

Surface Guidance for SBRT Treatments: Benefits & Optimal Workflow

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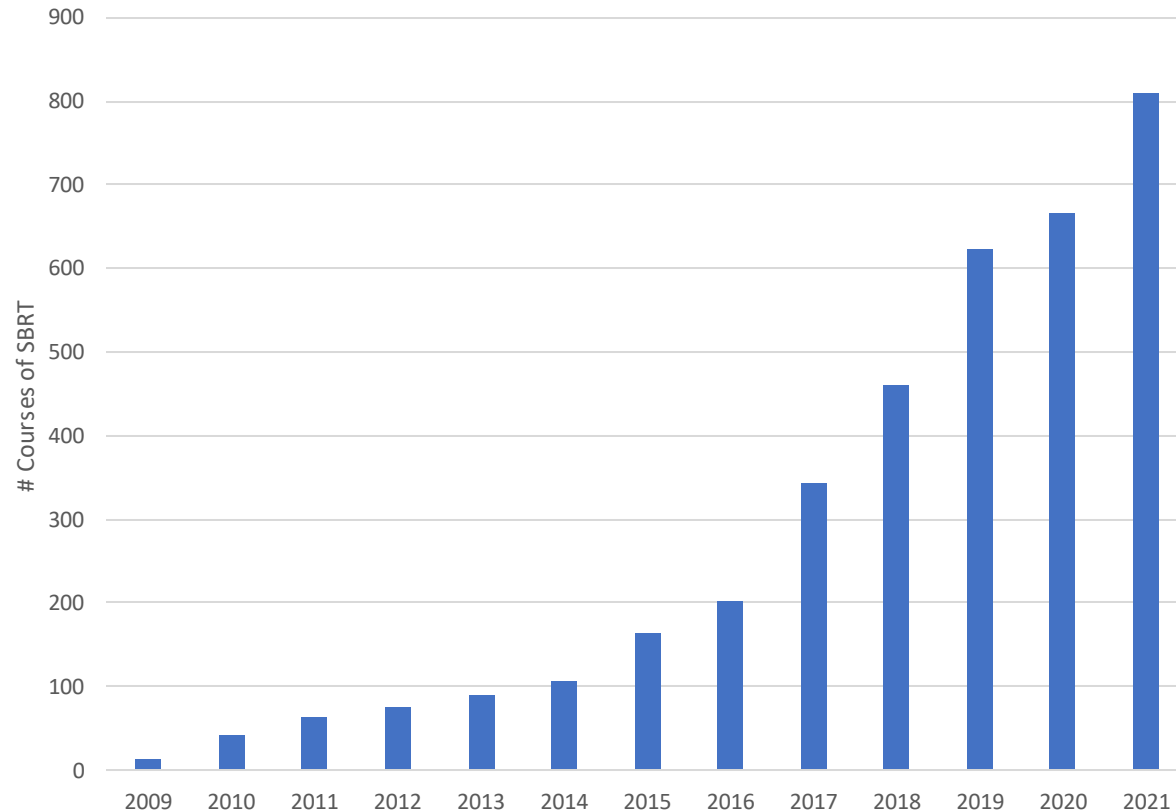
Chief Radiation Therapist

AGENDA

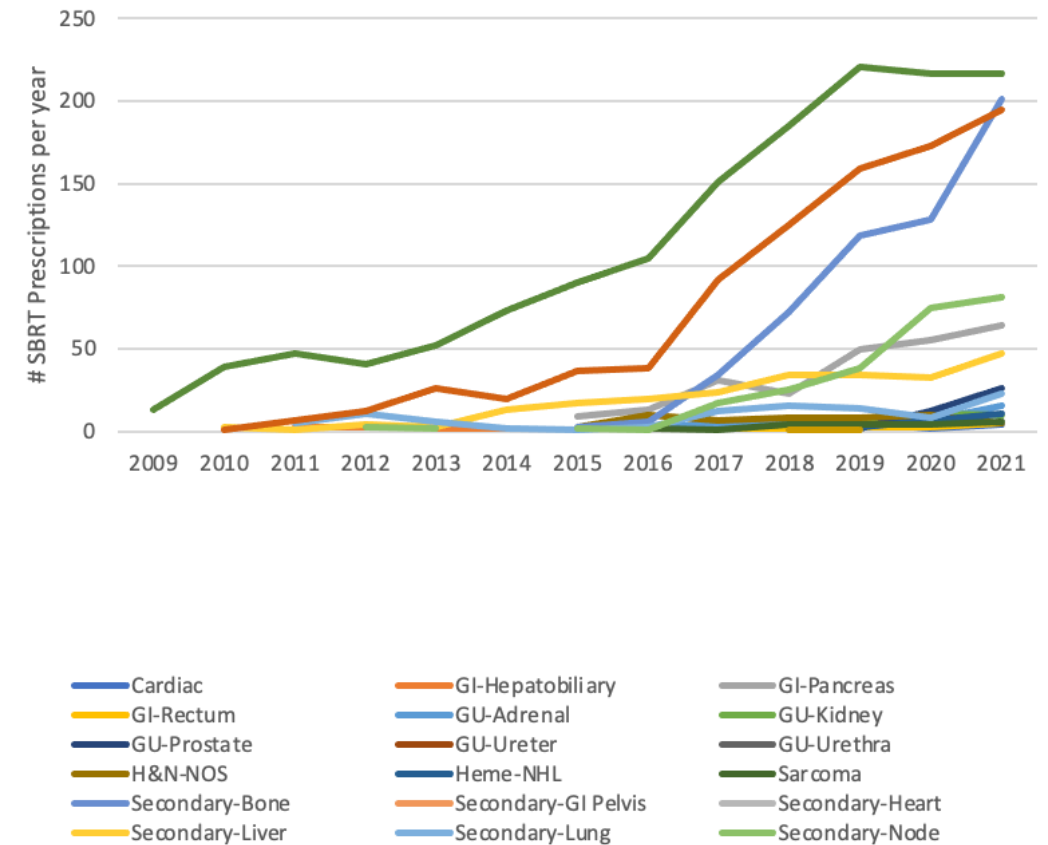
- Background and Clinical Rationale
- Case Study in Practical Implementation of SGRT for Non-Spine Bone SBRT
- Clinical Impacts of Tattooless Workflow

SBRT Treatment is Increasing

SBRT Volume at BWH/DFCI Cancer Center



SBRT Volume by Disease Site



Clinical Rationale

- Expanding Indications for SBRT
 - Oligometastatic Disease
 - Re-Irradiation
 - Radioresistant Histologies
 - Pain Control
- Incorporating SGRT for treatment set up or treatment delivery may reduce treatment time and improve fidelity of treatment delivery
- Faster and more efficient treatment improves patient experience and expands operational capacity

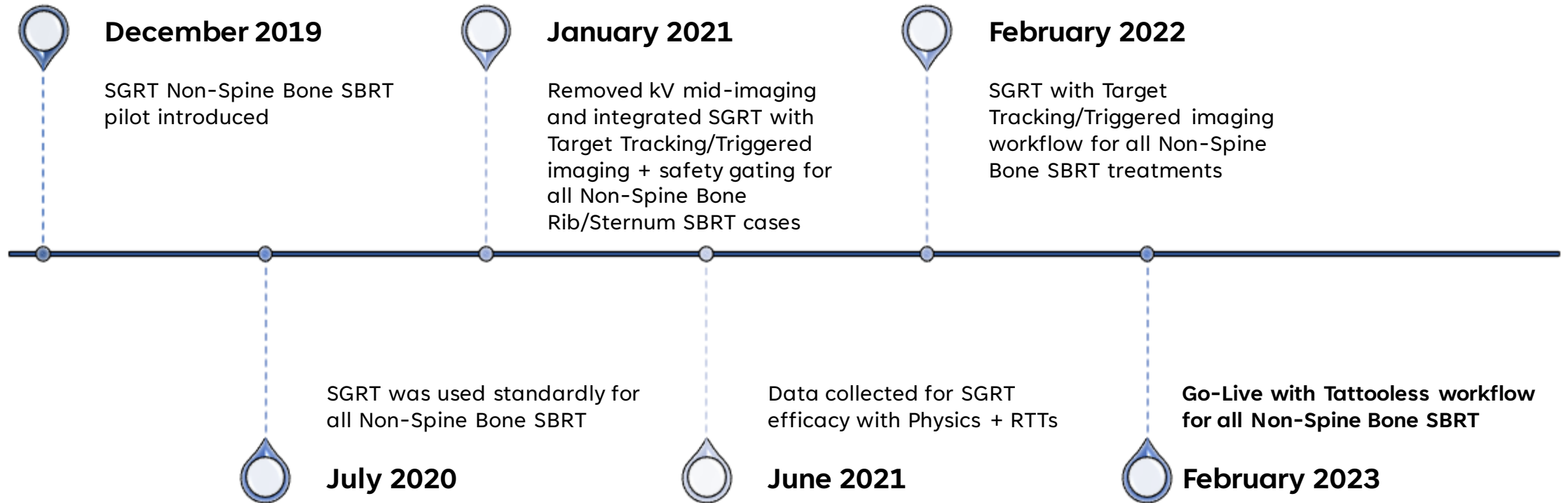
Considerations for Non-Spine Bone SBRT

- Maintaining accurate position of joint is critical for non-spine bone SBRT due to the highly conformal nature of VMAT plans
- Up to 2019, pre and mid kV or CBCT imaging was institutional standard given excellent visualization of bone and tighter margins and tolerance used (2mm / 2deg)
- Tradeoff of using on-board imaging to ensure set up accuracy and extending time needed to deliver treatment

Clinical Questions

- How can SGRT minimize time or imaging needed for initial set up of non-spine bone SBRT patients?
- Can SGRT be used as surrogate for intrafraction motion monitoring?
- Can SGRT replace need for leveling tattoos for non-spine bone SBRT set up?

Process Improvement Timeline





Non-Spine Bone Tattooless Workflow

Inside Treatment Room

1. Set up patient per simulation instructions.
2. Ensure Vac Lok bag is level based on board index points and marks on immobilization.
3. Auto table to couch coordinates provided by planning team.
4. Turn on AlignRT.
5. Position patient and shift table to get deltas within tolerance.

Non-Spine Bone Tattooless Workflow

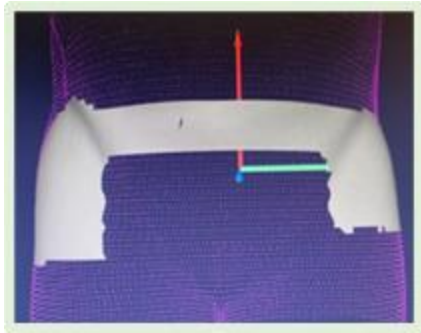


Created protocols with specific delta tolerances

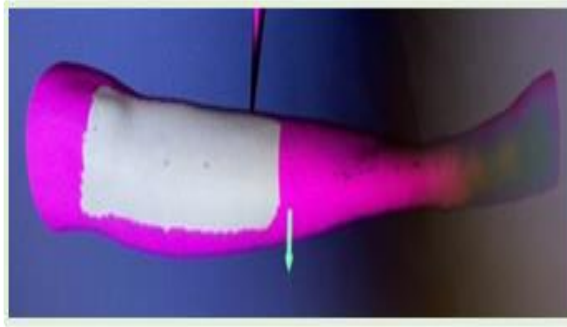
ROIs can be adjusted. Helpful for troubleshooting!

Suggestions for Non-Spine Bone ROIs

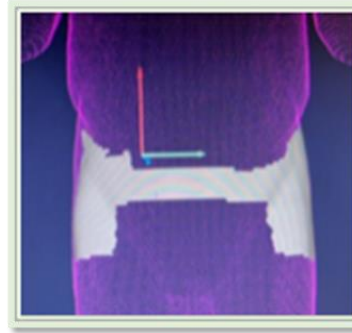
PUBIC RAMUS



EXTREMITY LOWER LEG



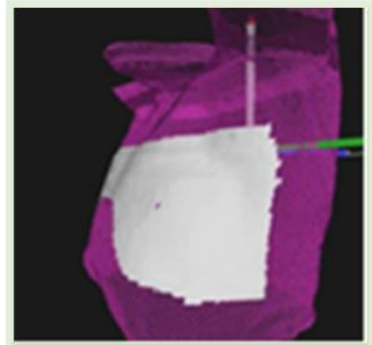
FEMUR



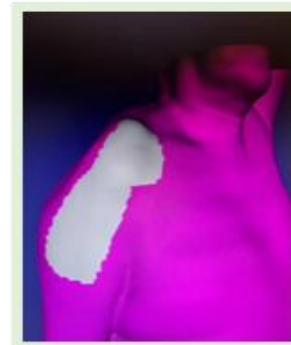
Tips:

- Remove abdomen from ROI if pt is a heavy breather or do a Gated Reference Capture
- Include a Joint
- If ROI is drawn too inferiorly on leg, the pitch may be affected.

RIB/STERNUM/CHEST WALL



HUMERUS/SHOULDER



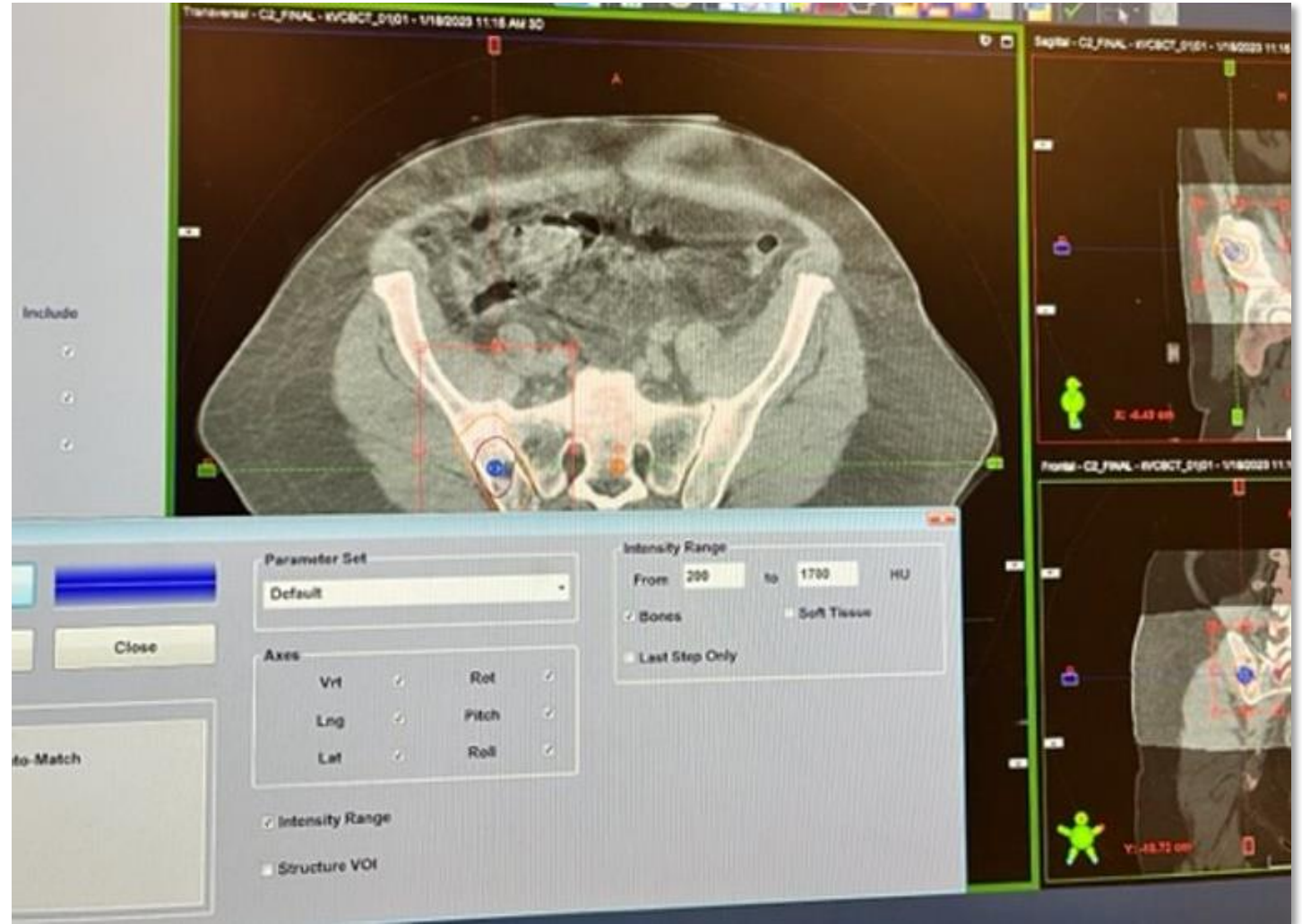
Tips:

- Lateral ROI is to be drawn to the mid coronal plane
- Always think about what the cameras can see!
- Consider setting 2 ROIs for scapula/clavicle/shoulder sites

Non-Spine Bone Tattooless Workflow

Outside Treatment Room

1. Take kV image, apply shifts
2. Take CBCT (per our institutional policy CBCT must be at or under tolerances)
3. MD approves CBCT, apply shifts



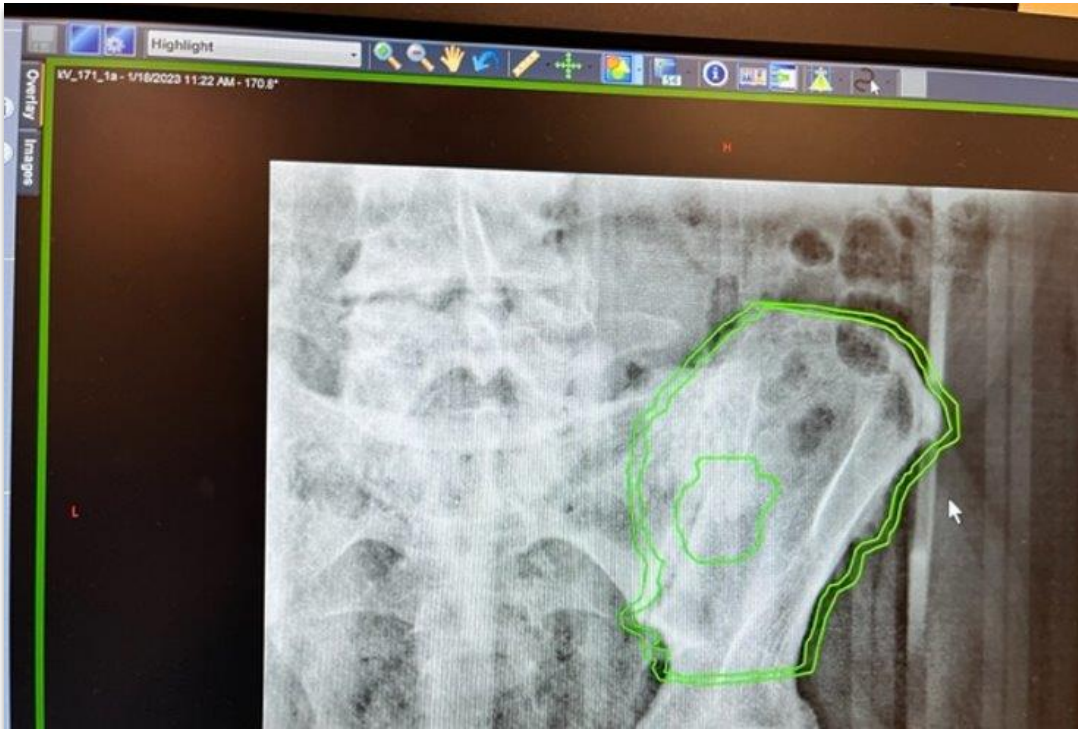
Non-Spine Bone Tattooless Workflow

2nd RTT captures a new Reference Capture that includes all shifts from imaging

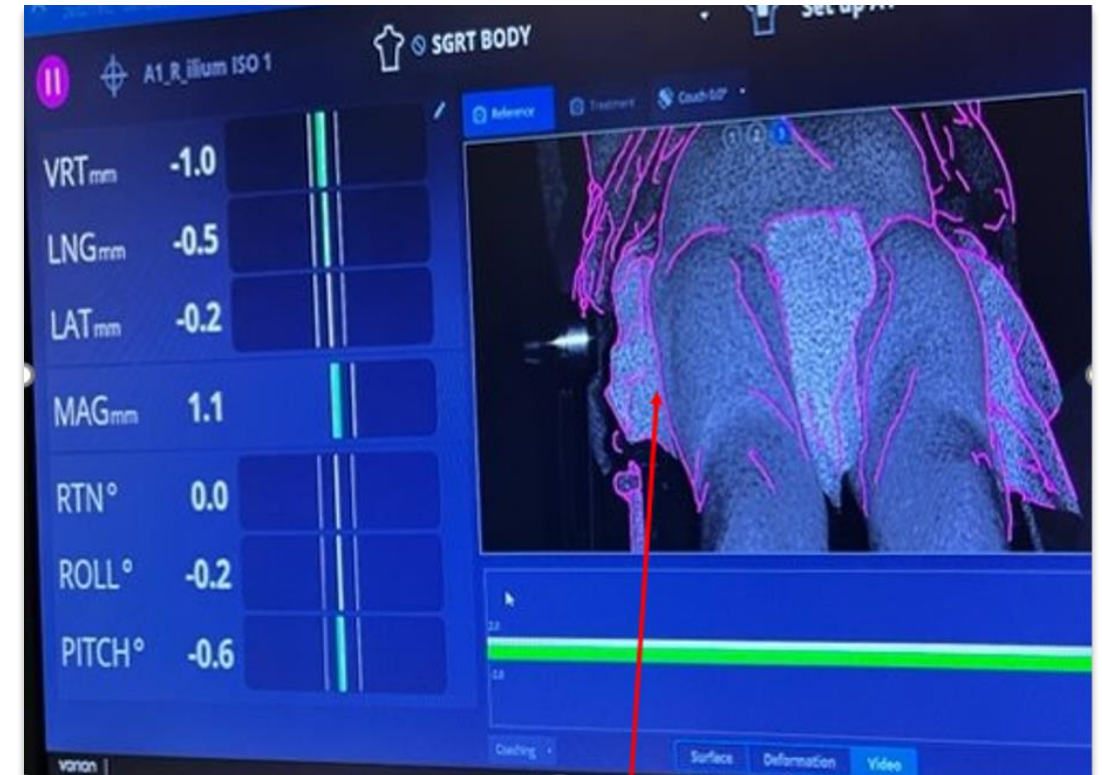


Non-Spine Bone Tattooless Workflow

Driving RTT monitors kV triggered imaging with Tracking Structures

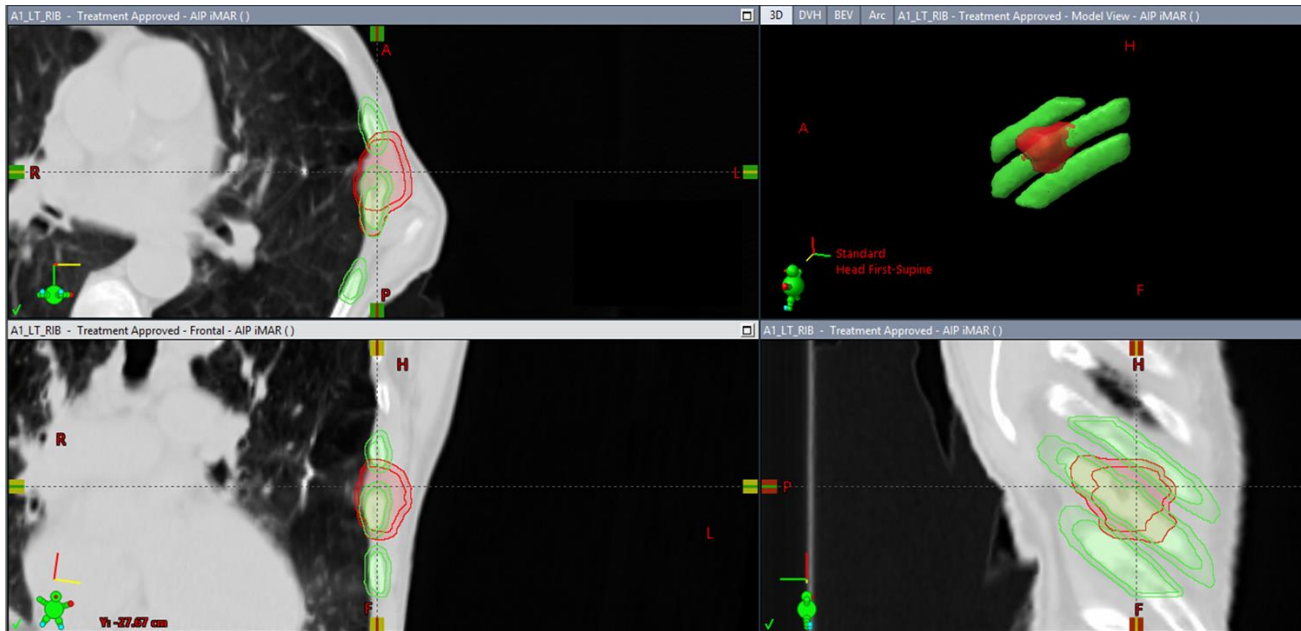


2nd RTT monitors AlignRT deltas + postural video

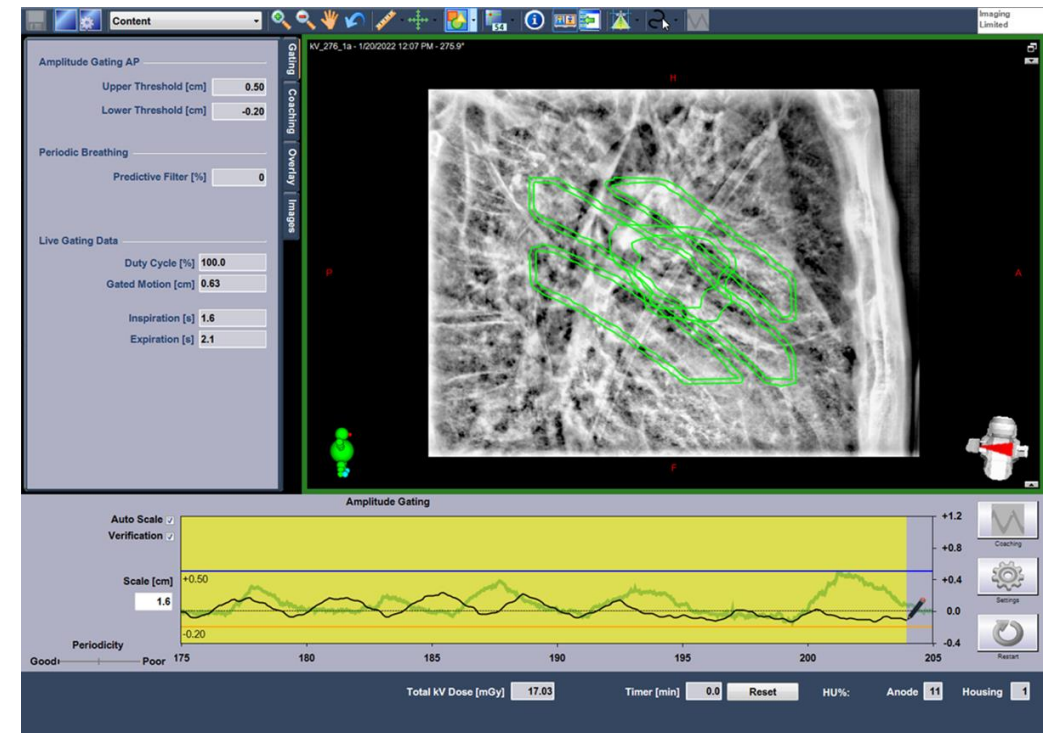


Non-Spine Bone Tattooless Workflow

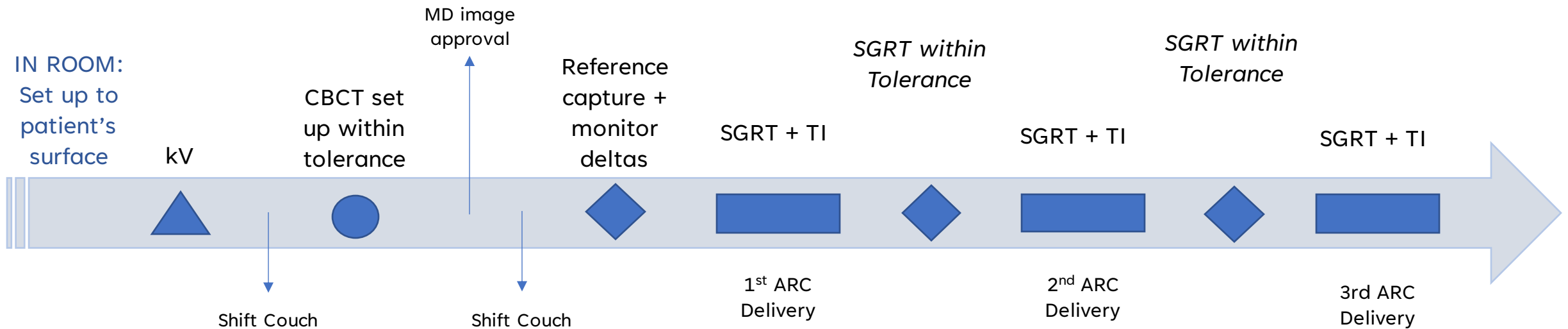
Multi Rib Involvement



Real-time Triggered Imaging



Non-Spine Bone Tattooless Workflow



Current sites:

- Non-Spine Bone
- Lung
- Lymph Nodes

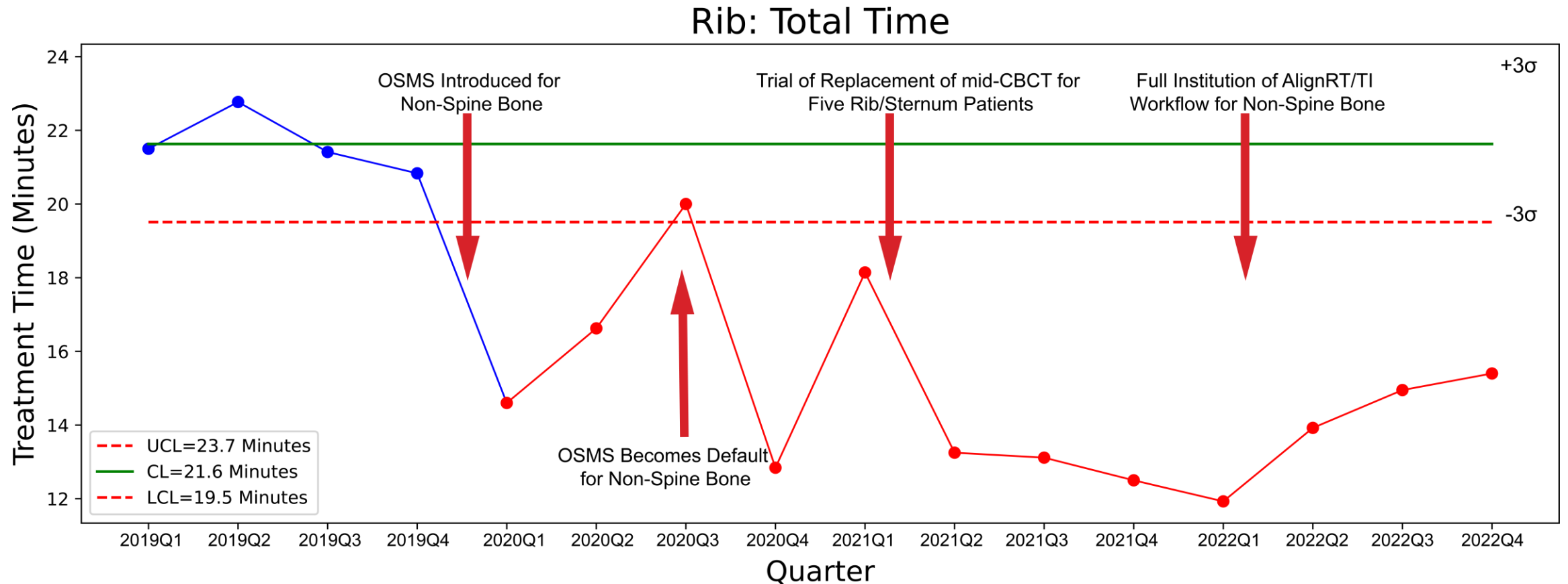


Future sites:

- Spine
- GI/GU

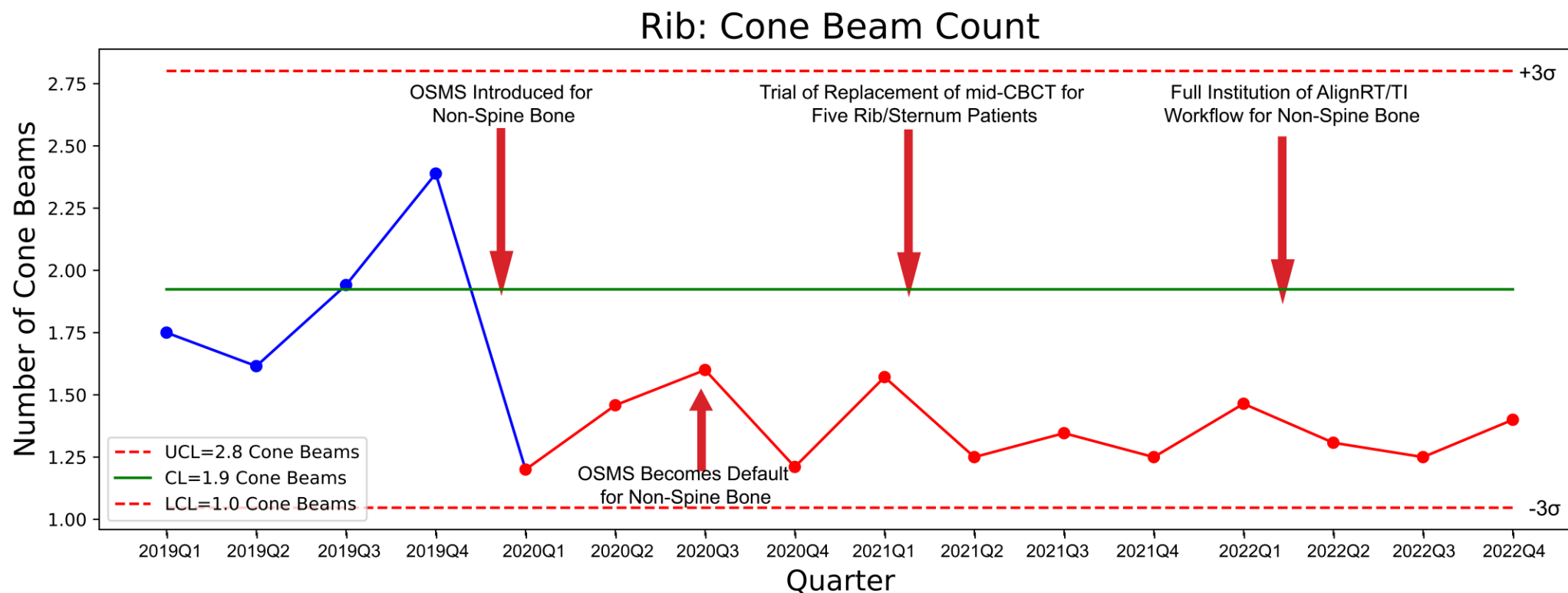
TI= Triggered Imaging

Reduction in Total Treatment Time for Rib SBRT



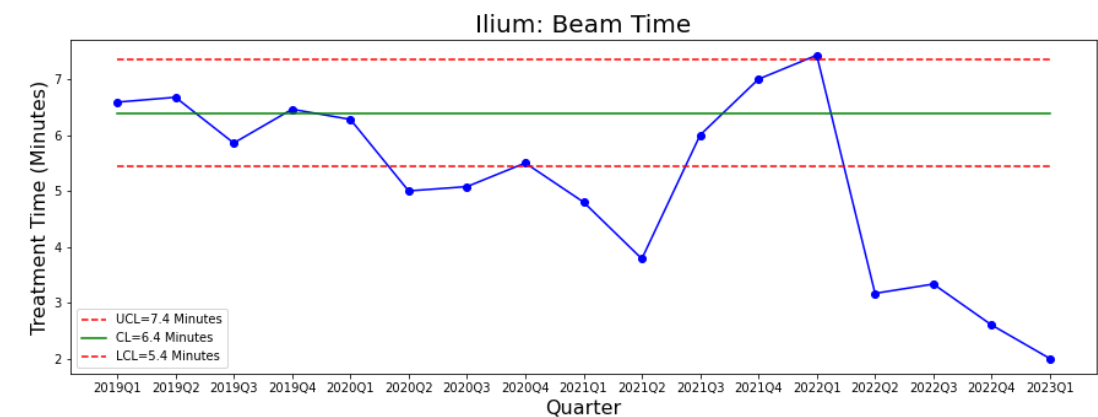
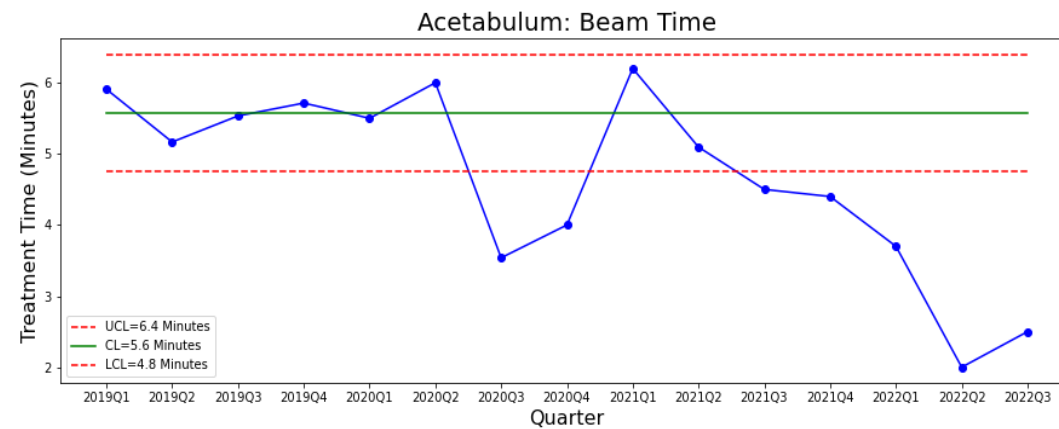
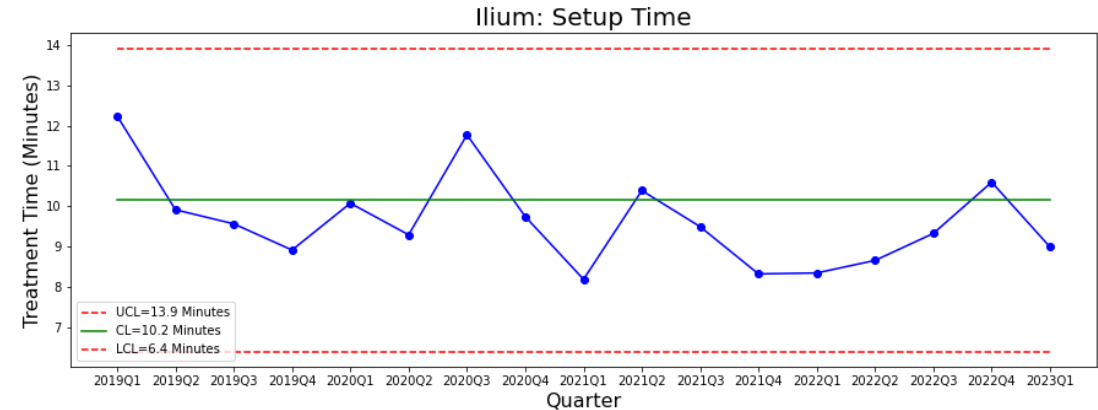
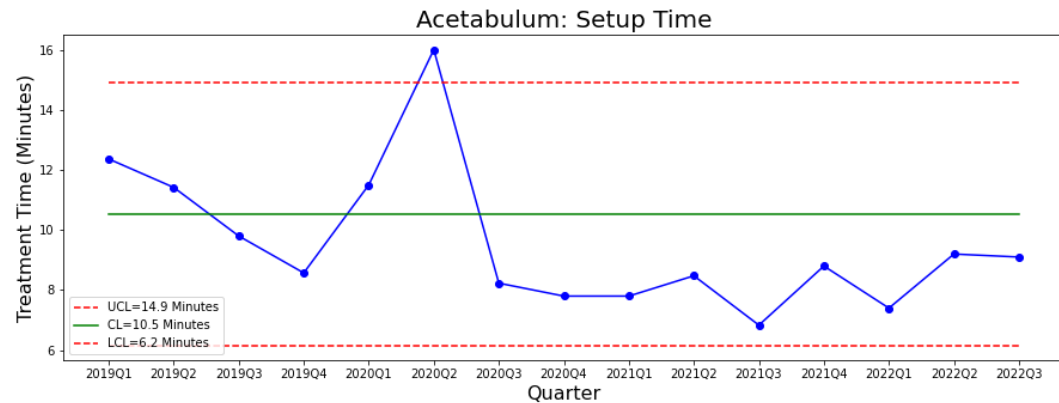
Andrew Zhou et al., Manuscript in Preparation

Reduction in CBCT in Rib SBRT



Andrew Zhou et al., Manuscript in Preparation

Reduction in Set Up Time for Acetabular SBRT and Treatment Times for Acetabular/Ilium SBRT



Andrew Zhou et al., Manuscript in Preparation

Conclusions

- We successfully transitioned to a tattooless workflow for Non-Spine Bone SBRT, utilizing SGRT for set up and mid-imaging and SGRT + TI for real-time intrafraction motion monitoring
- Implementation of this novel workflow was associated with significant reductions in treatment time and CBCT imaging required for rib SBRT and reduced treatment times for acetabular and ilium SBRT
- Higher fidelity treatment will improve outcomes and reduce toxicity
- Improvements in the patient experience
 - Faster treatment time
 - Reduced radiation exposure
 - Omit need for permanent tattoos

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