ASCO’s Quality Training Program

A multidisciplinary effort to decrease time from admission to chemotherapy on an inpatient oncology unit

University of Virginia Health System
January 2017
# Team Members

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Job Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Sponsor</td>
<td>Michael Keng, MD</td>
<td>Oversees the role of team leader; inpatient oncology unit medical director; liaison with the inpatient hematology/ oncology unit</td>
</tr>
<tr>
<td>Team Leader &amp; Facilitator</td>
<td>Louise Man, MD</td>
<td>Primary data collection; core team member for project direction. Facilitate team meetings; delegate and coordinate individual team members’ role</td>
</tr>
<tr>
<td>Core Team Member</td>
<td>Jeremy Sen, PharmD, BCOP</td>
<td>Data collection; core team member for project direction; heme/onc clinical pharmacist; pharmacy representative</td>
</tr>
<tr>
<td>Core Team Member</td>
<td>Jeanne Cahan, BSN, RN</td>
<td>Data collection; core team member for project direction; hematology/oncology/ stem cell transplant; nurse representative</td>
</tr>
<tr>
<td>Other Team Member</td>
<td>Kathlene DeGregory, PharmD, BCOP</td>
<td>Pharmacy clinical coordinator for heme/onc and stem cell transplant; pharmacy representative</td>
</tr>
<tr>
<td>Other Team Member</td>
<td>Tanya Thomas, BSN, RN, OCN</td>
<td>Inpatient oncology unit assistant nurse manager; nurse representative; liaison with the inpatient hematology/ oncology unit</td>
</tr>
<tr>
<td>Other Team Member</td>
<td>Elizabeth Daniels, RN, MSN</td>
<td>Inpatient oncology unit nurse manager; nurse representative; liaison with the inpatient hematology/ oncology unit</td>
</tr>
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<td>Other Team Member</td>
<td>Lisa Huntsinger, RN, MSN, CCRN</td>
<td>Inpatient oncology unit nursing director; nurse representative; liaison with the inpatient hematology/ oncology unit</td>
</tr>
<tr>
<td>Other Team Member</td>
<td>Erin McLoughlin, MD</td>
<td>Chief internal medicine resident; medical housestaff representative</td>
</tr>
<tr>
<td>Other Team Member</td>
<td>Mark Smolkin, MS</td>
<td>Statistician</td>
</tr>
<tr>
<td>QTP Improvement Coach</td>
<td>Amy Guthrie, RN</td>
<td>Provides remote support to the team regarding the science of quality improvement and participation in the QTP.</td>
</tr>
</tbody>
</table>
Institutional Overview

Tertiary care referral center
585-bed hospital
Cancer Center: an NCI-designated cancer center

Catchment area: Northern VA, central VA, western VA, eastern WV, eastern TN
Many oncology patients at the University of Virginia are admitted for scheduled inpatient chemotherapy (chemo) administration for established diagnoses. These patients frequently experience delays in starting chemo after their arrival on the inpatient oncology unit. Delays are made known by patient complaints and also directly observed by physicians, nurses, and clinical pharmacists. These delays negatively impact healthcare resource utilization, length of stay, and may delay other patients’ admissions.
Green = “value added.” Yellow = “value enabling.” Red = “waste.”
Measures

- Baseline patient population: 340 planned inpatient chemo encounters between Jan. and Dec. 2015
- Calculation methodology: 100 randomly selected encounters
- Excluded:
  - Patients who did not receive chemo
  - Patients receiving IL-2, octreotide, induction for acute leukemia, stem cell transplantation, or patients on clinical trials for treatment

- Median time to chemo (TTC) for these encounters was 6.7 hours

- Limitations in data quality: Retrospective; sample size could have been larger
Data collected for each encounter

- MRN, age, sex, race, zip code
- Hematologic/ oncologic diagnosis
- Primary oncologist
- Admission date
- Time of pre-admission clinic appointment (if applicable)
- Chemotherapy (chemo) regimen
- Chemo regimen cycle number
- Isolation requirement (Y/N)
- Admitting service: resident, heme fellow, onc fellow, Neuro-Onc
- Time of patient arrival on floor
- Pre-admission procedure required? If so, what procedures?
- Time of last pre-chemo procedure completion
- Time of admit order signature
- Time of first inpatient vital signs
- Time of lab order, collection, and result
- Time of chemo order signature and release
- Time of IVF start
- Time of first pre-medication
- Time of meeting urine output ± urine pH parameters (if applicable)
- Time of chemo start
- Chemo issue after start (e.g., reaction)?
- Was chemo was sped up (Y/N)?
- Discharge date and time
- Hospital length of stay
- Oncology unit census on the day of chemo start
- Number of chemo nurses on shift at the time of chemo start
Time from Arrival to Start of Chemotherapy
(XMR chart, 3 sigma)

Median TTC: 6.7 hours (range 1.5-105.3 h)

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)
Aim Statement

Aim: Decrease the time to chemotherapy initiation (TTC) by 30% from baseline. There are no national standards on TTC, so a goal decreased of 30% was felt to be logical and appropriate.

Specific: Decrease by 30% from baseline
Measurable: Median time (in hours) between the time of patient arrival to the inpatient heme/onc unit and the start of chemo
Attainable: Felt to be logical and appropriate
Relevant: Patient satisfaction, utilization of healthcare resources
Time bound: By June 2017
Pareto Chart

Time spent from previous to current event (in minutes)

Proportion of TTC

Previous event to current event
Priority Matrix

Low

Pharmacist reviews & fixes tx plan 1 day prior
Rx oral bicarb for pt to take beforehand if HD-MTX
Pt called w/ reminder of time to arrive 1 day prior (esp if no clinic appt)

High

Admitting MD required to communicate w/ inpatient team and pharm
Beacon plans reworked: UOP param removed if not needed
Remove chemo consent

Low

Set specific admit times

High

All pts seen by LIP in clinic prior to admit
Protocolize hydration adj for plans w/ UOP param
For UOP req: IVF prehydration in ECCC
MD signs chemo before admit
Reminders for MDs to sign chemo before admit

Easy

Single registration process
Pts go directly to 8W from ECCC
Outpatient lab draw prior
Outpatient port access prior
Procedure prioritization for heme/onc pts

Difficult

Standardize po hydration prior to admit for those w/ UOP param
Rx oral bicarb for pt to take beforehand if HD-MTX

Pt called w/ reminder of time to arrive 1 day prior (esp if no clinic appt)

Set specific admit times

Remove chemo consent

Pharmacist reviews & fixes tx plan 1 day prior

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For UOP req: IVF prehydration in ECCC

Outpatient lab draw prior

Pt called w/ reminder of time to arrive 1 day prior (esp if no clinic appt)

Easy

Difficult

Highlight interventions are the ones our team chose to pursue
# PDSA Plan (Tests of Change)

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<tr>
<th>Date of PDSA Cycle</th>
<th>Description of Intervention</th>
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| Effective 1/18/16 | - Chemotherapy consent process was reformed to reflect Virginia state law  
- Previous state: paper consent required. Frequently misplaced and/or not scanned into EMR and would delay starting chemo  
- New electronic documentation done; searchable  
- Team sampled admissions for month of March 2016 |         |             |
**PDSA #1: Change Data**

**Time from Arrival to Start of Chemotherapy**

(XMR chart, 3 sigma)

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)

PDSA cycle 1: consecutive patient encounters from March 2016 (n=19)

<table>
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<th>Patient Encounters (date)</th>
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**Baseline:** median 6.7 h

**PDSA cycle 1:** median 7.2 h

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*Lower Control Limit (<0 h) - Upper Control Limit*

*Median - Individual Value*
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<td>Maintained chemo consent reform for convenience of patient and physician</td>
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<td>- Reservation calendar used to reserve beds for admission lists specific times for pts to arrive&lt;br&gt;- Took effect on 1/14/16</td>
<td>- Beds were not available at the set scheduled times.&lt;br&gt;- Intervention was not enforced</td>
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<td>- Clinical pharmacist reviews treatment plan 1 business day prior to planned patient arrival&lt;br&gt; - Standardized checklist used for each review</td>
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PDSA #2: Change Data

Time from Arrival to Start of Chemotherapy
(XMR chart, 3 sigma)

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)

PDSA cycle 1: consec patient encounters from March 2016 (n=19)
PDSA cycle 2: consec patient encounters from 11/22-12/30/16 (n=30)

Baseline:
median 6.7 h

PDSA cycle 1:
median 7.2 h

PDSA cycle 2:
median 6.6 h
PDSA #2: Change Data

• ~90% pre-review rate

• 2 instances where pre-review revealed the patients did not need to be admitted.
  • Hospital bed reservations were cancelled

• 2 instances where pre-review revealed need for custom creation of chemo treatment plans
  • Custom plans were built one day prior to admission
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<td>N=30&lt;br&gt;(11/22-12/30/16)&lt;br&gt;Median TTC 6.6 h</td>
<td>TBD (ongoing)</td>
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</table>
Discussion

• XMR charts show there are many outliers in baseline population

• Many variations in:
  • Sequence of events prior to chemo start: procedures, consults, clinic appointments
  • Chemo regimen
  • Parameter requirements (e.g., urine output)
Time from Arrival to Start of Chemotherapy
(XMR chart, 3 sigma)

Median TTC: 6.7 hours (range 1.5-105.3 h)

All outliers were examined.

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)
**Time from Arrival to Start of Chemotherapy**

(XMR chart, 3 sigma)

**Median TTC: 6.7 hours (range 1.5-105.3 h)**

All outliers were examined.

Most were requiring procedures, consults, or both prior to starting chemo.

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)

---

**Proc = procedure**  
**Cons = consult**  
**Tx = treatment-related issue**  
**Param = parameter requirement**
PDSA #1: Change Data

Time from Arrival to Start of Chemotherapy

- Median
- Lower Control Limit (<0 h)
- Upper Control Limit
- Individual Value

Baseline

PDSA cycle 1

Individual Patient Encounters (date)
PDSA #2: Change Data

Time from Arrival to Start of Chemotherapy
(XMR chart, 3 sigma)

Baseline: Randomly selected patient encounters from 2015 (n=100 out of 340)
PDSA cycle 1: consec patient encounters from March 2016 (n=19)
PDSA cycle 2: consec patient encounters from 11/22-12/30/16 (n=30)
Conclusions

• Qualitative and quantitative tools showed us where “problem areas” were (or were not)

• Did not meet aim of decreasing TTC by 30%

Next Steps

• PDSA cycles targeting patient encounters requiring urine parameters

• Patients skipping admission office step in process map

• Pre-admission clinic visits: exam, labs, chemo signature

Sustainability

• Plan other PDSA cycles spring and summer 2017

• Regularly update to UVA Medical Center Medication Usage Safety & Informatics Subcommittee and Cancer Center leadership

In Closing
Thank you

ASCO QTP
Amy Guthrie
Mike Keng
Kathy Degregory
Tanya Thomas
Liz Daniels
Lisa Huntsinger
Erin McLoughlin

Our patients
Appendix Slides
Interventions in blue target admissions where urine parameters are required for treatment

Pharmacist reviews & fixes tx plan 1 day prior

Rx oral bicarb for pt to take beforehand if HD-MTX

Admitting MD required to communicate w/ inpatient team and pharm

Beacon plans reworked: UOP param removed if not needed

Single registration process

Pts go directly to 8W from ECCC

For UOP req: IVF prehydration in ECCC

MD signs chemo before admit

Reminders for MDs to sign chemo before admit

Add more nurses

Add more hosp rooms

24-hr chemo pharmacists

Remove chemo consent

Standardize po hydration prior to admit for those w/ UOP param

Outpatient lab draw prior

Outpatient port access prior

Procedure prioritization for heme/onc pts

Pt called w/ reminder of time to arrive 1 day prior (esp if no clinic appt)

Set specific admit times
Other Baseline Findings

- No chronological variation of TTC
- Patients (pts) with pre-admission outpatient appointments started chemo **2.4 h** earlier
- Pts with labs collected and resulted by the time of their arrival started chemo **2 h** earlier
- Pts with chemo orders signed before admission started chemo more than **1 h** earlier
- Pts without urine parameter requirements started chemo **3 h** earlier
- Pts admitted to the resident service started chemo roughly **5 h** later than those admitted to the fellow chemo services
- Pts arriving on the oncology unit between 1-5 PM started chemo ~**4 h** before those arriving before 1 PM or after 5 PM
- Pts needing any procedures done before chemo started >**9 h** after those not requiring any procedures
- Ratio of patients: chemo nurses did not appear related to TTC
PDSA #1: Materials Developed

Risk vs Benefit “Smartphrase”

Date _______

__________________ and his caregivers were provided with information regarding treatment with the ______ regimen including the following medication(s): ______.

We discussed the potential benefits of therapy, side effects, and toxicities. Potential risks associated with not receiving treatment were also discussed. The patient and his care giver had the opportunity to have their questions answered and demonstrated understanding of the information discussed.

__________________ , MD
Pharmacy pre-review checklist:
Pharmacist name ____________
Attending name ____________ (± nurse navigator name if applicable)
Date called ________________

[ ] Any changes made to admission date or plan? (Bed reservation still necessary?)
[ ] Any changes made to chemo regimen or doses?
[ ] If direct admission, is it signed?
[ ] If intrathecal chemo ordered in treatment plan, is encounter with neuroradiology set up?
[ ] Were changes made to treatment parameters? (For example, were urine output parameters or pregnancy tests removed?)
[ ] If WBC growth factor is needed, where will it be received?
  [ ] EC4 Infusion
  [ ] EC4 Retail
  [ ] Local physician office: ________________________
  [ ] G-CSF not required
<table>
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<tr>
<th>TTC</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.92</td>
<td>Doc #7. 3:30 PM appt. Needed PFTs and x-ray done; last procedure done at 9 PM. Chemo orders signed next AM. Had UOP parameters to meet as well.</td>
</tr>
<tr>
<td>24.60</td>
<td>Doc #7. Carbo/ Taxol #1 needing desensitization.</td>
</tr>
<tr>
<td>23.15</td>
<td>Doc #8. First-time horse ATG. Had to do test dose first and then actual ATG administration the following AM.</td>
</tr>
<tr>
<td>45.18</td>
<td>Doc #7. Pt arrival at 6:30 PM. Xray done at 10:30pm. Chemo orders (Cis/Adria) were signed 2 days after admit. Consult needed.</td>
</tr>
<tr>
<td>22.68</td>
<td>Doc #4. Cycle 3 HD-MTX. Patient arrived. Almost 3 hours to place admit order. Patient met UOP + urine pH parameters next AM.</td>
</tr>
<tr>
<td>22.05</td>
<td>Doc #7. Cycle 1 of AIM. Had 3 pm clinic appt; arrived to floor 5 pm. Chemo order signed next AM, but patient met parameters before chemo signed.</td>
</tr>
<tr>
<td>17.75</td>
<td>Doc #7. Cycle 3 of Adria/cis/ etop. No clinic appt. Had port placemnt 1st before arrival to floor at 4:30 PM. Chemo signed before admit. Need MFM consult before starting chemo. Pre-med and chemo started next AM.</td>
</tr>
<tr>
<td>25.42</td>
<td>Doc #10. Pt had 1 pm clinic appt. Cycle 1 of EPOCH (no R). Needed tunneled line placed before starting chemo. Chemo not released until 22 hours after procedure completed?</td>
</tr>
<tr>
<td>26.15</td>
<td>Doc #6, admitted for autologous SCT. Should have been excluded from data collection. Admitted for hydration on HD#1, then needed dialysis on HD#2 before chemo given.</td>
</tr>
<tr>
<td>22.73</td>
<td>Doc #8. HyperCVAD B1. 2:15 pm appt. Floor @ 4pm. Needed PIC, which was done following AM. Chemo signed before proc done.</td>
</tr>
<tr>
<td>27.38</td>
<td>Doc #7. Cycle 3 VDC. Needed dialysis before chemo. Orders were released into wrong EMR encounter.</td>
</tr>
<tr>
<td>50.95</td>
<td>Doc #2. No appt. EPOCH-R 1. Arrived 6pm. Echo on afternoon of day #2. Chemo sig before admit. Chemo released AM of day #3.</td>
</tr>
<tr>
<td>32.42</td>
<td>Doc #7. Cycle 5 VDC. Needed x-ray and MUGA. Last procedure done on AM of HD#2. Still didn’t start chemo until 9 PM on HD#2.</td>
</tr>
<tr>
<td>15.43</td>
<td>Doc #13. Cycle 2 of R-MPV. Elevated lactate. Chemo held; work-up done.</td>
</tr>
<tr>
<td>31.33</td>
<td>Doc #13. Cycle 2 R-MPV. Need PEG and NG tube placement; finished HD#2 at 4 PM. Starting chemo evening of HD#2.</td>
</tr>
<tr>
<td>27.02</td>
<td>Doc #7. Etop. No appt. 1:30 pm. Dialysis needed. Chemo signed 12 noon, released 3:40 pm. Chemo not started until hosp day #2 @ 3pm.</td>
</tr>
<tr>
<td>20.83</td>
<td>Doc #4. Getting Cycle 3 HD-MTX . Clinic appt @ 2:30 pm; arrival to floor. 3:40 pm. Admit order 4:20 pm. Met UOP and urine pH param on HD#2 in AM.</td>
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## PDSA cycle 1

<table>
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<tbody>
<tr>
<td>20.12 hrs</td>
<td>Difficulty meeting methotrexate urine parameters</td>
</tr>
<tr>
<td>17.77 hrs</td>
<td>Patient met parameters 3/9/2016 at 19:48 but then the urine pH dropped to 6. Patient did not meet parameters again until 3/10/16 at 02:30.</td>
</tr>
<tr>
<td>30.08 hrs</td>
<td>Doc #7. Nephrology consult was necessary for the continuation of patient’s regular dialysis prior to starting chemo. Then, patient went off thr unit to visit mother who was admitted to the hospital.</td>
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## PDSA cycle 2

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<th>TTC</th>
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<tbody>
<tr>
<td>27:18</td>
<td>Doc(s) #13. Patient getting R-MPV (no R or V). Had h/o hydration-induced SIADH. Oncology wanted Nephrology consult prior to starting chemo. 24-hour urine CrCl was desired before the start of HD-MTX.</td>
</tr>
<tr>
<td>20:08</td>
<td>Doc(s) #13. Patient getting R-MPV (no V). Patient had difficulty meeting treatment parameters (UOP and urine pH).</td>
</tr>
<tr>
<td>23:33</td>
<td>Doc(s) #13. Patient getting R-MPV (no R, P, or V). Patient difficulty meeting treatment parameters (UOP and urine pH). They followed an algorithm developed by a pharmacy resident for changes to hydration and/or alkanization but the patient still had difficulty meeting parameters.</td>
</tr>
<tr>
<td>18:42</td>
<td>Doc #4. Patient receiving cycle 1 of IGEV. Patient had h/o reaction to chemotherapy and significant anxiety. Therefore, pharmacy, doc, and patient agreed on overnight hydration and then starting chemo the following day (on hospital day #2).</td>
</tr>
<tr>
<td>19:26</td>
<td>Doc #10. Patient getting cycle 2 of HD-MTX. Met treatment parameters 12/15/16 PM but for some reason did not start until 12/16/16 AM.</td>
</tr>
<tr>
<td>19:05</td>
<td>Doc #8. Patient getting cycle 2 of HD-MTX as a part of HyperCVAD regimen. Patient had difficulty meeting treatment parameters (UOP and urine pH).</td>
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Time from Arrival to Start of Chemotherapy
(XMR chart, 3 sigma)

Baseline Data
Median: 6.15 h

PDSA cycle 1
Median: 6.5 h

PDSA cycle 2
Median: 6.0 h

Median: 6.7 h
Median: 7.2 h
Median: 6.6 h
Time from Arrival to Start of Chemotherapy

- Baseline
- PDSA cycle 1 (minus outliers) Median: 6.5 h
- PDSA cycle 2 (minus outliers) Median: 6.02 h

Individual Patient Encounters (date)