



Clinical Safety & Effectiveness Cohort # 13

High Dose Radiation Therapy Process Improvement



CENTER FOR PATIENT SAFETY & HEALTH POLICY

UT HEALTH SCIENCE CENTERTM

SAN ANTONIO

Educating for Quality Improvement & Patient Safety



The Team

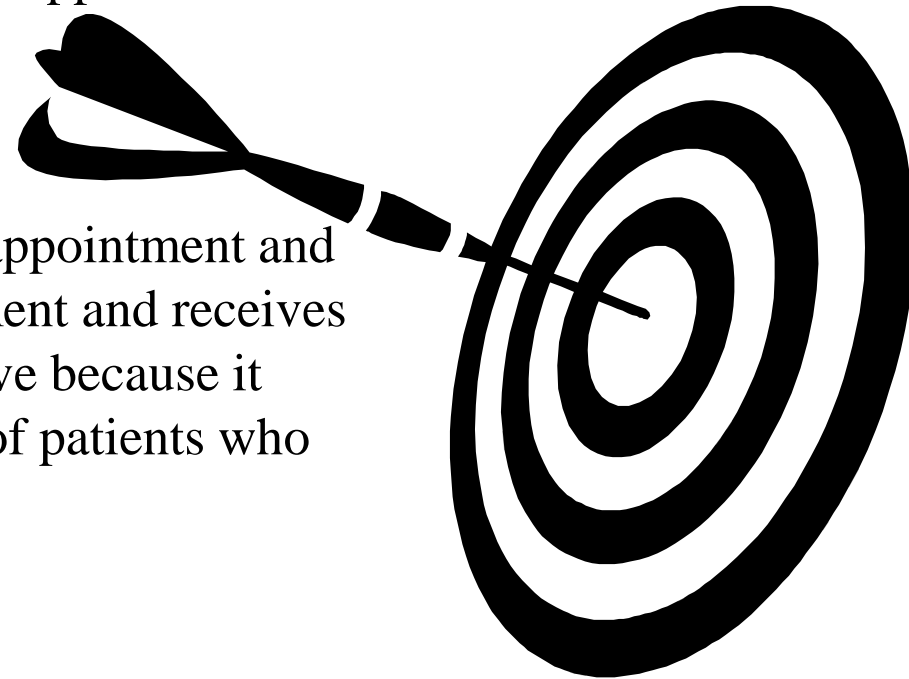
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 - Tony Eng, MD
 - Karen Miller, RN
 - CPT Justin D Kocher, MS RD
 - Maggie Autry, CT
 - Iba Aburizik - Facilitator
- Department Sponsor
 - Nikos Papanikolaou, PhD



AIM STATEMENT

The aim of this project is to increase the efficiency and safety of delivering High Dose Radiation therapy to patients with gynecological cancers through increased accountability, standardized processes and an overall 10% reduction in the total appointment time per procedure per day.

The process begins when a patient arrives for their appointment and ends when the patient completes their HDR treatment and receives discharge instructions. This is important to improve because it aligns with our strategic goal to improve the care of patients who have on-going radiation treatments.



Project Milestones

- Team Created
- AIM statement created
- Weekly Team Meetings
- Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses
- Intervention(s) Implementation
- Data Analysis
- CS&E Presentation

Aug 2013

Sept 2013

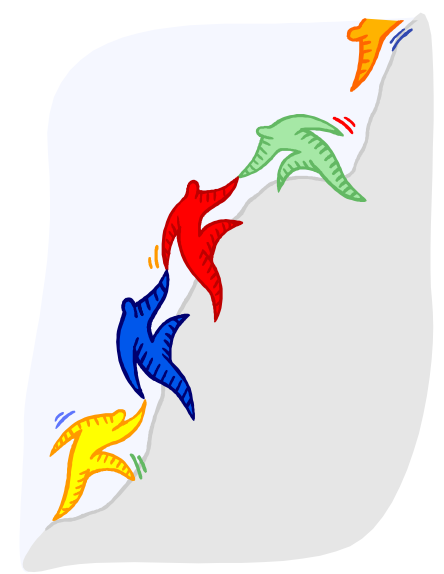
Aug 2013 - Present

Aug 2013 – Oct 2013

Nov 2013 – On-going

Dec 2014 – On-going

Jan 2014



Background



Context

- High Dose Radiation (HDR) treatment for cervical cancer is an emerging evidenced based procedure with notable success
- Outpatient procedure
- Invasive and uncomfortable for the patient

Rationale

- At risk population
- Complex mode of delivery
 - Relies on several healthcare providers
 - Protocol span several hours and involves frequent patient hand-off
- Dangerous side effects
 - Patient
 - Providers

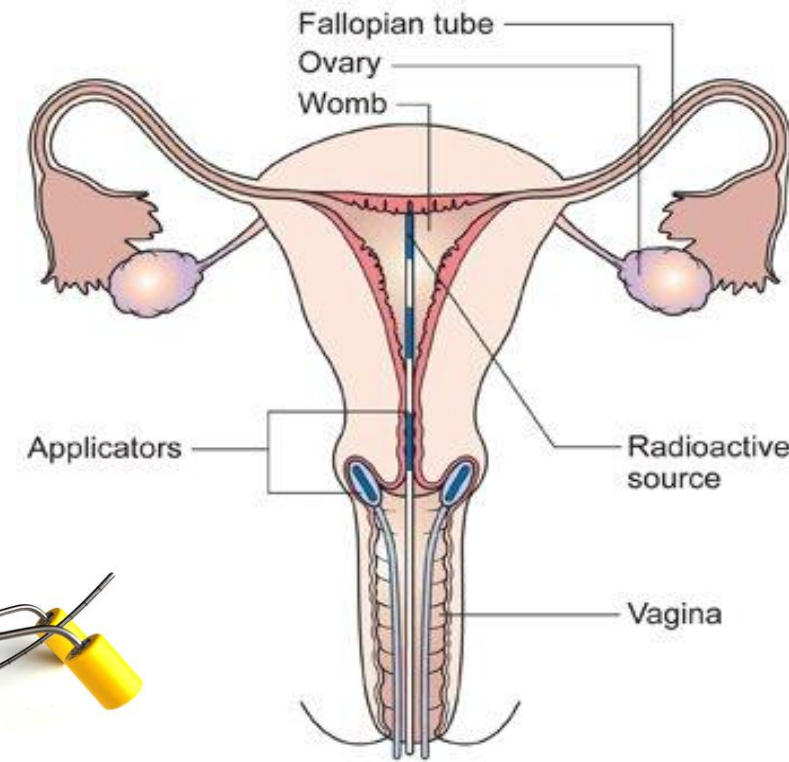
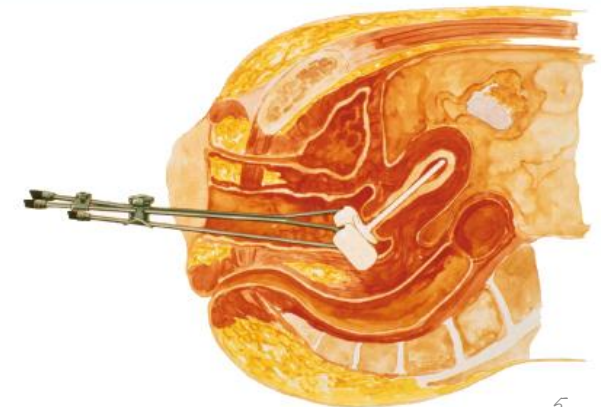


Diagram showing the position of the applicators for internal radiotherapy for cervical cancer
Copyright © CancerHelp UK

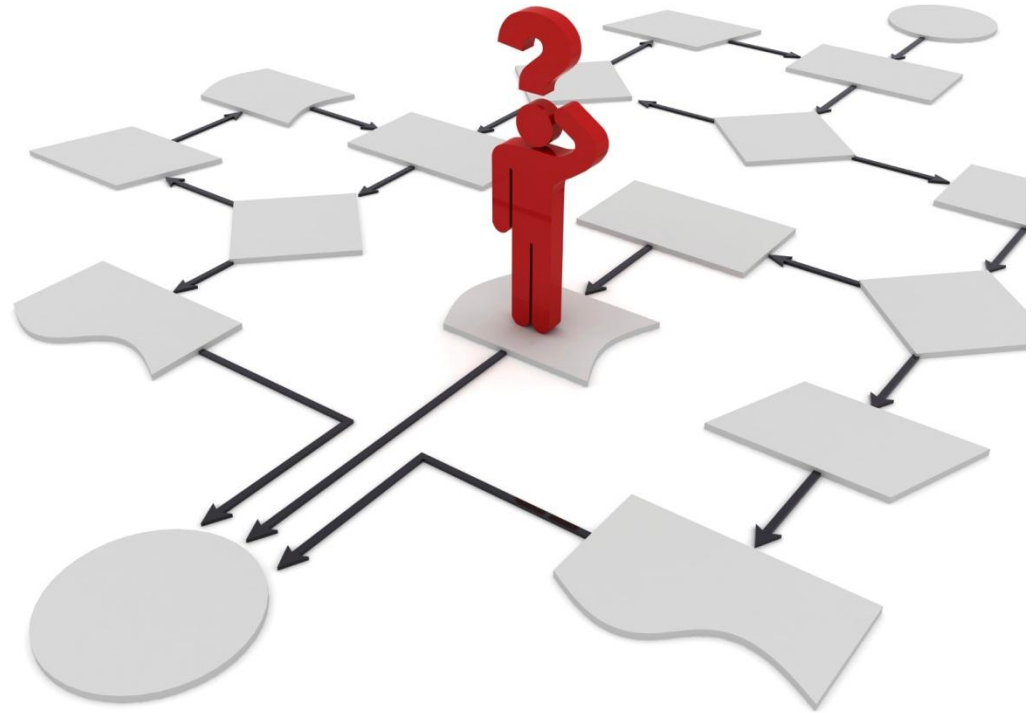


Delivery of brachytherapy using applicators placed in the cervix

Image Sources: <http://www.cancerresearchuk.org/cancer-help/type/cervical-cancer/treatment/radiotherapy/about-cervical-cancer-radiotherapy> (top right); <http://diacorinc.com/transfer> (top center); <http://www.aboutbrachytherapy.com/en-us/patients/cancers/cervical-cancer/Pages/brachytherapy-treatment.aspx> (bottom); <http://www.koboldmedical.com/catablog/items/pro-lock-fletcher-model-gyn-tandem-and-ovoid-setct-and-mri-compatible/> (bottom center)

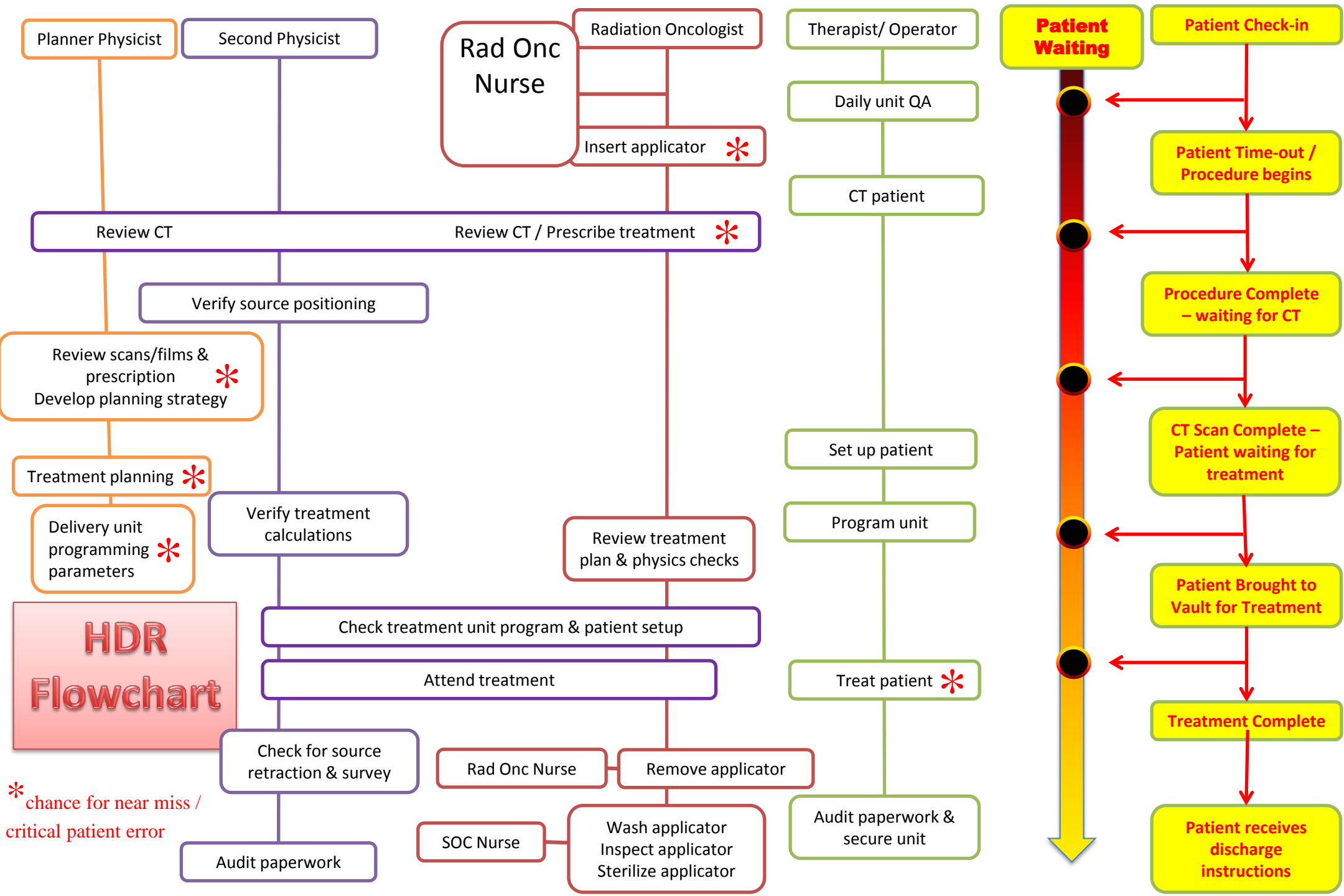
Selected Process Analysis Tools

- Process Map
- Flowchart
- Fishbone
- Chart Review
- SPC Charts

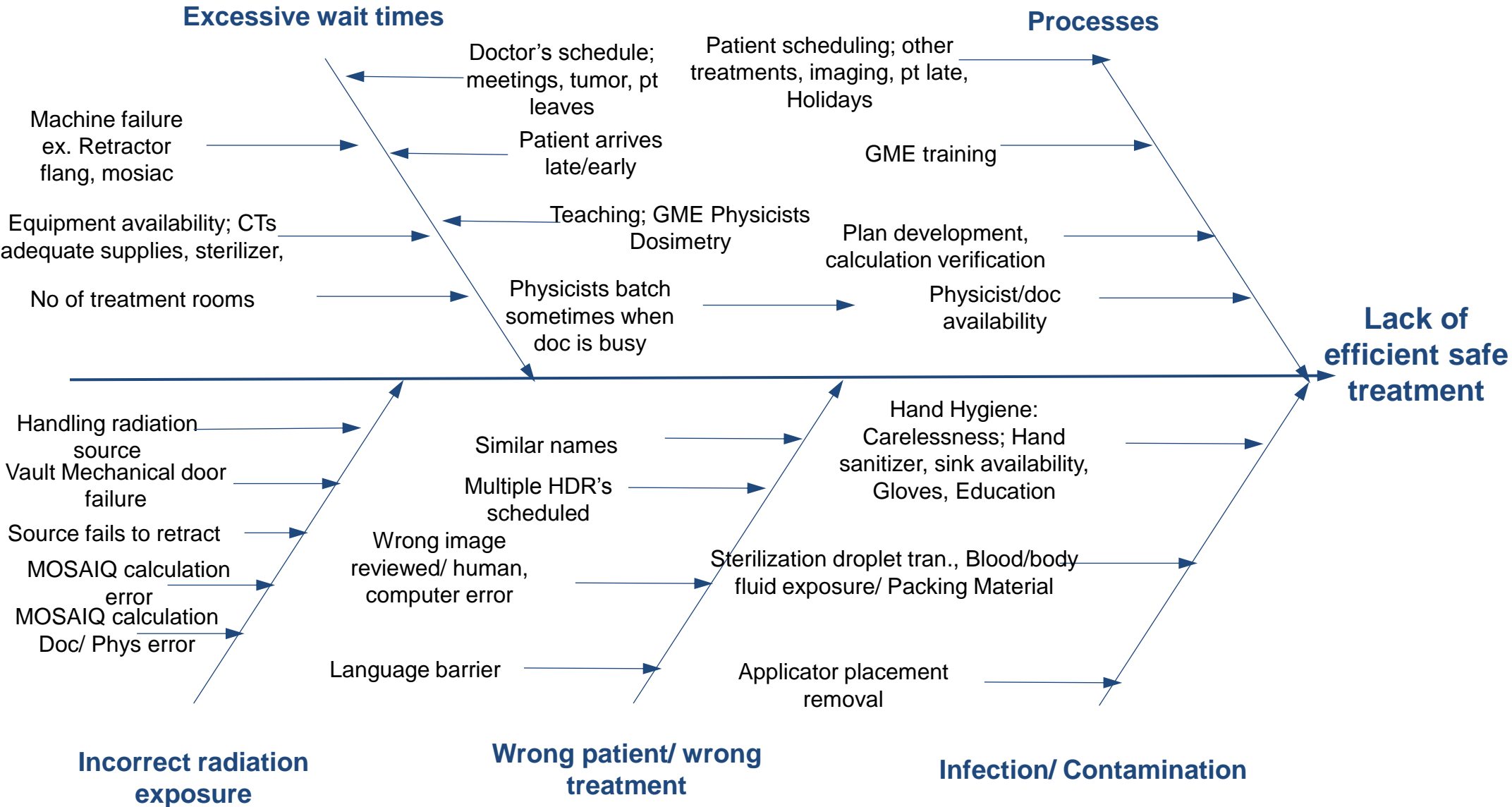


HDR Timeline Checklist and Process Map





CAUSES OF HDR Risk



Background Data Collection for Current Process Efficiency

Patient Charts reviewed (11 months of data)

- Nursing Treatment Assessment Form
- Physician Procedure Note
- MOSAIQ Software
 - Treatment Time
 - CT Image Time

Cohorts	Check-in to Procedure Time out (mean time)	Applicator Placement (mean time)	Waiting for CT (mean time)	Waiting for Transfer to vault (mean time)	Time spent on treatment (mean time)	Total Treatment Time (mean time)
Patient 1 of 1	57.5	27.1	28.5	77.1	26.1	216.3
Patient 1 of Multiple	71.67*	27.1	32.6	87.43*	36.3	255.1*
Patient 2 of Multiple	83.74*	29.3	34.2	98.33*	29.5	275.1*
*mean values were found to be statistically different						

Intervention

Changes That Will Result in an Improvement?

- Implement a checklist to standardize processes and assign accountability for the high priority steps
- Provide physician schedule access to patient scheduler
- Stagger patients appointment times by 30 minute intervals
- Give the physician a 10 minute warning for each procedure
- Physicists will get plans approved/checked as they are complete rather than waiting for both to be developed
- Assess infection control / contamination protocols - standardize
- Use “patient notes” in Epic if the patient needs a translator so that the need can be anticipated

Good Practices to Sustain!!

- ✓ 2nd Physicist double checks calculation
- ✓ Calculation conferred with computer recommendation
- ✓ Nurse preps procedure room for physician
- ✓ Staff is using checklists for coding and charting
- ✓ Daily vault inspection to ensure radiation safety precautions are working
- ✓ Physicist clears vault after each treatment
- ✓ Physicist develops preliminary protocol for physician during treatment development

How Will We Know That a Change is an Improvement?

- Shortened length of stay for treatment
 - Tracking specified time intervals
 - Total decrease in total treatment time of 10%
 - Interventions target improved scheduling, care coordination and patient hand-off.
- Increase Patient Safety
 - No patient medical errors (zero radiation related errors)
 - Standardize the process/minimize chance for medical errors
 - Compliance with HDR Tracking form

HDR Tandem and Ovoid Tracking Form – November 2013

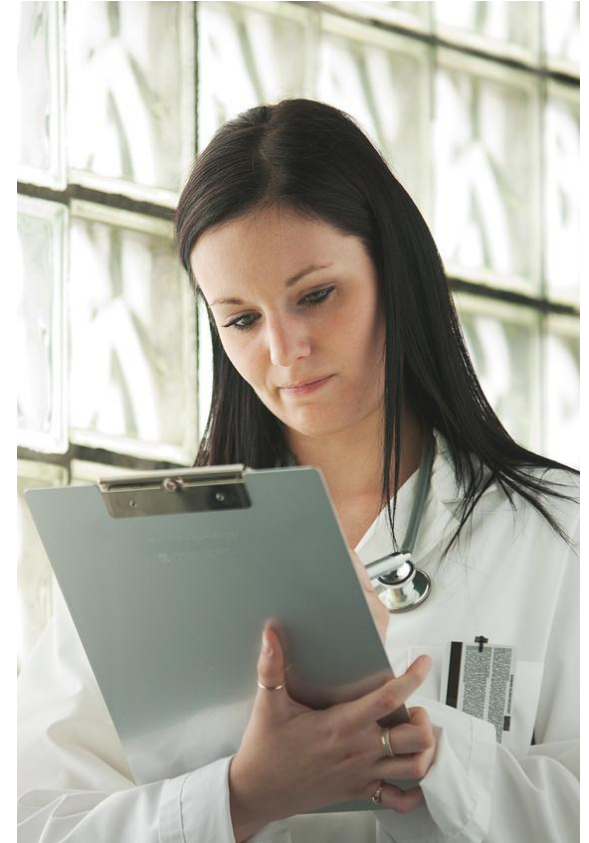
HDR Tracking Form		
Nursing		
Patient Name (First, MI, Last)		
Birthdate		
MRN		
Check in time		
Sound-depth [cm]		
Tandem angle [degree]		
Ovoid diameter [cm]		
Other catheter used:		
Fraction number		
Patient time out		
Responsible Nurse - Sign & Date		
CT		
Patient Time out: Name, MRN, fxn number		
Use HDR protocol for scanning: 5mm slice		
RUN number and number of slices		
Scouts & CT scan sent		
Physician & Physicist review scan		
Responsible CT Tech - Sign & Completion Time		
Treatment planning	Planner	2nd ck
Verify import scan with Patient information in Mosaic (name, MRN, fxn number)		
Review previous treatment Rx in MOSAIQ		
Review scouts and verify active length		
Daily QA reviewed and approved		
Calibration file used (write down)		
Reconstruction at tip end		
Indexer length [Write down]		
Catheters- Number and labelled		
Dose points: position and label		
Optimized Weights correctly		
Review contours		
Critical structures point doses		
Rx completed: Dose (cGy)		
Oncentra time:		
Oncentra date:		
Survey meter (SN _____, Cal Date: _____)		
Pre-implant survey (mR/hr)		
Post implant survey (mR/hr)		
Sign, date, time		

HDR Tandem and Ovoid Tracking Form		
Patient Name (First, MI, Last)	Tina v. Huang	
MRN	8675309	
Date	10/21/2013	
Check in time	9:08 AM	
Sound-depth	6.5	
Tandem angle (degree)	30	
Ovoid diameter	2	
Other catheter used:		
Fraction number	5/6	
Nursing		
Patient time out	LP	
Sign, date, time	Linda Phillips, 10/2/13 9:42 am	
CT		
Patient Time out: Name, MRN, fxn number	CS	
Use HDR protocol for scanning: 5mm slice	CS	
RUN number and number of slices	2	56
Scouts & CT scan sent	CS	
Physician & Physicist review scan	Exp	CE
Sign, date, time	Cathy Seales, 10/2/13 10:06am	
Treatment planning	Planner	2nd ck
Verify import scan with Patient information in Mosaic (name, MRN, fxn number)	CE	PPM
Review previous treatment Rx in MOSAIQ	CE	PPM
Review scouts and verify active length	CE	PPM
Calibration file used (write down)	7-Aug-13	7-Aug-13
Review scan	CE	PPM
Reconstruction at tip end	CE	PPM
Indexer length	1499	PPM
Catheters labelled	CE	PPM
Dose points: position and label	CE	PPM
Optimized correctly	CE	PPM
Review contours	CE	PPM
Critical structures point doses	CE	PPM
Rx completed: Dose (cGy)	500	PPM
Oncentra time:	CE	PPM
Oncentra date:	CE	PPM
Survey meter (SN _____, Cal Date: _____)	1222290	6/25/2013
Pre-implant survey (mR/hr)	2mR/hr	PPM
Post implant survey (mR/hr)	2mR/hr	11:45 AM
Sign, date, time	CE 10/2/13 11:33am	PPM 10/2/13 11:46am

Results – Radiation Errors

- HDR T&O Tracking form expanded to all HDR services
 - Communication
 - Accountability
 - Documentation (certification)

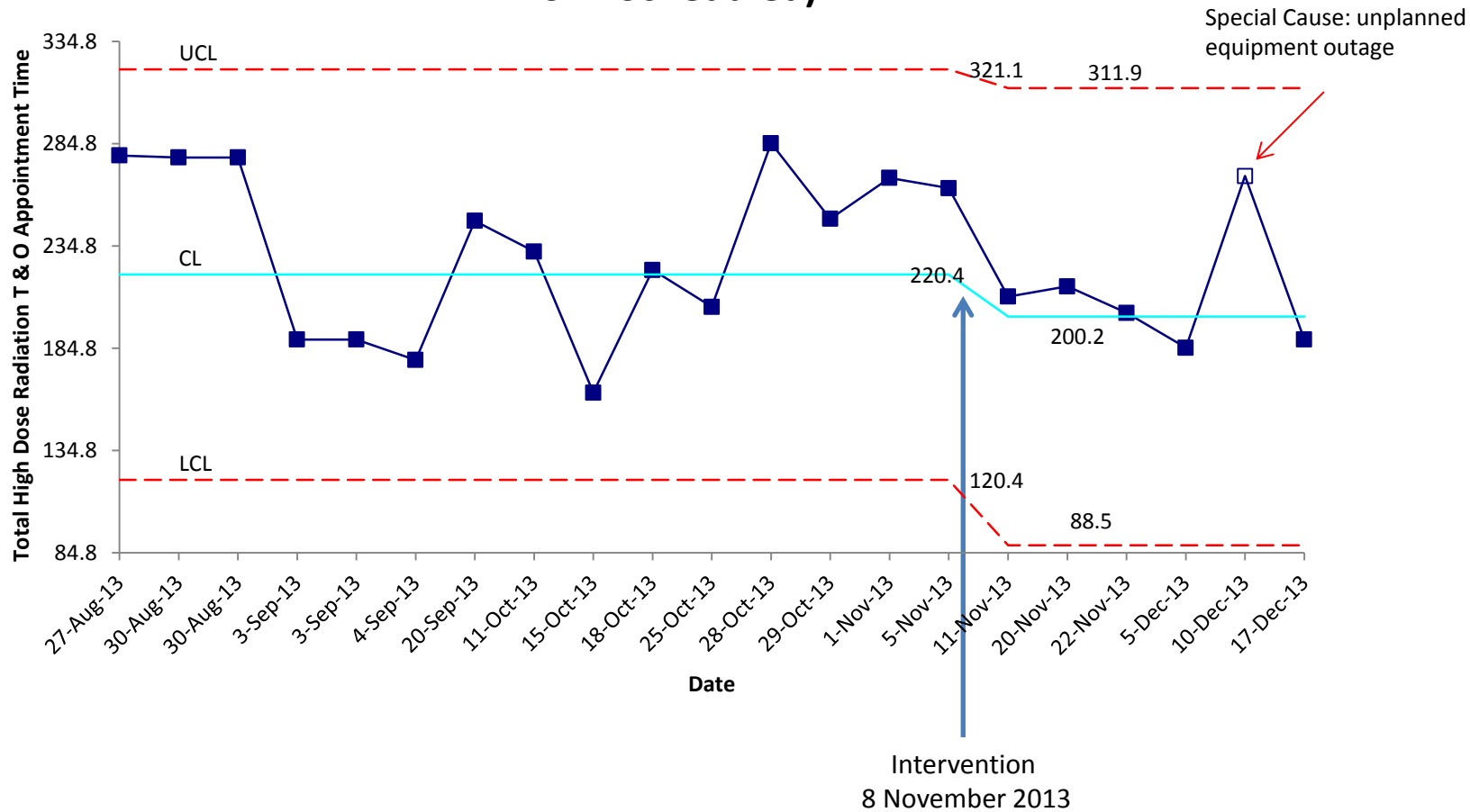
Zero radiation errors



Results

Goal Reduction	10%	20.4 minutes
Actual Reduction	9.2%	20.2 minutes

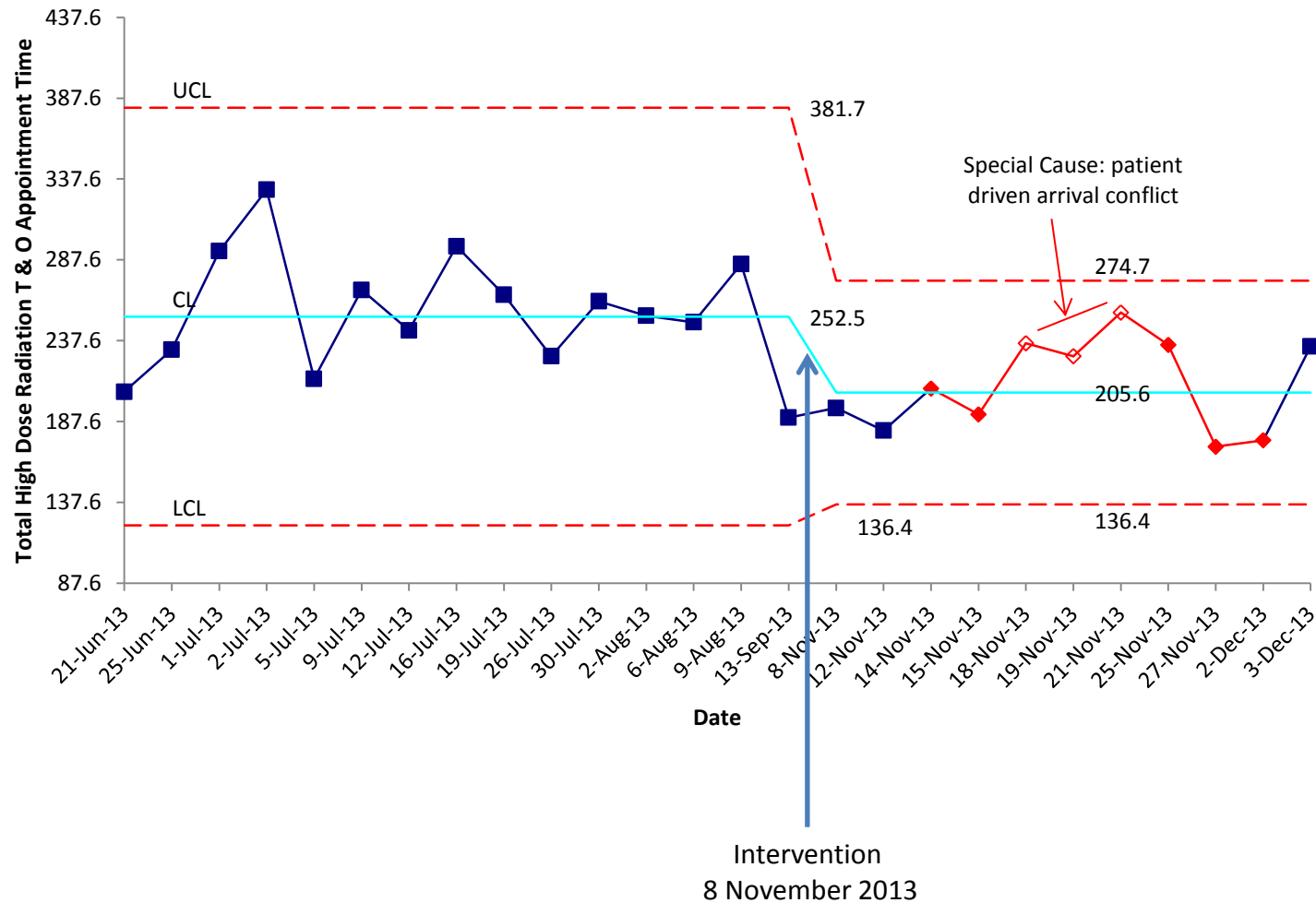
Total High Dose Radiation T & O Appointment Time (Patient 1 of 1 Scheduled)



Results

Goal Reduction	10%	25.25 minutes
Actual Reduction	18.6%	47 minutes

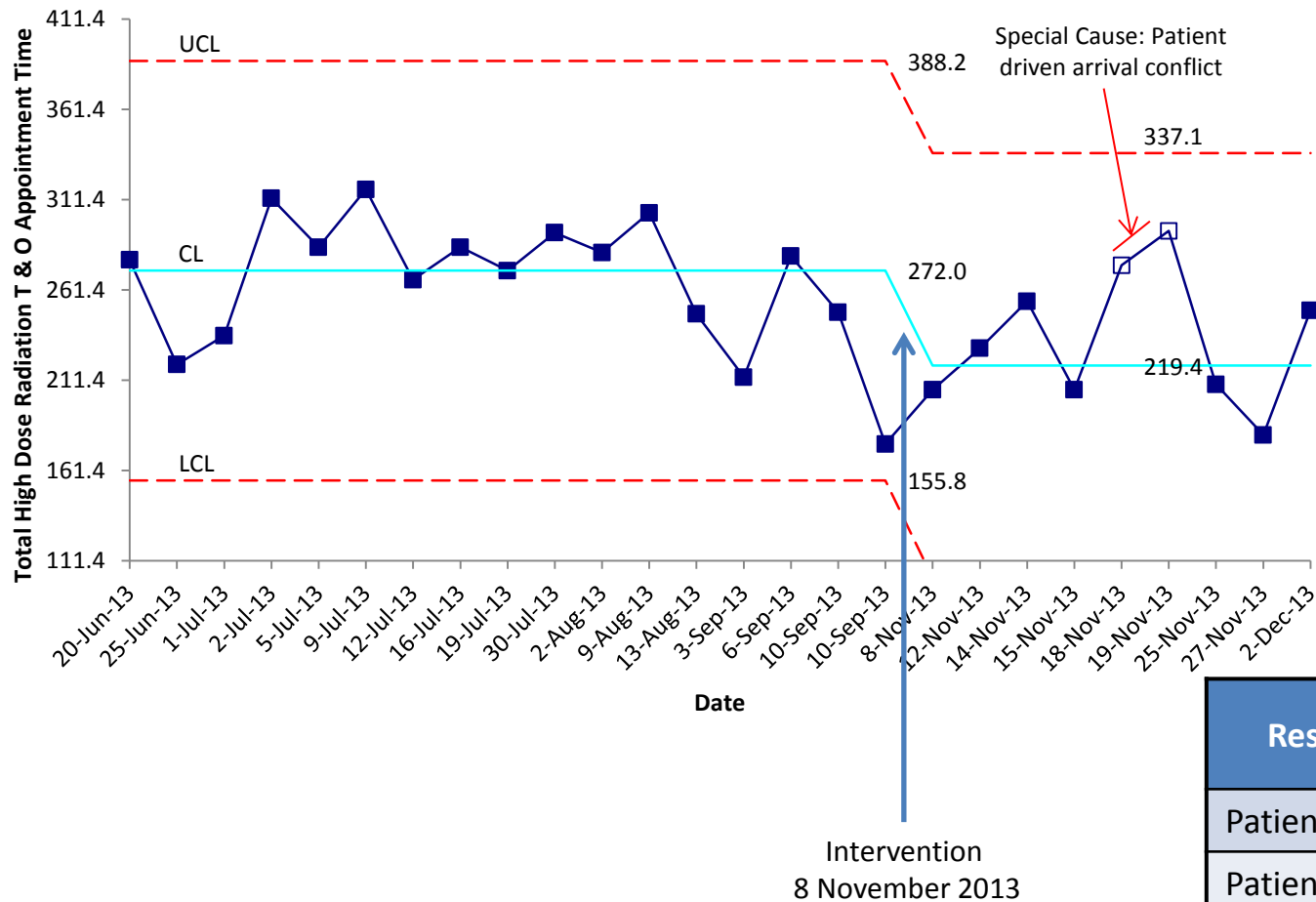
**Total High Dose Radiation T & O Appointment Time
(Patient 1 of Multiple Scheduled)**



Results

Goal Reduction	10%	27.2 minutes
Actual Reduction	19.34%	52.6 minutes

Total High Dose Radiation T & O Appointment Time (Patient 2 of Multiple Scheduled)



Results Summary	Target % Reduction	Actual % Reduction
Patient 1 of 1	10%	9.2%
Patient 1 of Multiple	10%	18.6%
Patient 2 of Multiple	10%	19.34%
Weighted total		15.33%

Return on Investment



Step 1:

- Calculate labor cost saved per encounter: \$107.89
 - Includes reduction in direct costs for nursing, physicists, physician, and technicians time and indirect support services

Step 2:

- ~~Cost of labor~~ x ~ 230 encounters annually:
\$24,815.30*

*Additional cost benefits excluded from the calculation

- Reduction in medication costs
- Costs associated with facility rent and other support services

Soft / Qualitative Benefits



- Patient Satisfaction
- Improved staff communication & patient hand-off
 - Potential reduction in medical errors
- Standardized work flow
 - Better resource utilization and increased clinic throughput
 - Annual certification tool for radiology services
- Identification of other performance improvement opportunities

Future Project Ideas

- Clinic template updates
 - Validating time requirements
 - Balancing physician availability with nursing support staff
- Updated patient check-in policies
 - Patients arriving extremely early or late for appointments
 - Consider further staggering appointments to 45 min

Sustainment / Conclusion

- Plan
 - Continuous data collection and tracking
 - HDR daily huddles
 - Monthly updates with SPC Charts
 - Quarterly review of tracking requirement
- Challenges
 - Appointment conflicts with partner clinics
 - Timely investigation of process variation between service areas

Thank you!



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