - Outcome Measures

IM Control Chart of Time from 1st Contact to 1st Dose Chemo

Pre-intervention avg = 404 minutes
Post-intervention avg = 360 minutes
Change Data- Outcome Measures

**IM Control Chart of Time from 1st Contact to 1st Dose Chemo**
- **BMT Service**
  - Pre-intervention avg= 530 minutes
  - Post-intervention avg= 477 minutes

**IM Control Chart of Time from 1st Contact to 1st Dose Chemo**
- **Hematology Service**
  - Pre-intervention avg= 342 minutes
  - Post-intervention avg= 257 minutes
## Change Data - Process Measures

**Chemotherapy Orders Signed Prior to Admission**

<table>
<thead>
<tr>
<th>Both Services</th>
<th>No</th>
<th>Yes</th>
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</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>(72.7%)</td>
<td>(37.3%)</td>
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<tr>
<td>Post-intervention</td>
<td>12</td>
<td>17</td>
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<tr>
<td>(41.4%)</td>
<td>(58.6%)</td>
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### Bone Marrow Transplant Service

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Pre-intervention</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>(100%)</td>
<td>(0%)</td>
<td></td>
</tr>
<tr>
<td>Post-intervention</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>(69.2%)</td>
<td>(30.8%)</td>
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### Hematology Service

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Pre-intervention</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>(59.5%)</td>
<td>(40.5%)</td>
<td></td>
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<tr>
<td>Post-intervention</td>
<td>3</td>
<td>13</td>
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<tr>
<td>(18.8%)</td>
<td>(81.2%)</td>
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</table>
Change Data- Admission and Chemo Start Times Did not Change

Admission Times Pre and Post-intervention

Pre-intervention avg= 10:30 AM
Post-intervention avg= 10:32 AM

Chemotherapy Start Times Pre and Post-intervention

Pre-intervention avg= 5:09 PM
Post-intervention avg= 4:32 PM
Change Data- Balance Measures

(Surrogate for Nursing Workload)

**IM Control Chart of Time from Scheduled Start Time to Administration**

Pre-intervention avg= 74 minutes
Post-intervention avg= 103 minutes

(Surrogate for Pharmacy Workload)

**IM Control Chart of Time from RPh Chemo Release to RPh Double Check**

Pre-intervention avg= 21 minutes
Post-intervention avg= 25 minutes
Qualitative feedback- physicians

1. Are you aware that there is an ongoing initiative for clinic physicians to sign chemotherapy orders prior to scheduled Hematology and BMT admissions to B6/6?

2. Have you noticed this change impacting your outpatient clinic workflow?

3. Have you noticed this change impacting your inpatient workflow?

4. Do you feel comfortable as an inpatient attending physician having inpatient orders signed by the patient's outpatient physician?

5. Have you experienced or heard of any issues that have impacted patient safety as a result of this initiative?

6. Do you have any other comments or feedback regarding this new process?
Qualitative feedback - physicians

1. Are you aware that there is an ongoing initiative for clinic physicians to sign chemotherapy orders prior to scheduled Hematology and BMT admissions to B6/6? **YES (7/7)**

2. Have you noticed this change impacting your outpatient clinic workflow? **NO (4/5)**, other physician notices minor change

3. Have you noticed this change impacting your inpatient workflow? **NO (6/6 with some creative asides thrown in)**

4. Do you feel comfortable as an inpatient attending physician having inpatient orders signed by the patient's outpatient physician? **YES (5/6)**

5. Have you experienced or heard of any issues that have impacted patient safety as a result of this initiative? **1 real concern, multiple theoretical**

6. Do you have any other comments or feedback regarding this new process?
Qualitative feedback- others

• NP- “I am also predicting that shifting the burden of checking chemo orders to day shift RN's will end up resulting in delay. The day nurses have more variables to juggle, admissions, rounds, etc....”

• RN- “It seems like staff like knowing when to expect the patient. However, they have also voiced concerns about not having time to admit the patient, check off and start chemo orders, round with the teams, and give blood products-supplements, etc. which are mostly given on day shift”

• Pharmacy- “labs have been taking awhile. Just today labs took well over 2 hours for a patient and previous labs were three weeks old. We'll see what the data says but it may be helpful to have everyone go to outpatient labs prior to coming up to B6/6. All disciplines seem to be giving a good effort. Kind of rewarding to see positive team dynamics.”
Conclusions

• We were able to successfully change our process with an improvement in orders signed prior to admission (37% vs 59%)
• An improvement was seen in time from admission to chemo starting on B6/6 (44 minutes)
• By individual service, hematology showed an 85 minute improvement and BMT showed a 53 minute improvement
Next Steps/Plan for Sustainability

• Separate BMT and hematology service as they appear to have different needs issues
• Continue to ensure safety of system
• Consider other issues- PICC/venous access, labs