Clinical Safety & Effectiveness
Cohort 16 Team # 7

Reducing time from CT simulation to IMRT plan approval in Radiotherapy

CENTER FOR PATIENT SAFETY & HEALTH POLICY
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The Team

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Project Milestones

- Team Created: Jan 2015
- AIM statement created: Jan 2015
- Weekly Team Meetings: Feb 2015
- Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses: Feb 2015
- Interventions Implemented: April 2015
- Data Analysis: April-May
- CS&E Presentation: Graduation Date
Background

• Prolonged time between CT simulation to plan approval delays the initiation of radiation treatment.
• Rationale: The reduction of time between CT simulation and IMRT plan approval will improve quality of care and patient satisfaction.
  – Patients will be able to start their radiation therapy treatments sooner.
Flow Process from CT Simulation to Treatment Plan Approval

1. CT simulation (Time Stamp)
2. CT set marking (Dosimetry)
3. Notify Med Resident (Time Stamp)
4. Other imaging and Physics MPC (as needed)
5. Notify MD
6. Planning
7. Notify Dosimetry (Med Res) (Time stamp)
8. Contouring and Objectives
9. Plan evaluation by MD
10. Plan approval at TPS and sign Rx
11. Upload to MOSAIQ
12. Approval of Plan in MOSAIQ (Time Stamp)
Process Policies Procedures

Delayed attending RTP review

Plan complexity

Physicist not available for MPC

Objectives not available

Rx not signed in MOSAIQ

Contouring not complete

Medical residents training

Dosimetry School training

MD Scheduling

Hand-off (dosimetry, MD and Physicists)

Delayed RTP approval

People
Pareto Chart of Causes for RTP delay

- MD scheduling
- Delayed attending RTP review
- Plan complexity
- Contouring
- Delayed physics MPC
- Medical residents training
- Objectives not available
- Dosimetry School training
- Rx not signed in mosaix
- Hand-off

Volume:
- MD scheduling: 35
- Delayed attending RTP review: 20
- Plan complexity: 10
- Contouring: 9
- Delayed physics MPC: 7
- Medical residents training: 4
- Objectives not available: 4
- Dosimetry School training: 4
- Rx not signed in mosaix: 3
- Hand-off: 3

Cumulative %:
- MD scheduling: 35%
- Delayed attending RTP review: 55%
- Plan complexity: 65%
- Contouring: 74%
- Delayed physics MPC: 81%
- Medical residents training: 85%
- Objectives not available: 89%
- Dosimetry School training: 93%
- Rx not signed in mosaix: 97%
- Hand-off: 100%
Mean (X) CT Simulation to Plan Approval
Cycle Time in Work Days

Interpretation: The process is stable and within the upper and lower control limits. The average of 6.73 is above the 5 work day cycle time indicated by policy.
USL 5
LSL 0
Average 6.73

Within
SAMPLE
CP should be ≥ 1.33
Stdev 2.79
Cp 0.30
CpU -0.21
CpL 0.81
Cpk -0.21
PPM 740793.32

Overall
TOTAL POPULATION
Pp should be ≥ 1.67
Stdev 2.92
Pp 0.29
PpU -0.20
PpL 0.77
Ppk -0.20
PPM 734176.02

Interpretation: The average of 6.73 is above the 5-work day cycle time indicated by policy. The Cp is low and recommend improvement in processes to bring the average down.
Interpretation: The within and overall lines are well outside the specification limits of 0 to 5 work days. All 3 lines should be close to the specifications limits. This process requires improvement to ensure that the department is capable of meeting policy specification requirements.
PLAN: Intervention

Standardization
• Implement evidence based handoff.
• Monitor compliance with handoff.

Simplicity
• Reschedule patients undergoing hormonal therapy to 5 to 7 days prior to when the treatment plan approval is needed to reduce treatment plan changes/defects, delays, waste, rework and variation. This creates a pull system.
• Use the rescheduled date to calculate the work day cycle time.
DO: Implementing the Change

• Recording the time of:
  – CT simulation
  – Patient mark
  – Contouring of normal tissue
  – Target delineation
  – Ready for plan review
  – Plan approval

• Recording the times made everyone aware of the process and they tried to complete their task in timely manner
Results

Mean (X̄) Chart CT Simulation to Plan Approval
Cycle Time in Total Days

X̄ Values

Period

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97
CHECK: Results/Impact

Pre-Capability Plot
- Within
- Overall
- Specifications

Post-Capability Plot
- Within
- Overall
- Specifications

Pre-Capability Histogram

Post-Capability Histogram
ACT: Sustaining the Results

The recording of the time stamp at each step of the process from CT simulation to Plan approval is implemented into our policies and procedures.

The times are recorded in the notes of our Record and Verify system.
Return on Investment

Increased productivity
Increased capability
We can monitor each step of the process and intervene if needed.
Conclusion/What’s Next

Decreased the number of days between CT simulation and plan approval by 2.2
Patients can start treatments sooner.
We can increase the number of patient plans to accommodate more patients
Personnel (dosimetrists, physicians, residents) need to be educated to maintain gains.
Team Picture
Thank you!