Clinical Safety & Effectiveness
Session # 6

REDUCTION OF PATIENT TREATMENT TIME IN RADIATION THERAPY

CENTER FOR PATIENT SAFETY & HEALTH POLICY
UT Health Science Center™
SAN ANTONIO

Educating for Quality Improvement & Patient Safety
The Team

• Division
  – Alonso N. Gutiérrez, Ph.D., DABR
  – Anu Shrestha, B.Sc., RTT
  – June Duran, B.Sc., RTT
  – Rick Watkins, B.Sc., RTT
  – Chul Ha, M.D., DABR
  – Jonathon Tinker, MHA, MBA

• Sponsor Department
  – Department of Radiation Oncology
Project Milestones

- Team Created: Aug 2010
- AIM statement created: Aug 2010
- Team Meetings: Ongoing
- Background Data, Brainstorm Sessions, Workflow and Fishbone Analyses: Aug – Oct 2010
- Interventions Implemented: Oct 11, 2010
- Data Analysis: Aug 22-Nov 16, 2010
- CS&E Presentation: Jan 20 2011
Radiotherapy Delivery

• Radiotherapy requires accurate patient positioning throughout treatment
  – Image guided (CT): Aids in initial patient positioning
  – Patient may move after positioning

• Reduction in overall treatment time is beneficial
  – Reduced probability of patient motion
  – Better accuracy in targeting tumor and sparing normal tissues
  – Improved patient experience
  – Increased patient throughput
What We Are Trying to Accomplish?

OUR AIM STATEMENT

To decrease, by mid-December 2010, the single fraction treatment time* by 15.0% using the TomoTherapy Hi-ART unit located within the Department of Radiation Oncology at CTRC

*single treatment time – time required to setup, register and dismiss the patient
Major Key Process Components

- TomoTherapy Radiation Delivery Process

1. Patient Initial Setup
2. CT Scan
3. Image Fusion
4. Patient Final Position
5. Treatment
Flow Chart

Open patient plan and select CT scan region

Retrieve patient from waiting room

Correct patient?

Yes

Escort patient into treatment vault

Perform initial patient setup

No

Record patient shift data on spreadsheet

Acquire screen capture for patient record

Proceed to vault to apply shifts to patient

Treat patient

Aid patient off of treatment table and escort to lobby

Call MD and resident to approve scan

New patient new plan?

Yes

Therapist approves the scan

Therapist begins fusion process

Start CT scan

No

Flow Chart
How Will We Know That a Change is an Improvement?

• To track improvement, overall treatment time for all patients will be logged
• Specific data recorded:
  – Time patient enters treatment vault
  – Time patient radiation delivery starts
  – Time patient exits treatment vault
What Component of the Process do We Target?

• Strategically evaluated main contributing factors:
  – TomoTherapy machine
  – Patients
  – Healthcare providers
  – Processes
  – Personnel Skills/Training
Cause-and-Effect Diagram of the Reasons Why Treatment Time is Prolonged on TomoTherapy

Machine
- TomoTherapy errors requiring physicist/engineer attention
- System needs to be rebooted

Processes
- Therapist time to transfer verification image into R&V
- Therapist time to record shifts
- Physician time to approve fusion on first tx fraction

Patient
- Pt enjoy talking to therapist
- Pt move during CT scan
- Some patients require longer time to setup
- Pt nervous and tense about Tx

Healthcare Providers
- Long time to localize physician
- Therapist tending to other requests
- Therapist socialize
- Therapist & Physician not familiar with fusion
- Therapist not selecting optimal scan length

Skills

Overall treatment time on TomoTherapy too long
**Intervention – Action Plan**

- Focused on **three** specific components:
  - Healthcare providers
    - Time efficiency of treatment dependent healthcare provider
  - Processes
    - Current processes performed established practice and not optimized for efficiency
  - Personnel Skills/Training
    - Image fusion technique highly variable among physician and therapist
    - CT scan volume region also highly variable among therapist
Implementing the Change

• Healthcare providers
  – “Tomo Time”: Establish an understanding of the importance of time efficiency during setup thru delivery

• Processes
  – Pt. shifts recorded during radiation delivery
  – Fusion verification image transferred at END of day
  – Pre-notification of physician for fusion approval

• Personnel Skills/Training
  – Therapist training to optimize CT scan volume
  – Physician/therapist training to systematically fuse images
Mean Daily Patient Treatment Time Run Chart

- 25% decrease in overall treatment time (13.0 vs. 17.4min)
- 53% decrease in variation (15.2 vs. 7.1min)
Mean Daily Setup/Fusion Time Run Chart

- 35% decrease in setup/fusion time (9.0 vs. 13.9min)
- 35% decrease in variation (4.7 vs. 9.9min)
Expansion of Our Implementation

• Techniques utilized to decrease patient treatment time are universal
  – Apply similar strategy to other radiation delivery machines
    • Novalis Tx experience

• Address patient component
  – Providing patient education at start of treatment
  – Providing patient with multimedia illustrating treatment
Return on Investment (ROI)

- Tangible return
  - Increased patient throughput = increased department revenue
  - Typical IMRT treatment (5wks/$35K/Pt.)
  - Based on 8 hour work schedule
    - Treat 4 additional patients per day (~40 Pts/yr.)
    - Revenue increase: $1.4M

- Intangible return
  - Patient satisfaction
  - Potential improvements in treatment effectiveness
  - Potential reduction of radiation side effects
Conclusion/What’s Next

• Our team was able to reduce overall patient treatment time by 25% largely due to:
  – Personal training
  – Processes optimization
• We found that continuous training and peer encouragement is essential for sustainability
• Overall patient satisfaction increased due to shorter treatment times
• Complete similar project for Novalis Tx treatment unit
Thank you!