

ASCO's Quality Training Program

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

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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

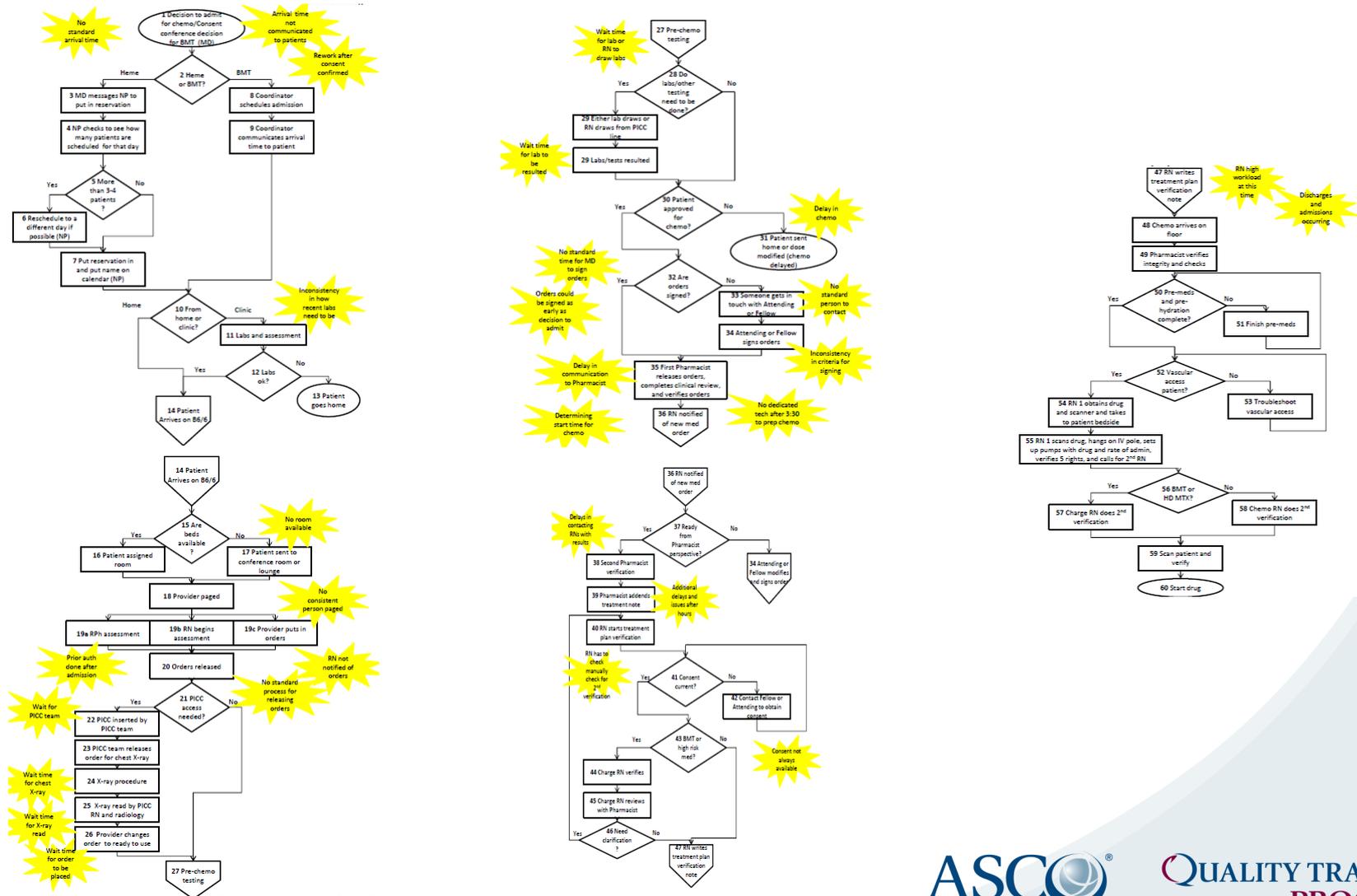
- Patients admitted to the hematology and bone marrow transplant service for scheduled chemotherapy average 7 hours between arriving on the B6/6 inpatient unit and starting chemotherapy. This delay results in later chemotherapy start times leading to decreased patient satisfaction and prolonged hospitalization. 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

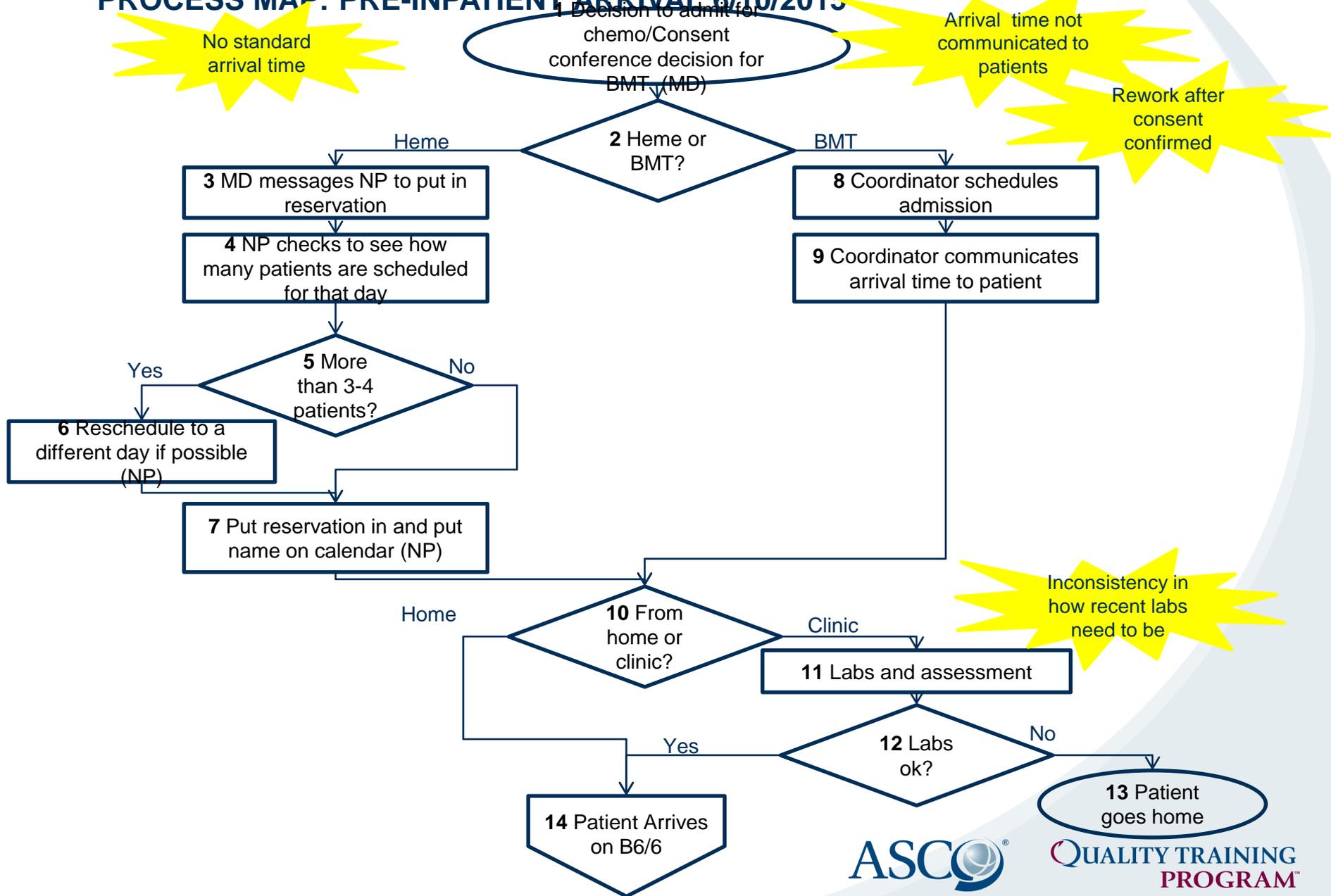
| | |
|---------------------|-------------------------------|
| Ryan Mattison, MD | Faculty |
| Ruth O'Regan, MD | Division Head and sponsor |
| Mike Fallon, PharmD | Pharmacist |
| Rory Makielski, MD | Fellow |
| Nicole Domask, MS | Quality and Process Engineer |
| Kurt Osterby | CCKM |
| Eva Allen, NP | Advanced Practice Nurse, Heme |
| Blythe Gage, NP | Advanced Practice Nurse, BMT |
| Gail Hettrick, RN | Nurse |

| | |
|-------------------------|-------------------------|
| Jessica Fischer, PharmD | Pharmacist |
| Andrew Brown | Health Unit Coordinator |
| Brianna Grahm, RN | Nurse |
| Brett Welhouse, RN | Nurse Case Manager |
| Hannah Drayers, RN | Nurse |
| Mark Juckett, MD | Faculty |
| Jean Ligocki, | Social Worker |
| Vicki Hubbard, RN | Nursing Manager |
| Laurie Kaufman, MSN, RN | QTP Coach |

Process Map

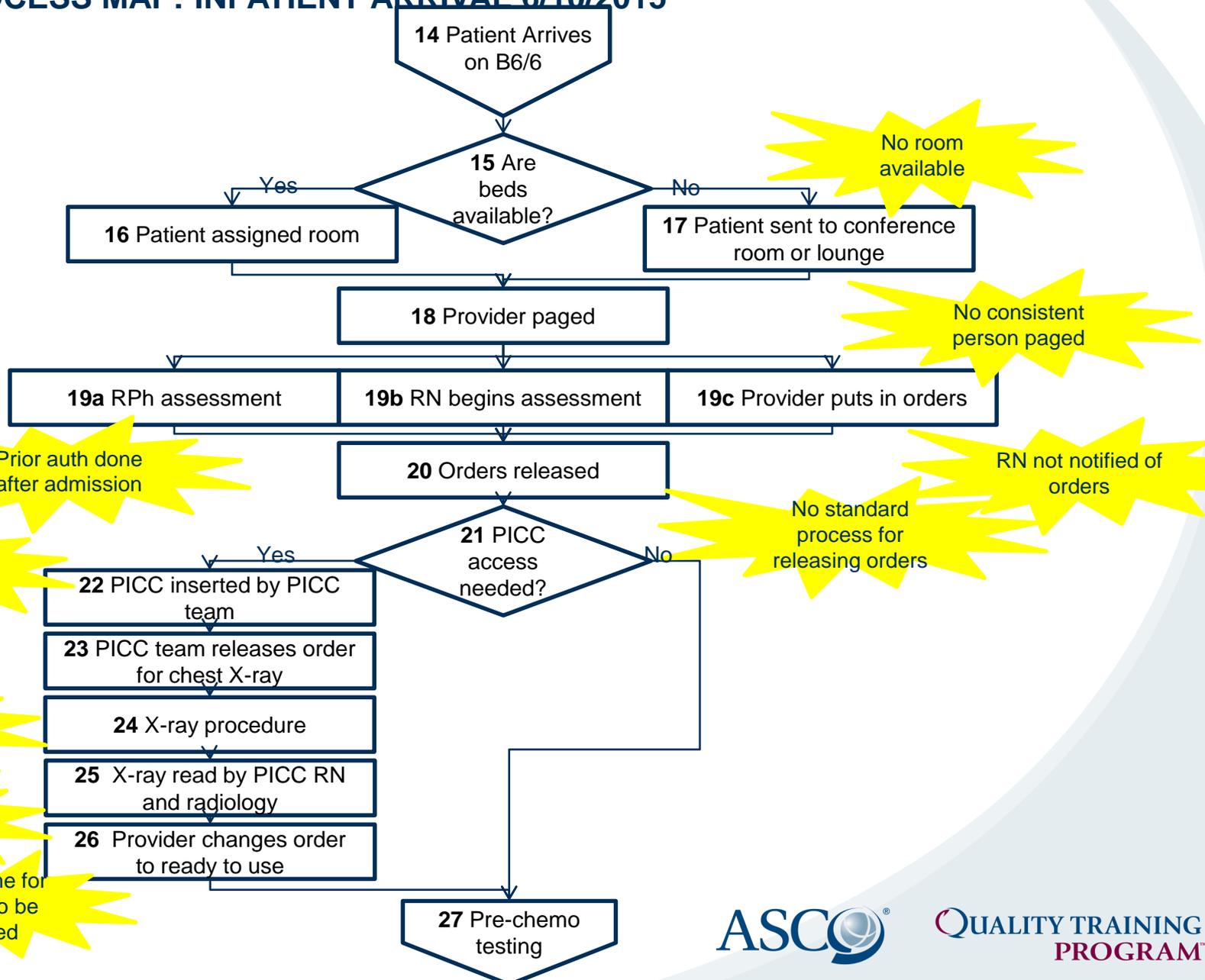


SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE PROCESS MAP: PRE-INPATIENT ARRIVAL 6/10/2015



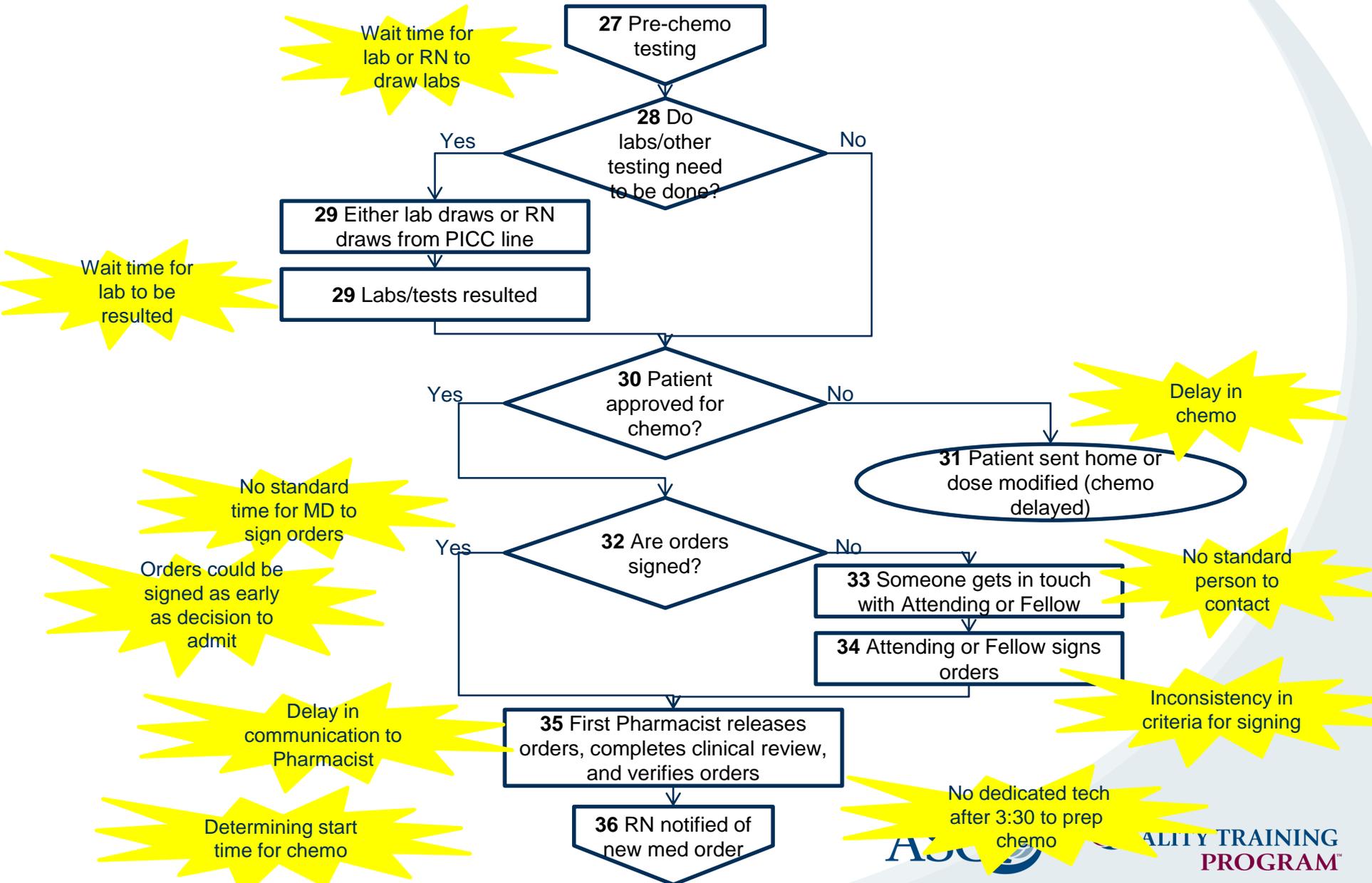
SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE

PROCESS MAP: INPATIENT ARRIVAL 6/10/2015



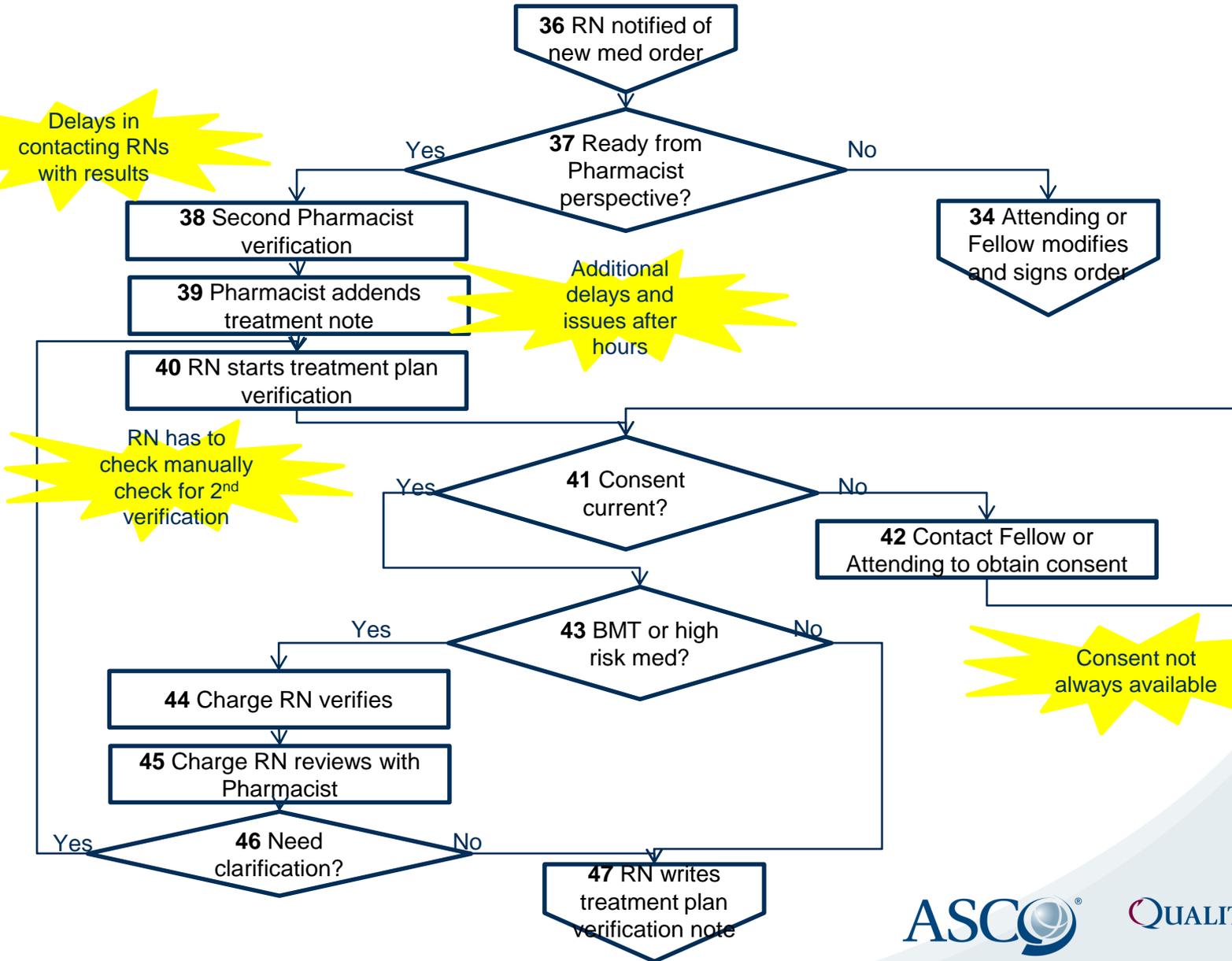
SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE

PROCESS MAP: Pre-Chemo Testing 6/10/2015



SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE

PROCESS MAP: Pre-Chemo Verifications 6/10/2015



Delays in contacting RNs with results

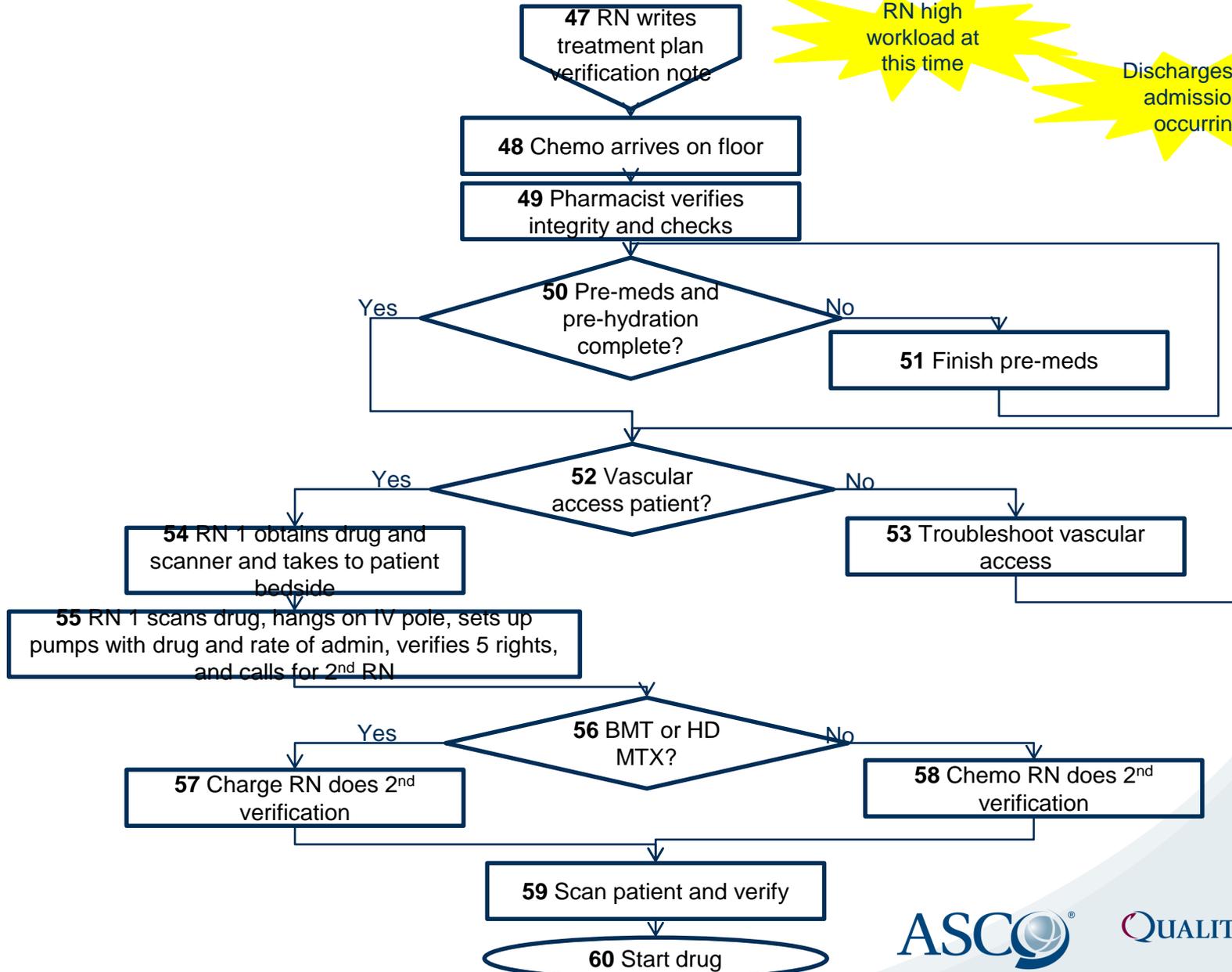
Additional delays and issues after hours

RN has to check manually check for 2nd verification

Consent not always available

SCHEDULED CHEMOTHERAPY ADMISSION CURRENT STATE

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



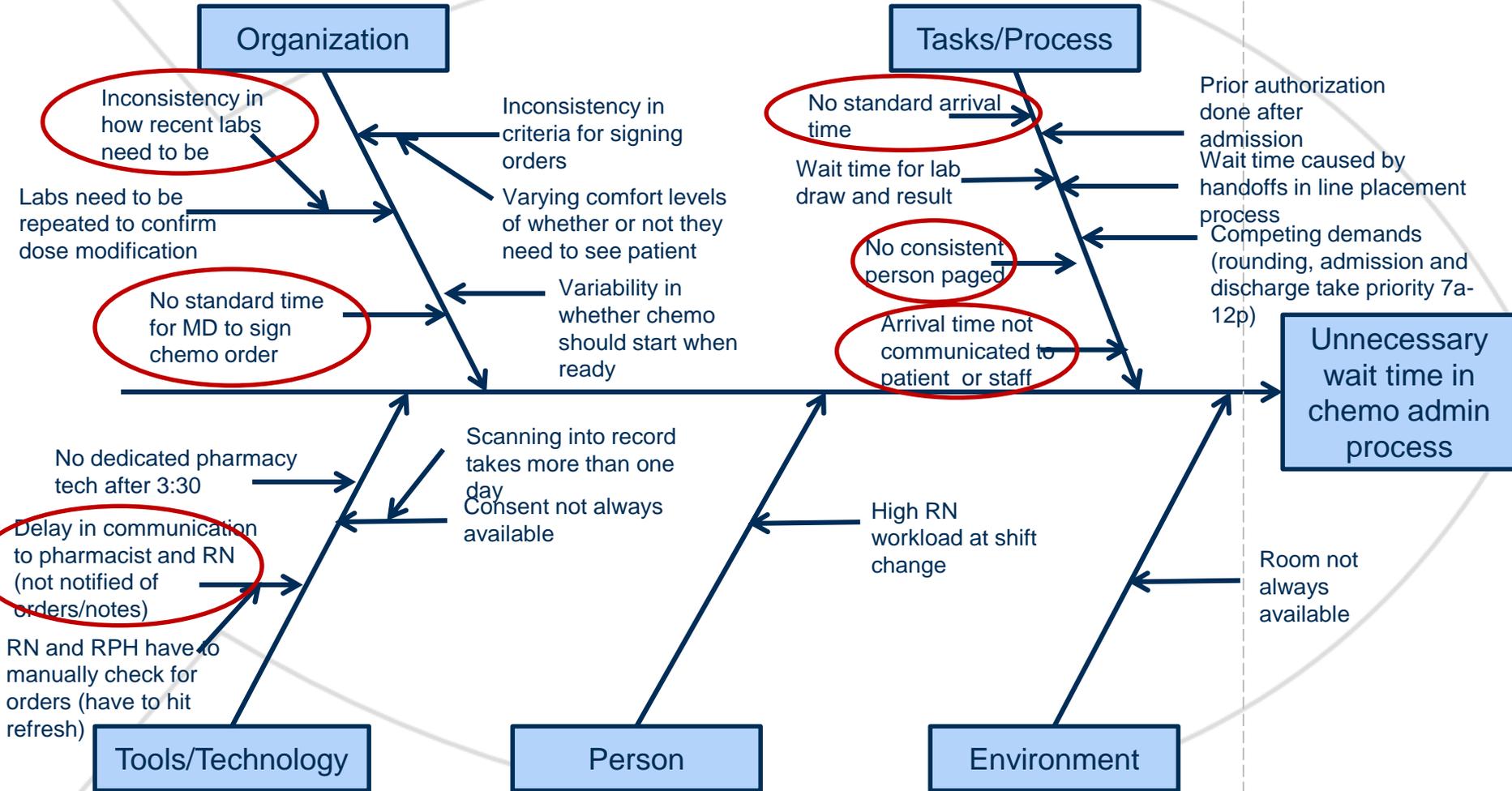
RN high workload at this time

Discharges and admissions occurring



Cause & Effect Diagram

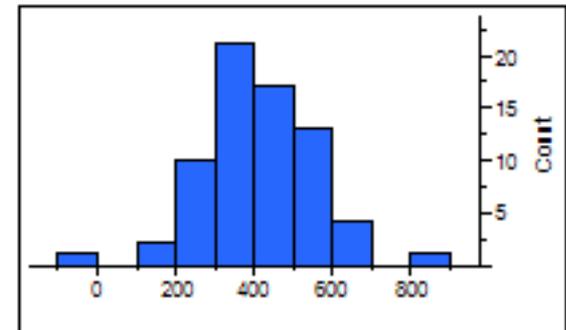
Causes Effect



Diagnostic Data

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

Time (Minutes) from B6/6 Admission to Chemo Dose Administration



Quantiles

| | | |
|--------|----------|--------|
| 100.0% | maximum | 808 |
| 99.5% | | 808 |
| 97.5% | | 705.25 |
| 90.0% | | 595 |
| 75.0% | quartile | 513.5 |
| 50.0% | median | 402 |
| 25.0% | quartile | 313.5 |
| 10.0% | | 244 |
| 2.5% | | 127 |
| 0.5% | | -71 |
| 0.0% | minimum | -71 |

Summary Statistics

| | |
|----------------|-------|
| Mean | 411.3 |
| Std Dev | 142.8 |
| Std Err Mean | 17.2 |
| Upper 95% Mean | 445.6 |
| Lower 95% Mean | 377.0 |
| N | 69.0 |

Aim Statement

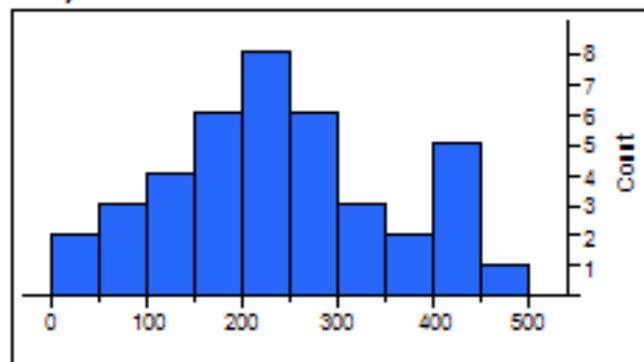
We aim to decrease the average time between admission and initiation of chemotherapy from 7 hours to 5 hours on the inpatient hematology and bone marrow transplant services by 10/1/2015.

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)



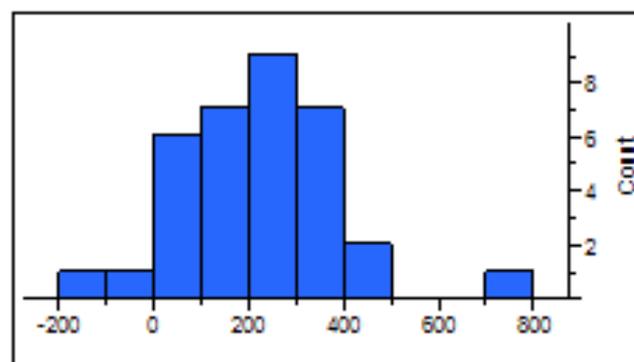
Quantiles

| | | |
|--------|----------|--------|
| 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



Quantiles

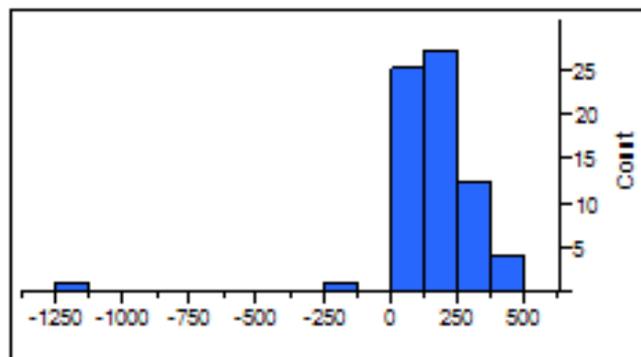
| | | |
|--------|----------|--------|
| 100.0% | maximum | 707 |
| 99.5% | | 707 |
| 97.5% | | 707 |
| 90.0% | | 395.5 |
| 75.0% | quartile | 321.75 |
| 50.0% | median | 247.5 |
| 25.0% | quartile | 99.75 |
| 10.0% | | 28 |
| 2.5% | | -144 |
| 0.5% | | -144 |
| 0.0% | minimum | -144 |

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



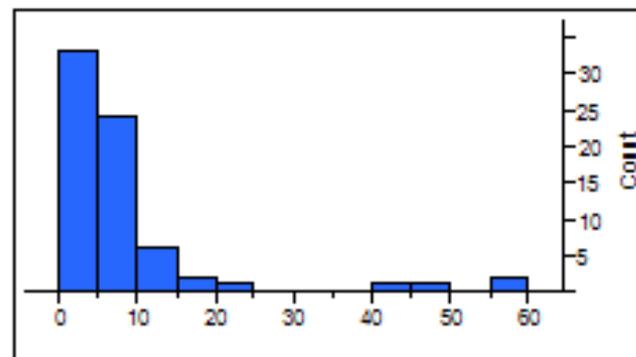
Quantiles

| | | |
|--------|----------|---------|
| 100.0% | maximum | 455 |
| 99.5% | | 455 |
| 97.5% | | 414.7 |
| 90.0% | | 326.1 |
| 75.0% | quartile | 246.5 |
| 50.0% | median | 157 |
| 25.0% | quartile | 88.5 |
| 10.0% | | 48.2 |
| 2.5% | | -390.07 |
| 0.5% | | -1155 |
| 0.0% | minimum | -1155 |

Summary Statistics

| | |
|----------------|-----|
| Mean | 155 |
| Std Dev | 195 |
| Std Err Mean | 23 |
| Upper 95% Mean | 201 |
| Lower 95% Mean | 108 |
| N | 70 |

Time (Minutes) from Physician Chemo Order to RPH Signing



Quantiles

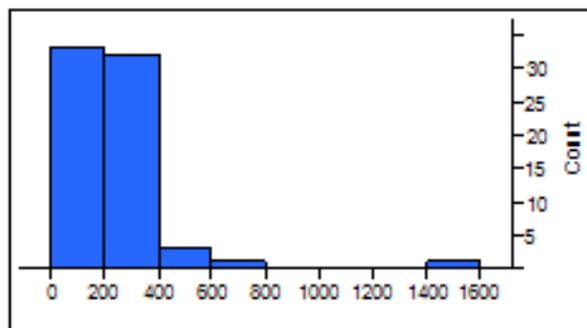
| | | |
|--------|----------|--------|
| 100.0% | maximum | 59 |
| 99.5% | | 59 |
| 97.5% | | 56.675 |
| 90.0% | | 14.8 |
| 75.0% | quartile | 8.25 |
| 50.0% | median | 5 |
| 25.0% | quartile | 3 |
| 10.0% | | 1 |
| 2.5% | | 1 |
| 0.5% | | 1 |
| 0.0% | minimum | 1 |

Summary Statistics

| | |
|----------------|------|
| Mean | 8.2 |
| Std Dev | 11.5 |
| Std Err Mean | 1.4 |
| Upper 95% Mean | 11.0 |
| Lower 95% Mean | 5.5 |
| N | 70 |

Baseline Data

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



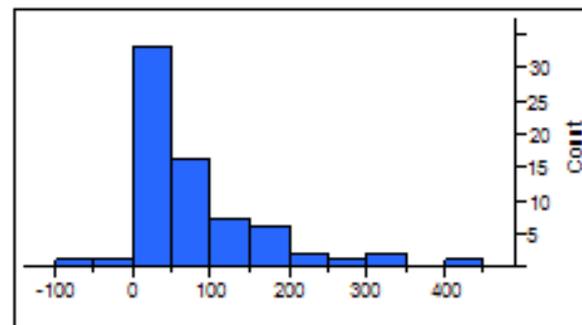
Quantiles

| | | |
|--------|----------|---------|
| 100.0% | maximum | 1473 |
| 99.5% | | 1473 |
| 97.5% | | 806.5 |
| 90.0% | | 382.5 |
| 75.0% | quartile | 307.5 |
| 50.0% | median | 208 |
| 25.0% | quartile | 177 |
| 10.0% | | 152.2 |
| 2.5% | | 121.025 |
| 0.5% | | 97 |
| 0.0% | minimum | 97 |

Summary Statistics

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

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



Quantiles

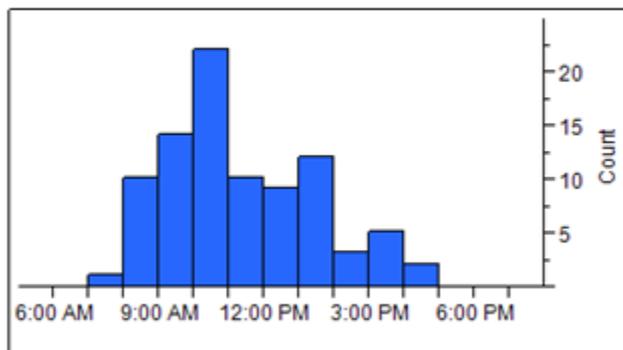
| | | |
|--------|----------|-------|
| 100.0% | maximum | 441 |
| 99.5% | | 441 |
| 97.5% | | 354.2 |
| 90.0% | | 183.5 |
| 75.0% | quartile | 116.5 |
| 50.0% | median | 49.5 |
| 25.0% | quartile | 20.25 |
| 10.0% | | 5.5 |
| 2.5% | | -24 |
| 0.5% | | -55 |
| 0.0% | minimum | -55 |

Summary Statistics

| | |
|----------------|-------|
| Mean | 79.5 |
| Std Dev | 88.3 |
| Std Err Mean | 10.6 |
| Upper 95% Mean | 100.5 |
| Lower 95% Mean | 58.4 |
| N | 70 |

Baseline Data

Time of Day – Admission to B6/6



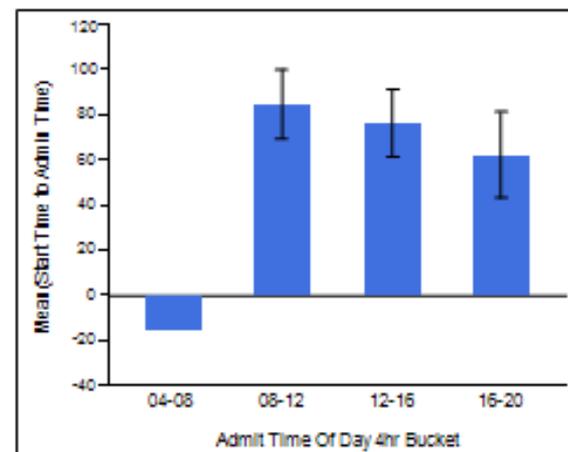
Quantiles

| | | |
|--------|----------|----------|
| 100.0% | maximum | 4:54 PM |
| 99.5% | | 4:54 PM |
| 97.5% | | 4:37 PM |
| 90.0% | | 2:28 PM |
| 75.0% | quartile | 12:58 PM |
| 50.0% | median | 10:44 AM |
| 25.0% | quartile | 9:43 AM |
| 10.0% | | 8:36 AM |
| 2.5% | | 8:11 AM |
| 0.5% | | 7:29 AM |
| 0.0% | minimum | 7:29 AM |

Summary Statistics

| | |
|---------|----------|
| Mean | 11:20 AM |
| Std Dev | 132 MIN |
| N | 88 |

Time (Minutes) from Chemo Start (Due) Time to Chemo Dose Administration by B6/6 Admit Time of Day



Each error bar is constructed using 1 standard error from the mean.

| Admit TOD 4hr Bucket | N | Mean | Median | Std Dev | Min | Max |
|----------------------|----|-------|--------|---------|-------|-------|
| 04-08 | 1 | -15.0 | -15.0 | | -15.0 | -15.0 |
| 08-12 | 56 | 84.8 | 48.0 | 97.7 | -55.0 | 441 |
| 12-16 | 29 | 76.1 | 56.5 | 76.0 | 1.00 | 255 |
| 16-20 | 2 | 62.0 | 62.0 | 26.9 | 43.0 | 81.0 |

Prioritized List of Changes (Priority/Pay-Off Matrix)

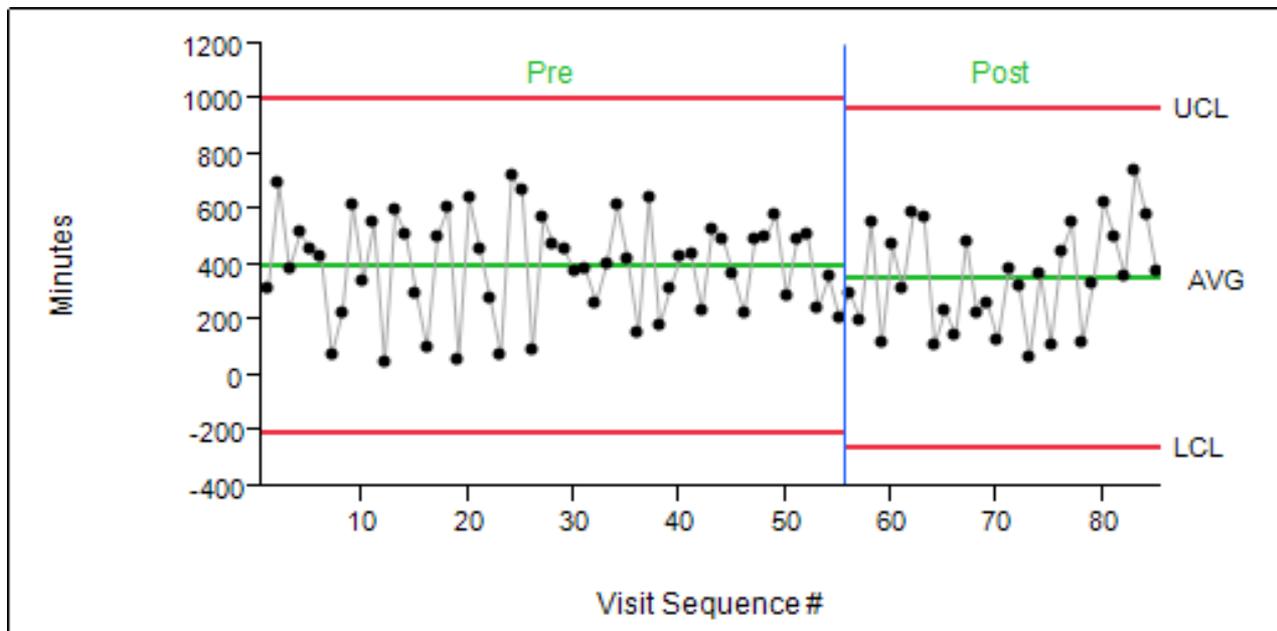
| | | | |
|---------------|-------------|--|--------------------------------------|
| Impact | High | Sign chemo orders prior to admission | Venous access in advance |
| | Low | Standardize Patient arrival times Standardize time prior labs good for | Dedicated RN for chemo checks |
| | | Easy | Difficult |
| | | Ease of Implementation | |

PDSA Plan (Tests of Change)

| Date of PDSA cycle | Description of intervention | Results | Action steps |
|--------------------|--|------------------|--------------|
| 8/1/2015-present | Chemo orders signed in advance Patients told to come at 9AM | Details upcoming | Pending |
| | | | |
| | | | |

Change Data- Outcome Measures

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

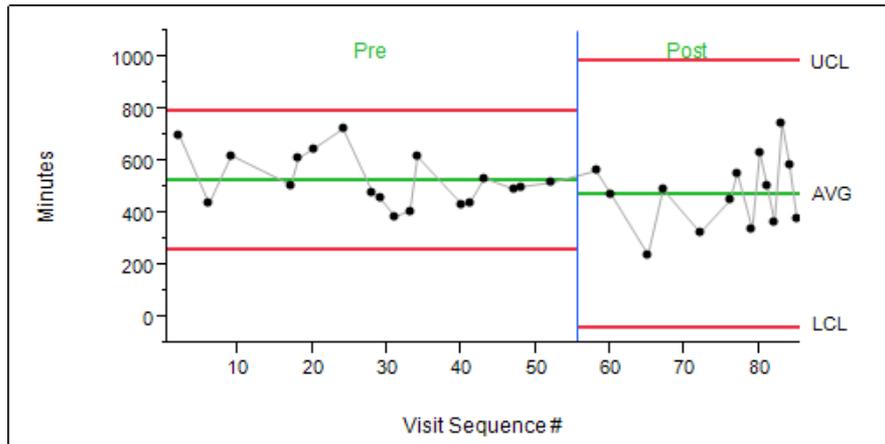


Pre-intervention avg= 404 minutes

Post-intervention avg= 360 minutes

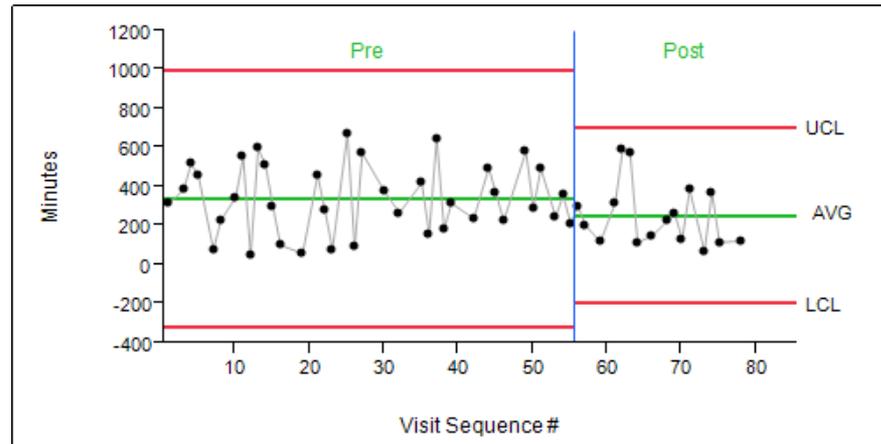
Change Data- Outcome Measures

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

Both Services

| | No | Yes |
|-------------------|---------------|---------------|
| Pre-intervention | 40 (72.7%) | 15 (37.3%) |
| Post-intervention | 12 (41.4%) | 17 (58.6%) |

Bone Marrow Transplant Service

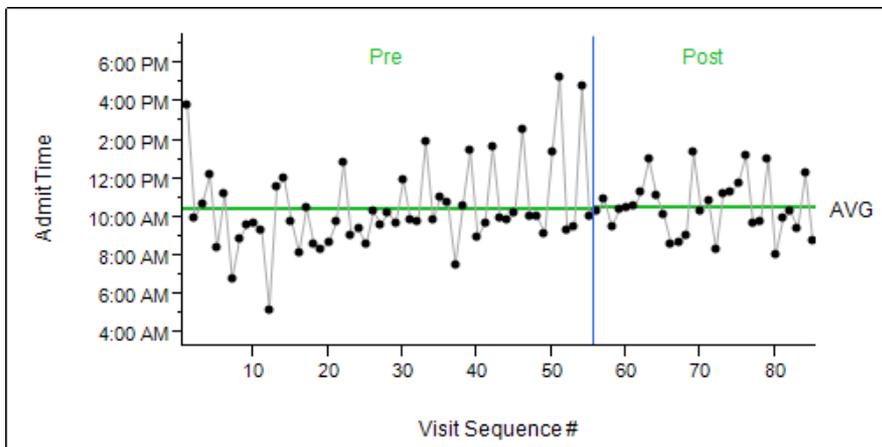
| | No | Yes |
|-------------------|--------------|--------------|
| Pre-intervention | 18 (100%) | 0 (0%) |
| Post-intervention | 9 (69.2%) | 4 (30.8%) |

Hematology Service

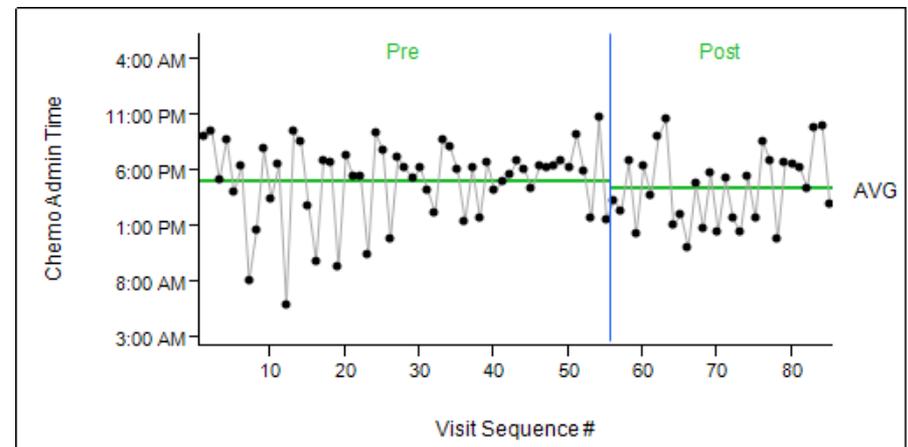
| | No | Yes |
|-------------------|---------------|---------------|
| Pre-intervention | 22 (59.5%) | 15 (40.5%) |
| Post-intervention | 3 (18.8%) | 13 (81.2%) |

Change Data- Admission and Chemo Start Times Did not Change

Admission Times Pre and Post-intervention



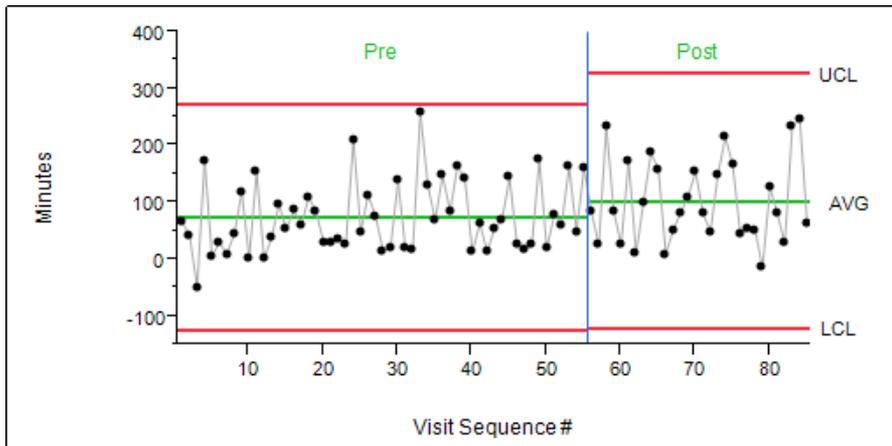
Chemotherapy Start Times Pre and Post-intervention



Change Data- Balance Measures

(Surrogate for Nursing Workload)

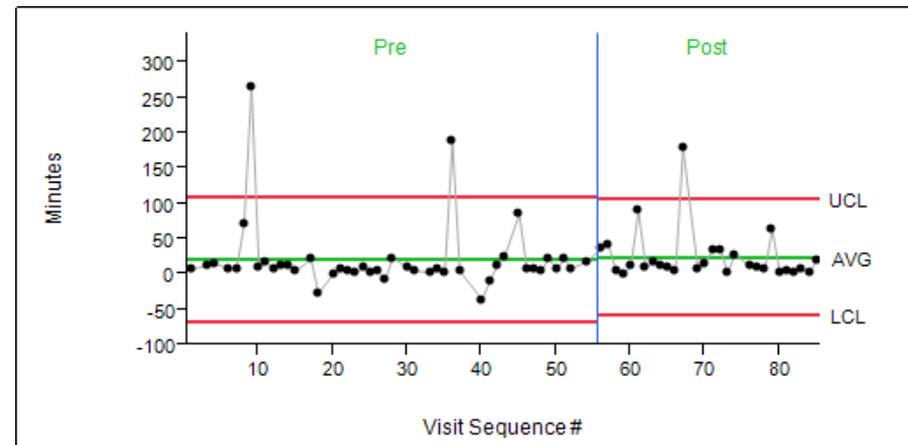
IM Control Chart of Time from Scheduled Start Time to Administration



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



Baseline Data

