

ASCO's Quality Training Program

Project Title: **Level Loading**

Presenters' Names: **Michelle Wade, Dorothy Ryan,
Andrea DuPuis, Lori Willette**

Institution: **OHSU**

Date: **18 October 2017**

Institutional Overview

OHSU is the state's only public academic health and research university. It includes OHSU Hospital and Doernbecher Children's Hospital with a combined 576 beds.

The OHSU Radiation Medicine main campus treated 1,027 patients last year.

We are staffed with 7 Radiation Oncologists, on 4 treatment machines, with the support of 5 Dosimetrists and 8 Physicists.

We treat all standard care paths as well as SRS, SBRT, TBI, TSEI, IORT, eye plaques, pediatric sedation cases and HDR.



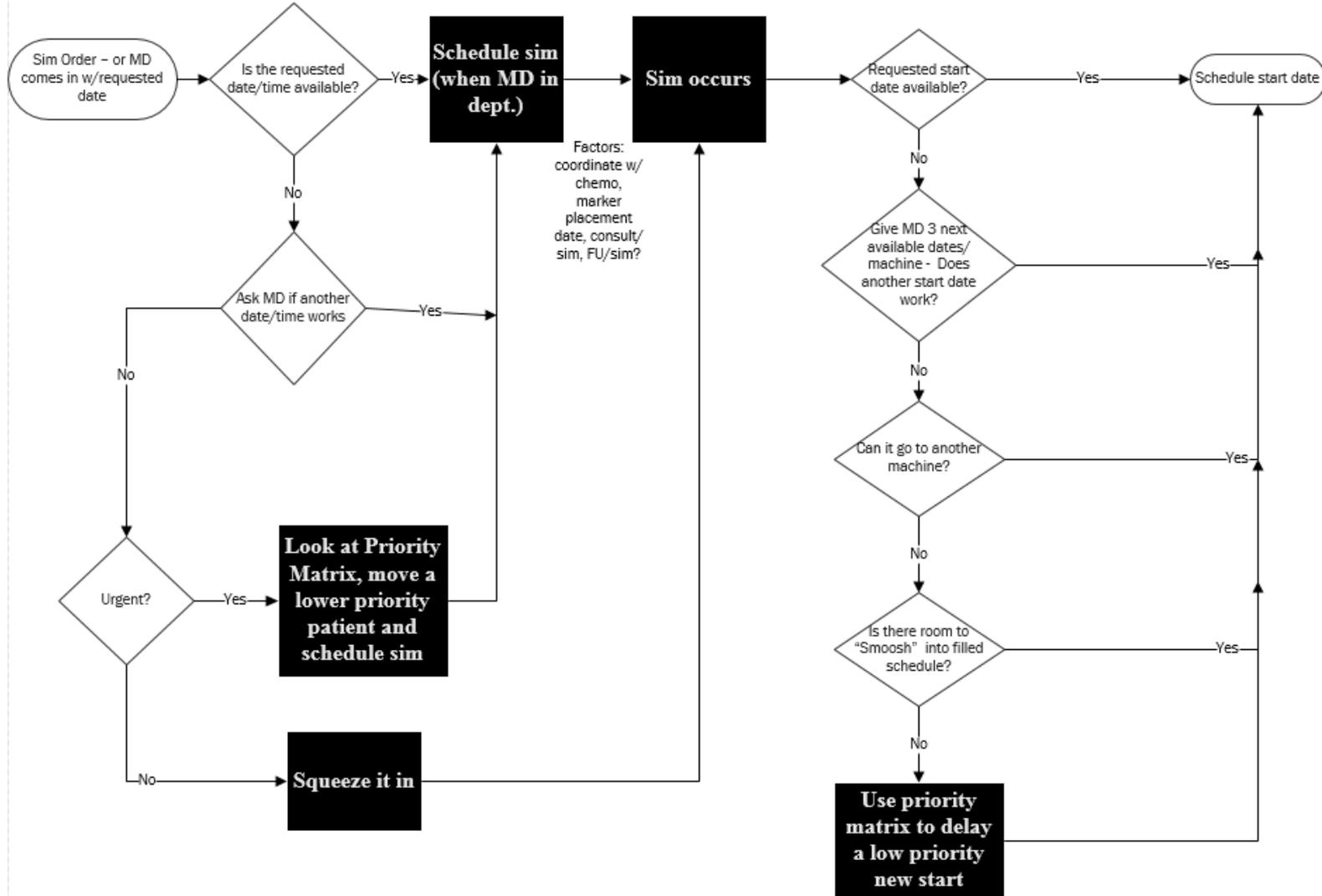
Problem Statement

- Beginning at time of sim order, 42% of OHSU Radiation Medicine new starts are unequally distributed among the treatment machines and days of the week which results in decreased patient and staff satisfaction.

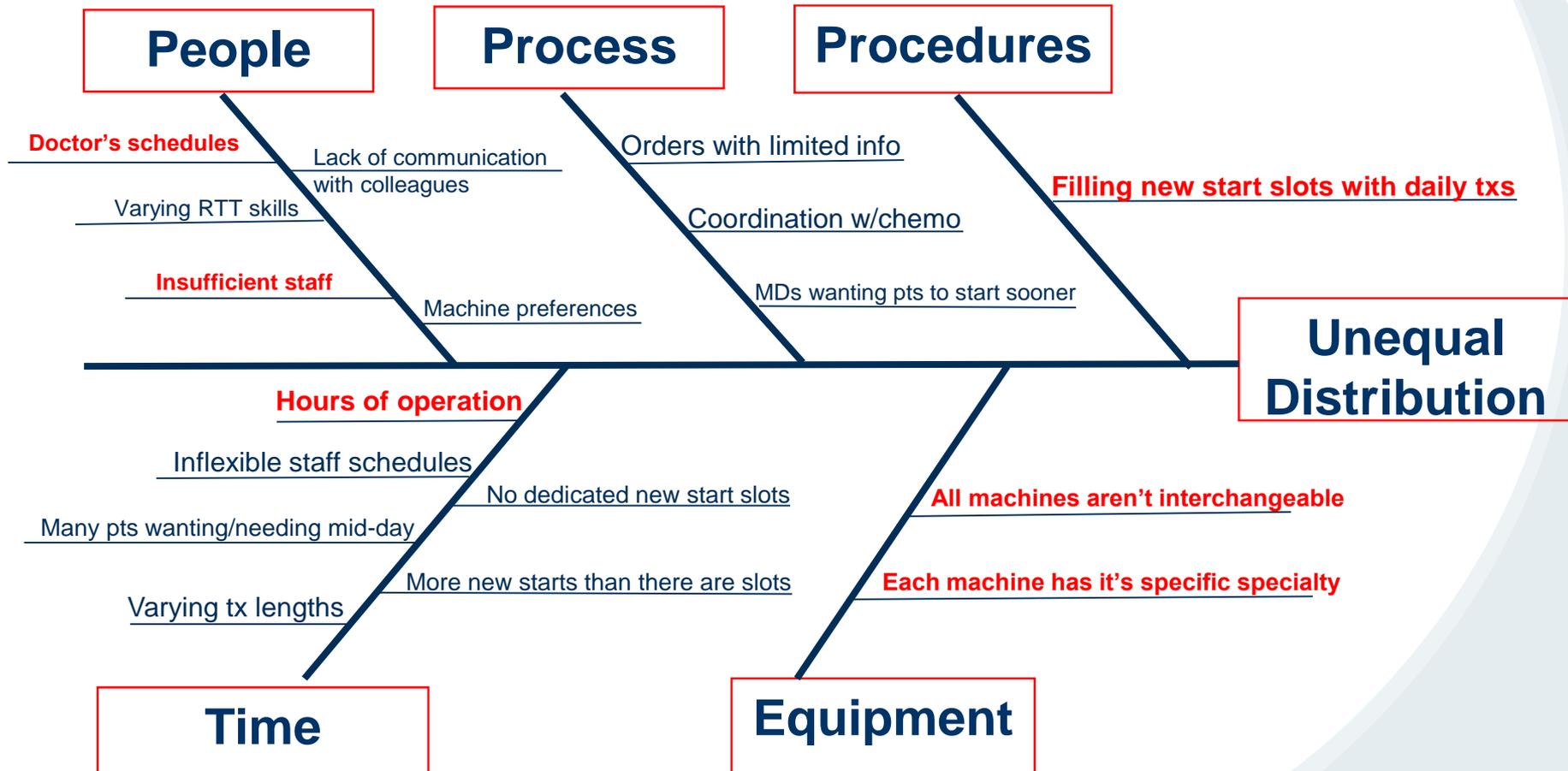
Team Members

- Dorothy Ryan – Chief Radiation Therapist
- Andrea DuPuis – Lead Radiation Therapist
- Erica Ryu – Radiation Therapist
- Lori Willette – Dosimetrist
- Michelle Wade – Charge Nurse
- Dr. Jerry Jaboin – Vice Chair Radiation Oncologist

Process Map

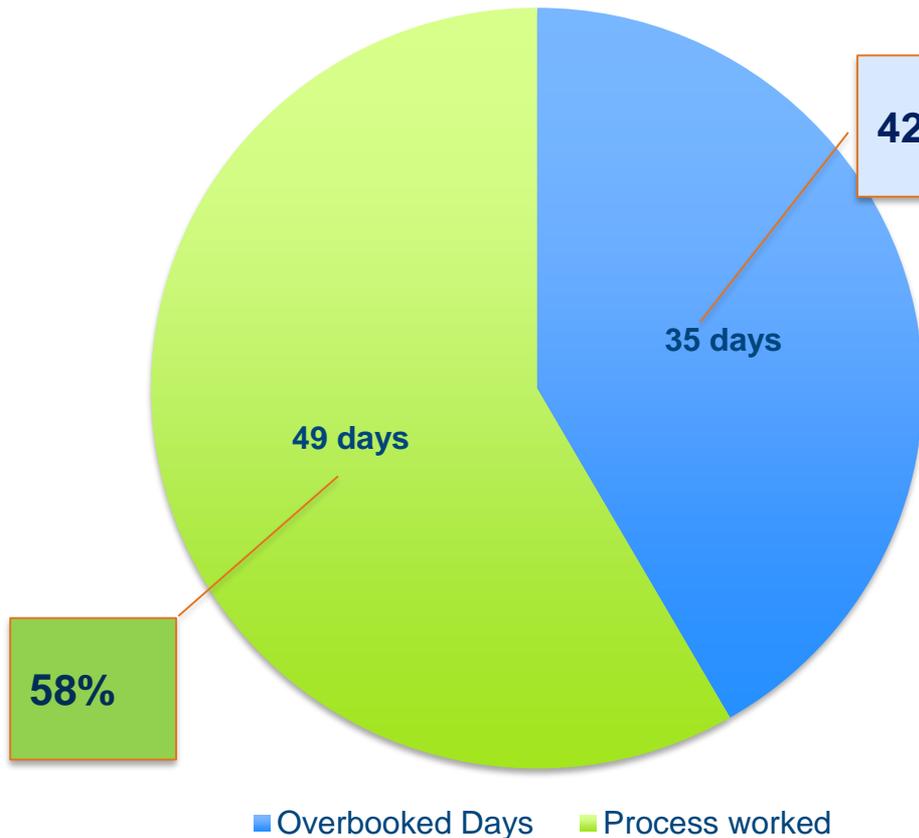


Cause & Effect Diagram



Diagnostic Data

Utilization Chart – 84 total days



35 days represents 42% of the days with uneven booking of new starts over an 84 day period.

Aim Statement

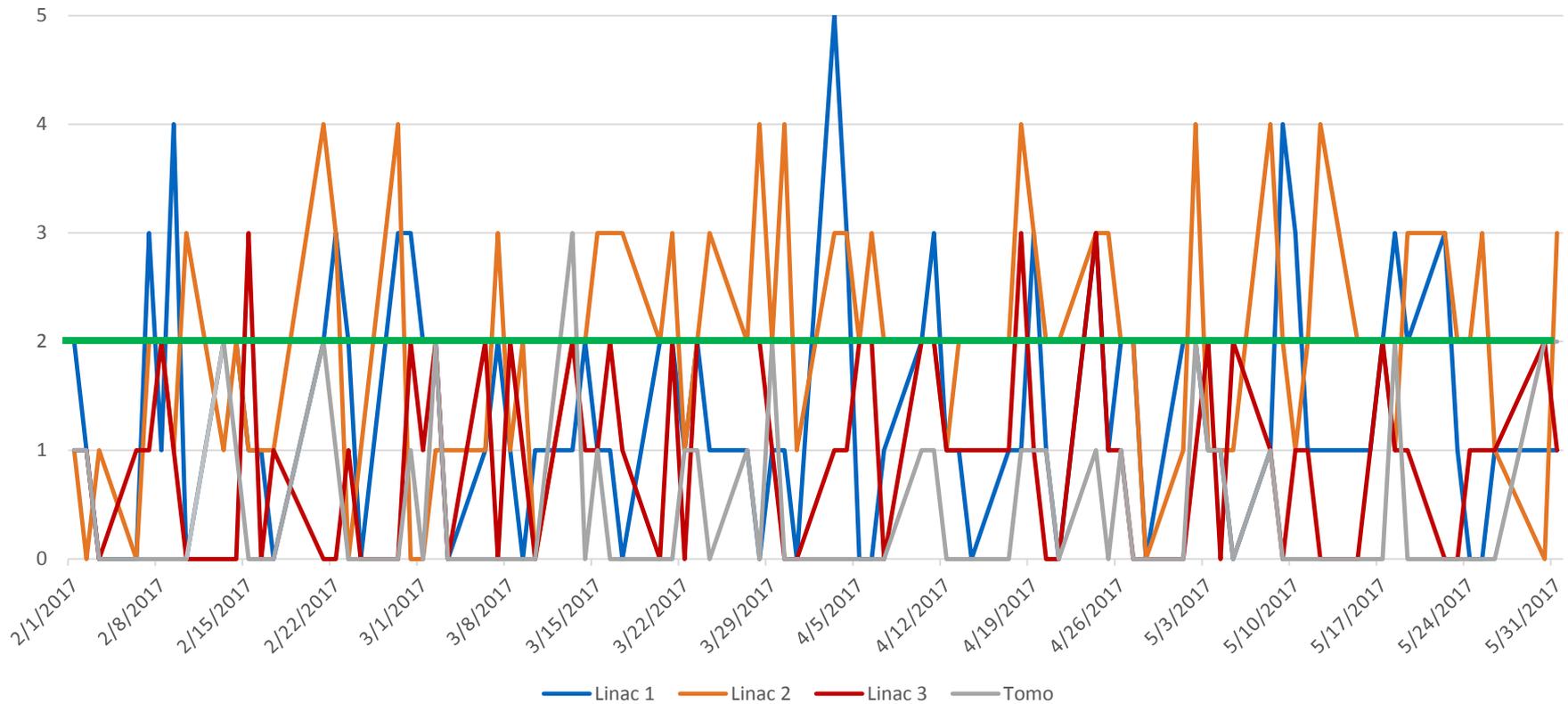
- By October 2017, we want to distribute the New Start patients between machines and days so that there is a 30% reduction in number of days with unevenly or overbooked booked new starts.
 - Ideally 2 new starts per day per machine.

Measures

- Measure: number of new starts scheduled post simulation
- Patient population: all patients receiving radiation treatment at OHSU
- Calculation methodology: # of overbooked days/total # of days
- Data source: Mosaiq
- Data collection frequency: daily
- Data quality (any limitations): all data collected from Mosaiq

New Starts per Day - All Machines

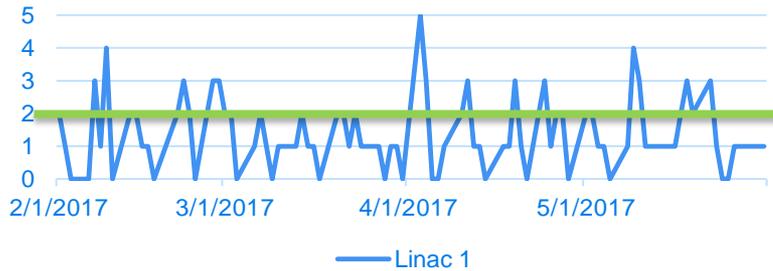
Feb. - May 2017
New Starts by Machine



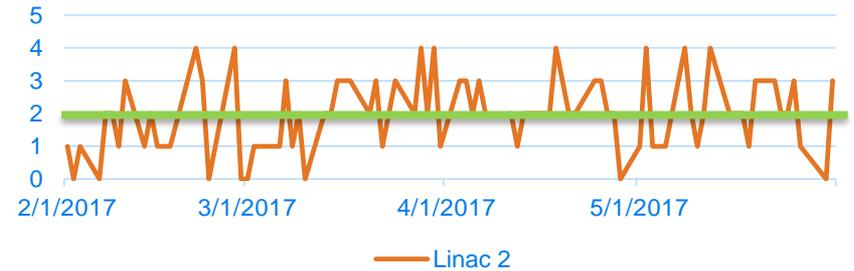
Green Line represent optimal patient volumes per machine - 2

New Starts per Day – Individual Machines

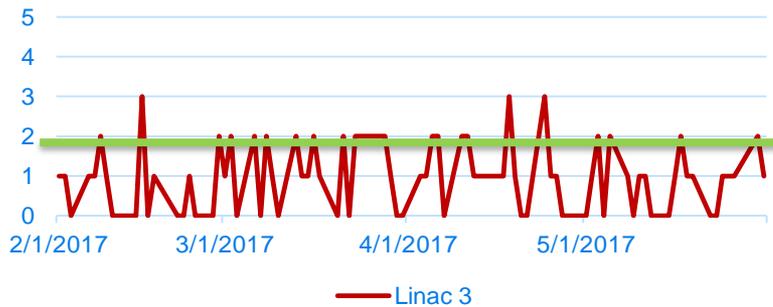
Feb. - May 2017
New Starts on Linac 1



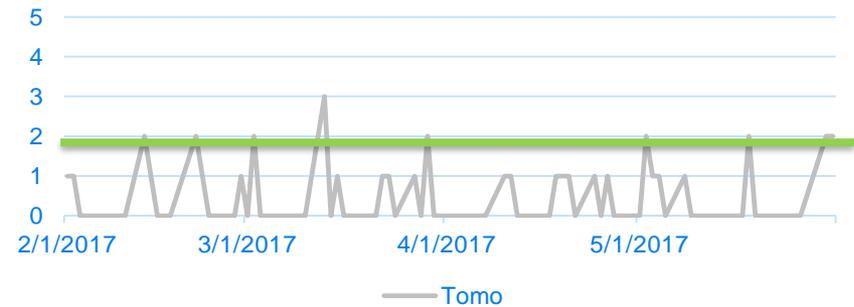
Feb. - May 2017
New Starts on Linac 2



Feb. - May 2017
New Starts on Linac 3

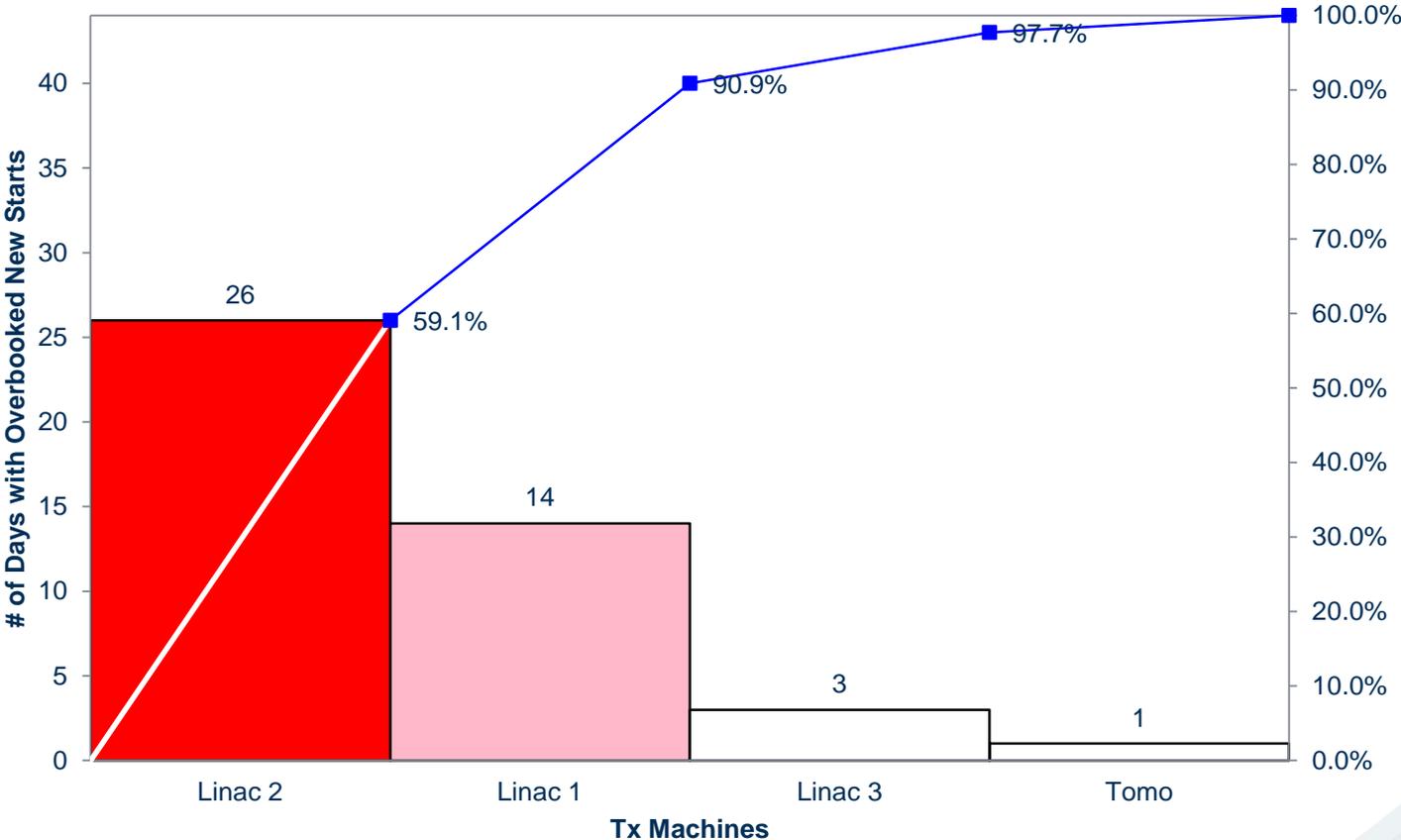


Feb. - May 2017
New Starts on TomoTherapy

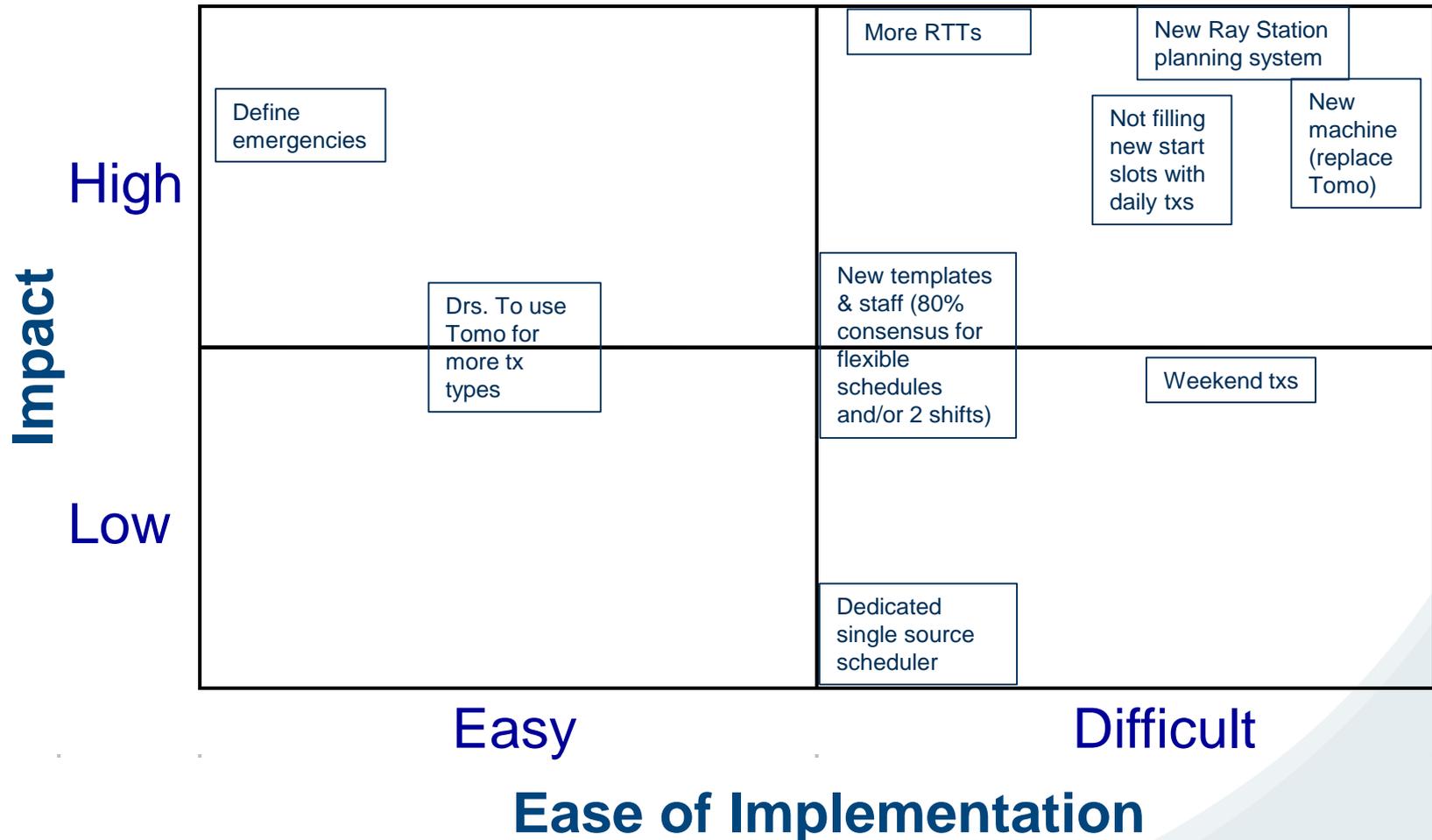


Baseline Data

New Start Distribution by Machine Feb. – May 2017



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



PDSA Plan (Tests of Change)

Date of PDSA cycle	Description of intervention	Results	Action steps
6/19/17	Spreadsheet of new start open slots by machine with a heavy visual component that allows for quick access and decision-making.	Even out the distribution of new starts across the 4 treatment machines.	<ul style="list-style-type: none"> - [7/3/17] Change Tomo time slots from 30 minutes to 20 minutes based on current beam on (plan) times - [Soft Start 7/24/17] Begin having Sim schedule New Starts on Tomo based on the laminated "Tomo Scheduling Sheet" - [7/24/17] Cap sims at 5 plus 1 emergency for an evaluation period - [8/1/17] Adjust sims to 5 sims plus 8am in-patient slot & 3pm emergency slot

Materials Developed

DATE	Linac 1		Linac 2		Linac 3		Tomo		Notes:
7/19/2017	-2	1	-3	1	1	-1	0	0	
7/20/2017	0	1	1	1	-1	-2	1	0	
7/21/2017	1	0	1	1	-2	1	-1	0	L1&L3 - N/A HP evo RT system install
7/24/2017	1	2	1	2	1	1	0	1	L2 - small cell lung ca, L1 urgent pelvis
7/25/2017	1	2	2	1	-3	1	1	1	L2 urgent brain met (multi-iso), L1 urgent whole brain
7/26/2017	1	1	1	2	-2	-2	1	0	L2 urgent brain met (multi-iso)
7/27/2017	1	1	1	2	1	1	1	1	L2 urgent growing nose tumor
7/28/2017	0	-1	0	1	-1	0	-2	0	
7/31/2017	1	1	1	-2	1	0	-2	0	L1 Breast Boost
8/1/2017	0	0	0	1	1	0	-2	0	
8/2/2017	1	1	1	1	1	1	-2	1	L2 emergent nasopharynx
8/3/2017	1	1	1	1	0	0	-2	0	
8/4/2017	0	0	1	1	0	0	N/A	-3	N/A: Tomo short staffed
8/7/2017	1	1	1	1	0	1	1	-3	
8/8/2017	1	0	1	2	1	0	1	-2	pt waited several weeks after surgery
8/9/2017	0	0	-3	1	0	0	-2	-3	
8/10/2017	1	0	0	-2	1	0	-2	-2	
8/11/2017	0	0	0	0	-1	N/A	-3	-2	L3 Hexapod testing 2-close
8/14/2017	1	1	-2	1	1	0	-3	-3	
8/15/2017	1	0	0	0	1	0	0	-3	
8/16/2017	0	0	0	0	0	0	-1	-1	
8/17/2017	0	0	0	0	0	0	-1	-3	
8/18/2017	0	0	1	0	0	0	-3	-1	

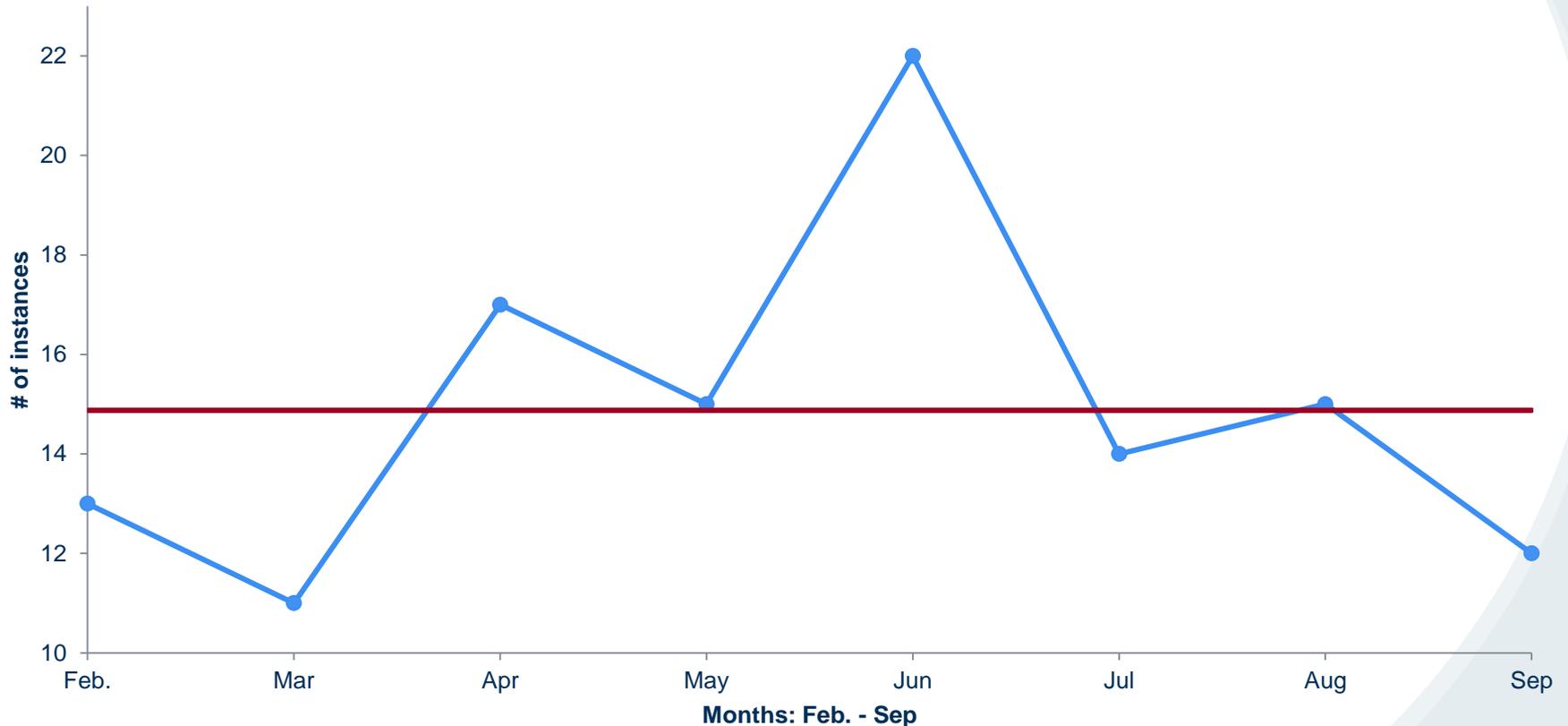
Legend: Open new start slot New start >1 new starts Filled with daily txs

Materials Developed (cont.)

SITE	TIME TO PLAN (DAYS)	CDK	JJ	JH	CRT	NN	AH
H/N	3						
CSI	3						
HDR	N/A						
PANCREAS	1.5		PLAN				
ADBO	1.5	NO SBRT	COMPARISON				
GYN	2						
RETROPERITONEAL ADENOPATHY	2						
GBM	1			PLAN COMPARISON			
SKULL SKIN	2						
TBI	TBD						
TBI PED	TBD						
SPINE (WRAP AROUND CORD)	1.5?						
WILM'S LUNG	2						
RECTAL IMRT PROTOCOLS	2						
THORACIC ESOPH	2						
DISTAL ESOPH	2						
PROSTATE W/ NODES	2						
HIPPOCAMPAL SPARING BRAIN	2						
POST FOSSA BRAIN BOOST	2	CSI ONLY					
WHOLE PELVIS	2						
HO	TBD		LONG TX TIME				"OVER KILL"
LUNG (NON MOVING TUMORS)	1.5						
ABDOMINAL/PELVIC SARCOMA	2						
REASONS <u>NOT</u> TO TX ON TOMO		IMAGING LIMITATIONS & LACK OF ROTATIONAL COUCH ADJUSTMENT	PLAN COMPARISON OF TOTAL SMALL BOWL DOSE	OTHER SITES EITHER DOESN'T TX OR CONCERNS OVER IMAGING QUALITY			CONCERNS DUE TO DOSE HETEROGENITY AND NO CONTROL OF HOT SPOTS
* TARGET VOLUMES MUST BE > 1CM SUP/INF AND .65 TRANSVERSE							

Change Data

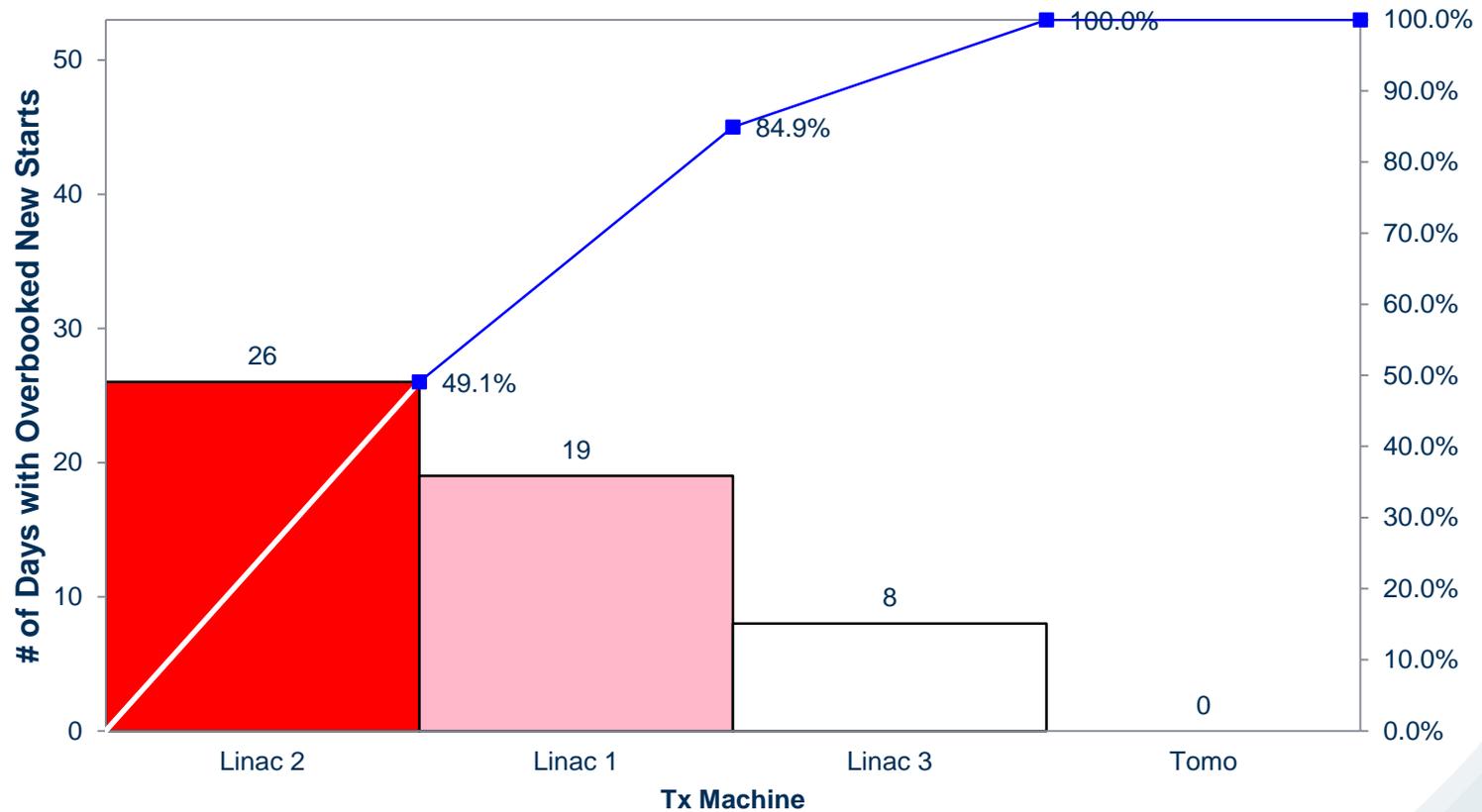
Total # of New Starts over 2/day/Machine



NOTE: This is in addition to the 2 new starts per machine per day.

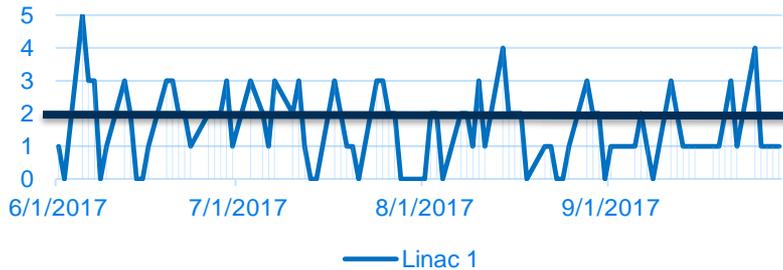
Data

Pareto Chart Jun.-Sep.

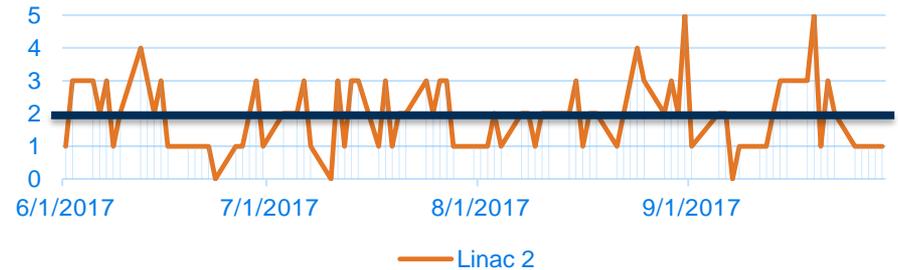


New Starts per Day – Individual Machines Jun. – Sep. 2017

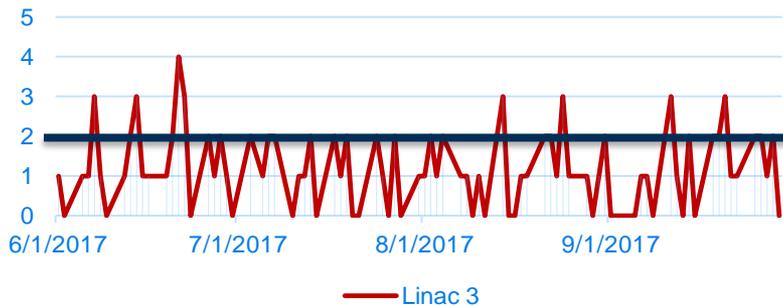
Jun.-Sep. 2017
New Starts on Linac 1



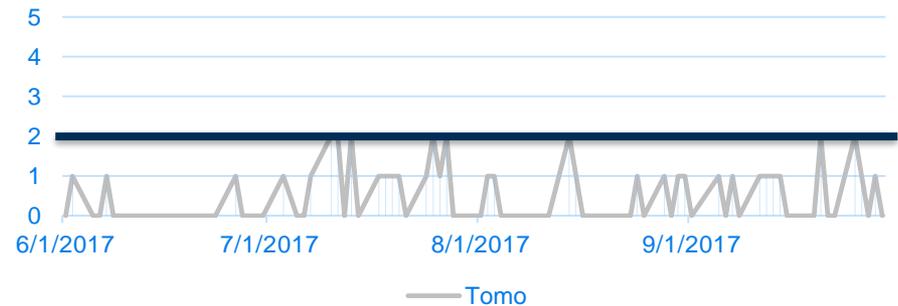
Jun.-Sep. 2017
New Starts on Linac 2



Jun.-Sep. 2017
New Starts on Linac 3



Jun.-Sep. 2017
New Starts on TomoTherapy



Conclusions

- Roadblocks:
 - **Union** scheduling rules
 - Lack of sufficient **staffing** levels
 - Utilizing the Tomo unit only **moved** the level-loading problem but did not resolve the issue
 - In addition, 2 new starts a day on Tomo puts it at capacity within 7 days due to lengthy tx courses
 - **Specialized** equipment on each machine
 - Physicians only available certain days often causing **bottlenecks** with their sims and starts
 - **Staggered** end times for machines schedules due to warm up needs
 - New start slots **not** “blocked” and often getting booked thru with daily tx patients already booked
 - When **census** lessens more new starts are added beyond the 2 per machine per day
 - This leads to saturation in the following areas: Dosimetry planning, physics QA, RTT QA, Attending presence required, more Insurance auths need to be obtained by managed care providers
 - All these lead to less time to do and check plans thus leading to more opportunities for errors

Conclusions

- Opportunities:
 - Revise process maps
 - Evaluate process map for areas of waste
 - Consider opportunity for Therapist aid
 - Scheduling, phones, paperwork, etc.
 - Consider revamping physician schedules

Lessons Learned

- Unable to incorporate a physician champion
 - This did not allow for a good communication link between the project and the other Attendings
- The ideal of having 2 new starts per machine per day is NOT the source of the problem.
 - The source is still undetermined.

Next Steps

- Detailed process map for CT Sim (starts 10/30/17)
- A3 waste removal at CT Sim
- Define emergencies

Level Loading

AIM: By October 2017, we want to distribute the New Start patients between machines and days so that there is a 30% reduction in number of days with unevenly or overbooked new starts.

INTERVENTION: There were 5 interventions: 1) A visual aid was implemented to show available new start slots on the treatment machines allowing the Sim Therapists to work with the physician on when and where would be most optimal to start a patient based on available new start slots, 2) one of the underutilized treatment machines was evaluated for actual time needed for treatment slots. This allowed the treatment slot times to be decrease making more room for appointments. 3) In line with this last action there was also a soft start of working with physicians to determine what additional cases could be put on this underutilized machine to lessen the load on the other machines, 4) We capped the number of sims slots at 5 regular and 1 emergency so as to level the flow out of sim onto the machines. This, however, was met with resistance so 5) we changed it to 5 regular, 1 in-patient and 1 emergency slot.

RESULTS: We were unable to level-load based on new starts per day due to the realization that the new starts were not necessarily the main underlying issue.

Total # of New Starts over 2/Day/Machine



TEAM:

- Andrea DuPuis, RTT
- Erica Ryu, RTT
- Lori Willette, CMD
- Michelle Wade, RN

PROJECT SPONSORS:

Dr. Jerry Jaboin, MD, Vice Chair

CONCLUSIONS: Our AIM was not met.

- The level loading issues we are experiencing seem to be starting earlier than the point that we tried to find the solution.
- We needed better engagement in the project. In particular we needed to work to ensure our physician champion could attend the meetings.

NEXT STEPS:

- Work on producing a Sim process map of current state and ideal state.
- Use the process map to start an A3 waste removal process in Sim.
- Define emergencies and work with physicians to utilize information.

Reflection

After all the “Kaoz” we are now reflecting on what we learned.



Questions?