Cancer Institute

Top Tips for Effective and Efficient SGRT Implementation

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NOVANT HEALTH

Conflicts of Interest

Both presenters had travel supported to present at this conference and otherwise have nothing to disclose.

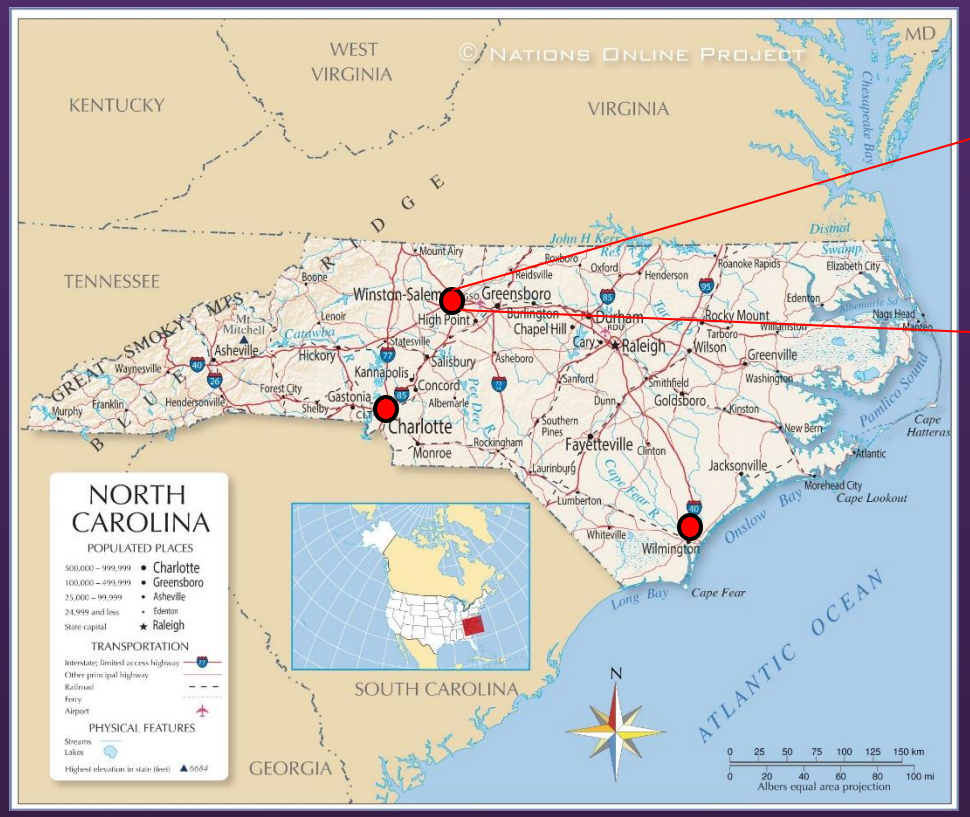
Disclaimer

Images used are stock, ChatGPT generated, or personally obtained. Any persons seen are not real patients.

Outline

1. Physics/QA focus topics
   - Building the case
   - Commissioning Strategy
   - Workflow Design and Integration – DIBH example
   - QA Program
2. Therapist/Treatment Focused Topics
   - Build a training and competency program
   - Communicate and educate patients
   - Breast, Chest, and DIBH
   - Expanding to other sites

About us

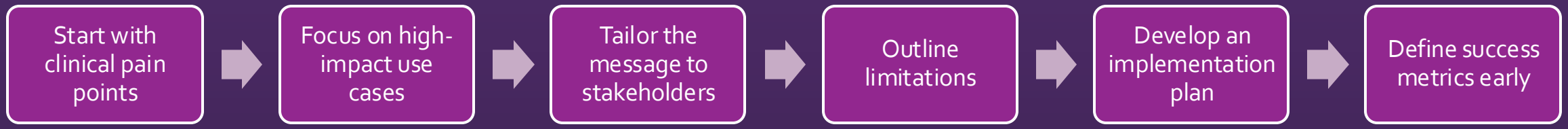


● = Novant Health RadOnc Market

<u>Winston-Salem Market</u>

- 2 sites (main campus and single linac satellite)
- 4 TrueBeams & 1 VitalBeam
- Aria/Eclipse
- VisionRT (AlignRT, SimRT) – 11 years
  - Fully markless for non-mask sites
  - Primary setup tool for all treatment types including standard 3D, IMRT/VMAT, SBRT, SRS, TBI

Building the Case

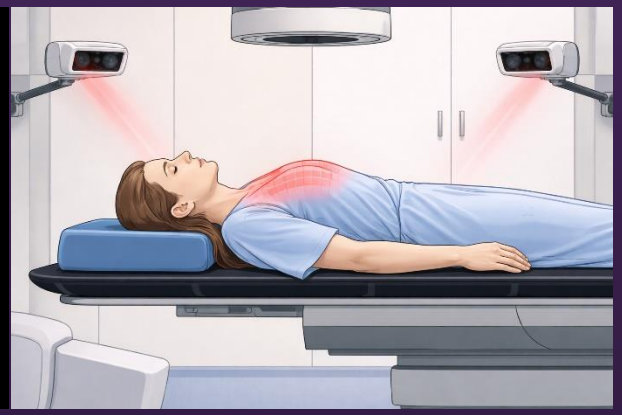


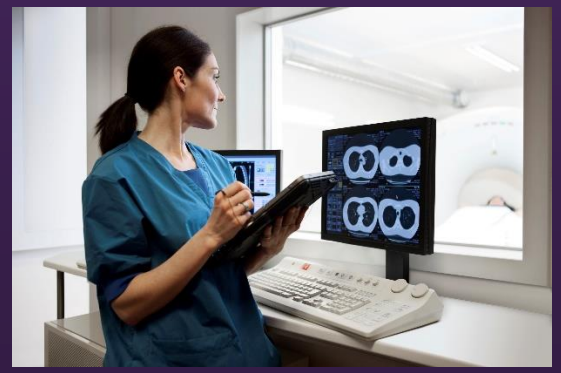
Building the Case

Start with clinical pain points

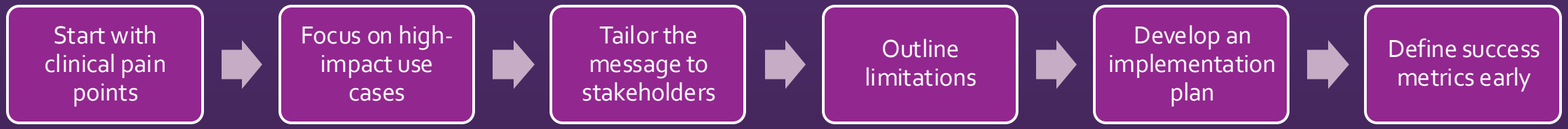
Examples:

- Set up time
- DIBH, SRS
- Extensive imaging/re-imaging





Building the Case

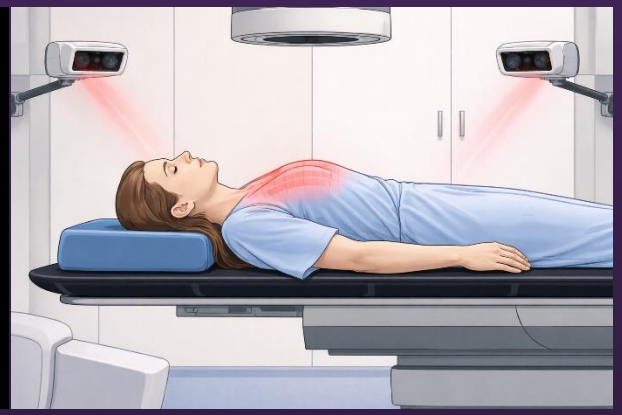


Building the Case

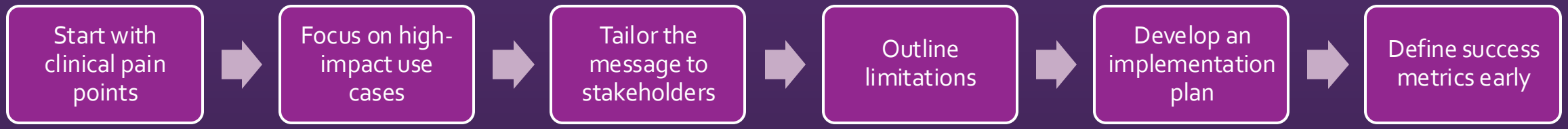
Focus on high-impact use cases

For us, this included:

- DIBH, SRS



Building the Case

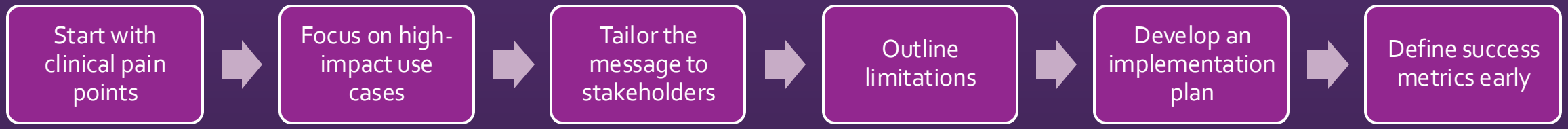


Building the Case

Tailor the message to stakeholders

I.e. MDs, physics, therapists, admin, etc.

Building the Case



Building the Case

Outline limitations

Examples:

- Surface only, no internal markers
- Limited view (arms blocking)
- ROI accuracy

Building the Case

Start with clinical pain points → Focus on high-impact use cases → Tailor the message to stakeholders → Outline limitations → Develop an implementation plan → Define success metrics early

Sarah C to discuss later

Key Tip

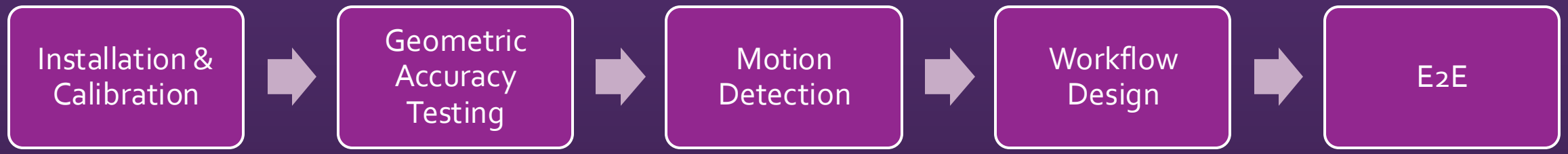
- Sell the problem, not the technology

Building the Case

Key Tip

- Sell the problem, not the technology

Commissioning Strategy



Commissioning Strategy

TABLE 4 Summary of tests outlined in Section III.B. of AAPM's Task Group 147 for commissioning an SGRT system

Test category	Description	Tolerance
Interface with peripheral systems	• Integrity of data transferred from CT simulation, TPS, R&V systems for a variety of patient orientations to test coordinate systems • Confirm isocenter coordinate transfers accurately into SGRT system using a phantom • Beam delivery functionality (with/without gating) • CT triggering functionality for prospective/retrospective gating • Couch shift functionality	Passing/functional
Spatial drift and reproducibility	• Characterize warm-up period necessary prior to clinical use • Localization accuracy for a 90-min period or until stability is achieved[48]	• NA • ≤2 mm over 1 h; ≤1 mm after stabilizing
Static localization accuracy	• Localization accuracy of offset phantom over a reasonable clinical range (i.e., ±100 mm range from isocenter)	≤2 mm ≤1 mm for SRS/SBRT
Dynamic localization accuracy	• 4D spatial localization accuracy • Frame rate characterization for clinically reasonable scenarios • Latency threshold (may depend on clinical workflow)	• per TG-142 • per spec. • within 100 ms of expected value
Camera system characteristics	• Camera exposure settings are appropriate for a variety of skin tones • Measure localization FOV • Characterization of camera occlusion for variety of clinical scenarios (e.g., couch/gantry angles)	• NA • per spec. • NA
Imaging	• Isocenter coincidence with all imaging modalities that will be used in complement with SGRT	≤2 mm ≤1 mm for SRS/SBRT
End-to-end	• Characterization of localization and monitoring accuracy from CT to dose delivery including beam hold if available • Winston-Lutz including SGRT for SRS applications	• ≤1% dose change; ≤2% dose change for beam hold • <1 mm
Standard Operating Procedures	• Should include training guidelines for new personnel (either new to the department or new to the technology) • Should include intended use of the SGRT system, case-types, etc. • Should be updated as experience and technology evolves	Existing/Available

FOV, field-of-view; R&V, record and verify; SRS, stereotactic radiosurgery; SBRT, stereotactic body radiotherapy; TPS, treatment planning system.
Reprinted in part with permission from Medical Physics Publishing.[7]

AAPM TG-302 Table 4

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Commissioning Strategy

Installation & Calibration → Geometric Accuracy Testing → Motion Detection → Workflow Design → E2E

Key Tip

- Verify accuracy first and foremost, then test integration

Commissioning Strategy

Key Tip

- Verify accuracy first and foremost, then test integration

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows → Gradually move to using for FB tx → Gradually move to using for DIBH tx → Gradually move to using for DIBH/bolus tx

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows

Goals:

- Gain familiarity with software
- Learn where SGRT helps/hinders your workflows

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows → Gradually move to using for FB tx → Gradually move to using for DIBH tx → Gradually move to using for DIBH/bolus tx

Workflow Design and Integration - DIBH

Gradually move to using for FB tx

Goals:

- Increase efficiency in setup/imaging
- Develop departmental guidelines for SGRT positioning
  - SGRT only shifts vs. re-imaging required

Treatment Type	If send-to-couch is used, when are follow-up images required?	What type of imaging?
3D Breast/Chestwall	Shift ≥ 1 cm	Open MV tangent port
IMRT/VMAT Breast/Chestwall	Shift ≥ 0.5cm	Imaging per Rx
APBI, SBRT, SRS/FSRT	Always	CBCT+MD Verification
Other	Always	Imaging per Rx

Table 1: Send-to-couch Guidelines

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows → Gradually move to using for FB tx → Gradually move to using for DIBH tx → Gradually move to using for DIBH/bolus tx

Workflow Design and Integration - DIBH

Goals:

- Determine patient enrollment guidelines
- Add DIBH scan at sim
- Positioning workflow
  - Initial setup FB
  - Fine tune with DIBH
- Patient coaching strategies

Gradually move to using for DIBH tx

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows → Gradually move to using for FB tx → Gradually move to using for DIBH tx → Gradually move to using for DIBH/bolus tx

Workflow Design and Integration - DIBH

Goals:

- Determine bolus detection with SGRT
- Workflow for multiple surfaces
  - i.e. bolus & no-bolus fields

Gradually move to using for DIBH/bolus tx

Workflow Design and Integration - DIBH

Use SGRT in tandem with existing workflows → Gradually move to using for FB tx → Gradually move to using for DIBH tx → Gradually move to using for DIBH/bolus tx

Key Tip

- Implement a stepwise workflow design and integration strategy

Workflow Design and Integration - DIBH

Key Tip

- Implement a stepwise workflow design and integration strategy

QA Program

TABLE 5 Summary of routine QA tests to be performed daily, monthly, annually as specified in Table II of AAPM's Task Group 147[1]

Frequency	Test category	Methods	Accuracy
Daily	Safety	Check interlocks and clear FOV for all mounted cameras	Pass
	Static localization	Daily QA phantom positioned at isocenter and can track movement to isocenter from offset	2 mm
Monthly (in addition to daily tests):	Safety	Machine interface: gating termination, couch motion communication	Functional
	Static localization	Localization test based on radiographic analysis (i.e., hidden target)	2 mm 1 mm for SRS/SBRT
	Dynamic localization	Motion table or manual couch motion of monthly phantom by known distances	2 mm or less as per manufacturer spec.
Annually (in addition to all monthly tests)	Safety	Test/reset buttons, backup power supply, and emergency-off switches	Pass
		System mounting brackets (all cameras are secure)	Pass
	Integrity	Check camera settings if accessible	Unchanged from previous
	Stability (drift/reproducibility)	Drift measurement (over at least 1 h)	<2 mm over 1 h
		Reproducibility of localization	<1 mm after stabilizing
	Static localization (extensive)	Complete end-to-end test (including data transfer check of localization accuracy, etc.)	<2 mm from isocenter <1 mm for SRS/SBRT
		Translation and rotation auto correct over a clinical range of motion	<2 mm from isocenter
	Dynamic (gating system)	Using a motion phantom/check of gating system radiation dosimetry accuracy.	< 2% (per TG-142)
	Data transfer	From all systems in use	Functional

FOV, field-of-view; SRS, stereotactic radiosurgery; SBRT, stereotactic body radiotherapy.

AAPM TG-302 Table 5

QA Program - Example

Key Tip

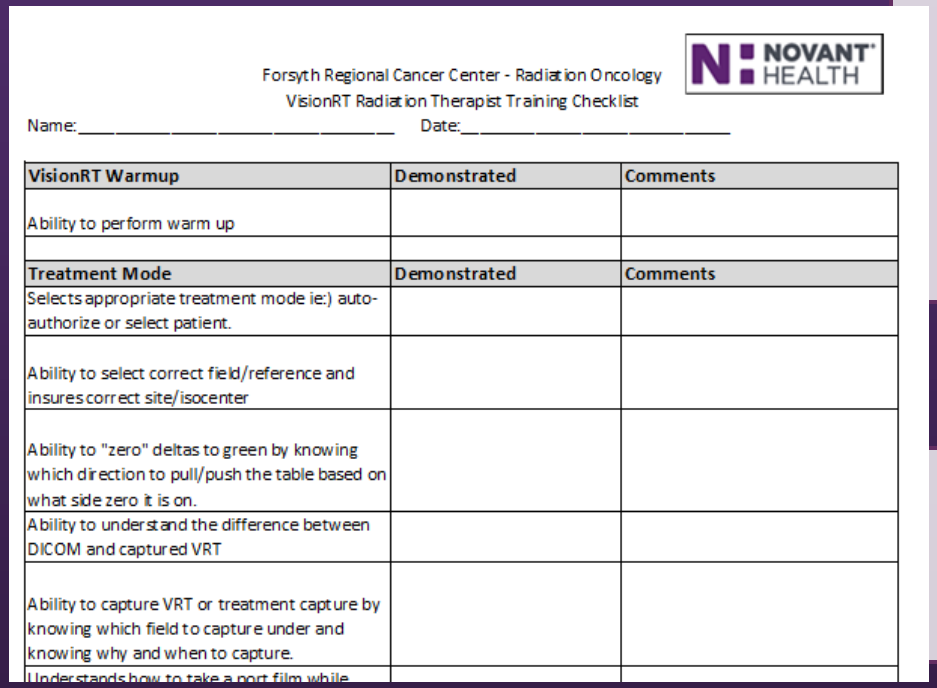
- Design tests that integrate within your existing QA for maximum efficiency

QA Program - Example

Key Tip

- Design tests that integrate within your existing QA for maximum efficiency

Build a Training and Competency Program



Forsyth Regional Cancer Center - Radiation Oncology
VisionRT Radiation Therapist Training Checklist

Name:_____ Date:_____

VisionRT Warmup	Demonstrated	Comments
Ability to perform warm up		
Treatment Mode	**Demonstrated**	**Comments**
Selects appropriate treatment mode ie:) auto-authorize or select patient.		
Ability to select correct field/reference and insures correct site/isocenter		
Ability to "zero" deltas to green by knowing which direction to pull/push the table based on what side zero it is on.		
Ability to understand the difference between DICOM and captured VRT		
Ability to capture VRT or treatment capture by knowing which field to capture under and knowing why and when to capture.		
Understands how to take a port film while		

Dedicated Superusers

- Initial staff training
- Create Tip Sheets

Competency Check Off Sheet

- Annual in-service

Build a Training and Competency Program

Key Tip

- Start with superusers, train intentionally, and revisit the basics regularly

Communicate and Educate Patients

- Starts at CT sim
- Consistency between Sim and Treatment
- Treatment area uncovered
- Significance of holding still
- Reassurance and build trust

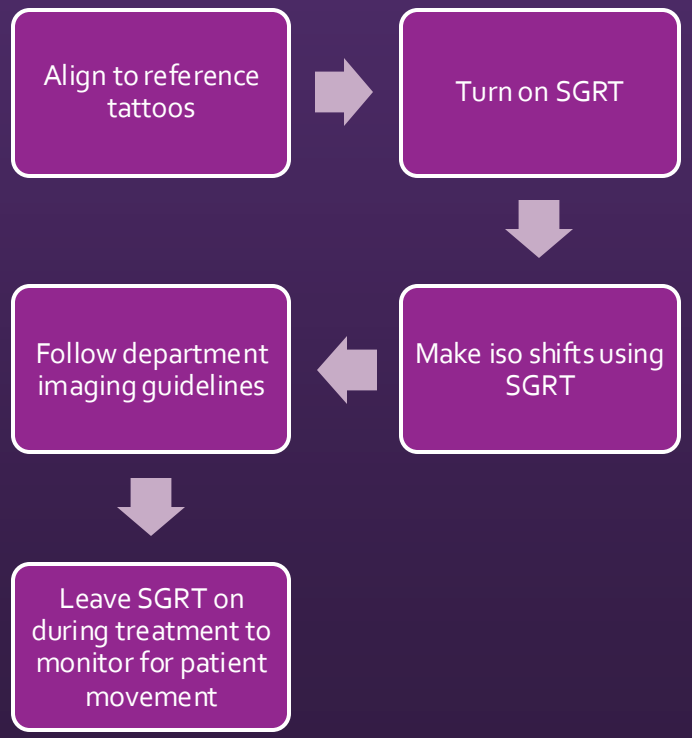
Communicate and Educate Patients

Key Tip

- Patient communication is just as important as the technology itself.

Breast, Chest, and DIBH

Phase 1: Start with patient reference tattoos and use SGRT for isoshifts and position tweaking



Breast, Chest, and DIBH

Phase 2: Patient has tattoos as back up but are not used at all for set up.

Turn on SGRT → Set up patient at iso using SGRT only → Follow department imaging guidelines → Leave SGRT on during treatment to monitor for patient movement

Imaging suggestion for patients that are not daily imaging: take port film Fraction 2 after using SGRT to set patient up, to ensure any shifts captured on SGRT surface are still correct.

Breast, Chest, and DIBH

Key Tip

- SGRT isn't replacing our judgement – it's adding information

DIBH

Turn on SGRT → Set up patient using a Free Breathing surface → Change to DIBH surface → Instruct patient to take in breath and hold
- Patient may need to take in deeper or let out air to get VRT delta in the green

→ Patient continues to hold breath → Therapists use Lat and Long on table to tweak patients positioning → Patient is then told to breathe

DIBH

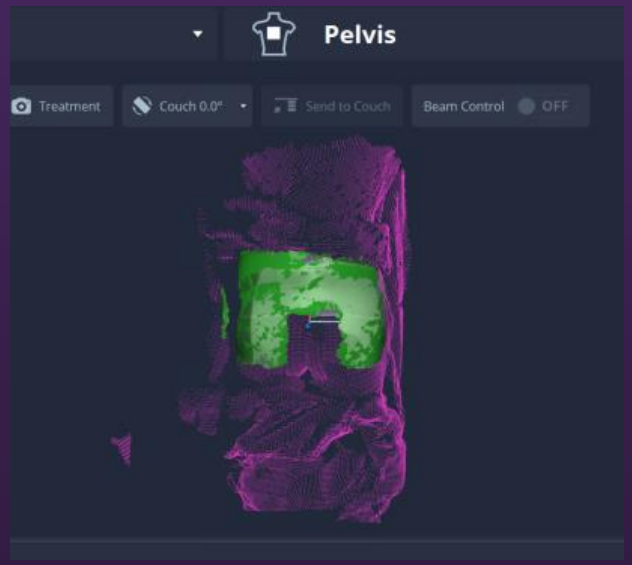
Key Tip

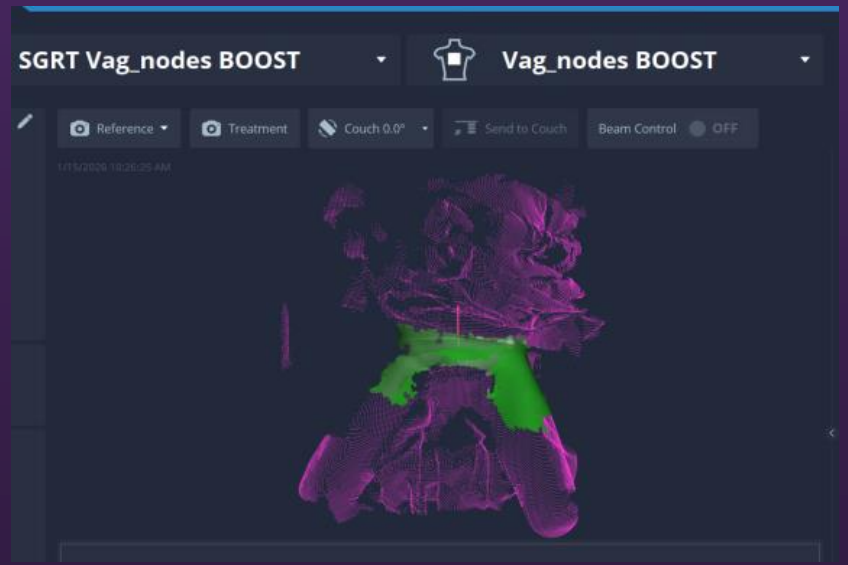
- **Repeatability comes from coaching, not perfection;** aim for a breath hold that's **comfortable, consistent, and reproducible**

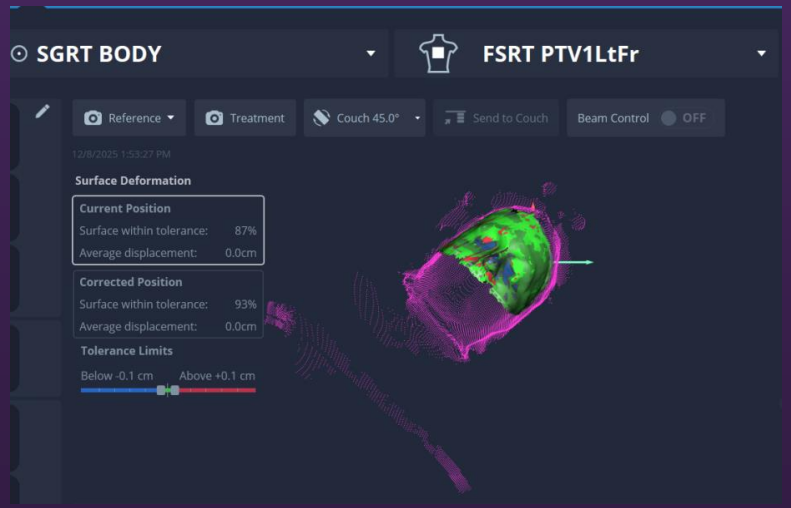
Expanding to other body sites

Key Tip

Start with one body site in a phased approach, then integrate the other body sites







Questions?