

# Simulation & Setup

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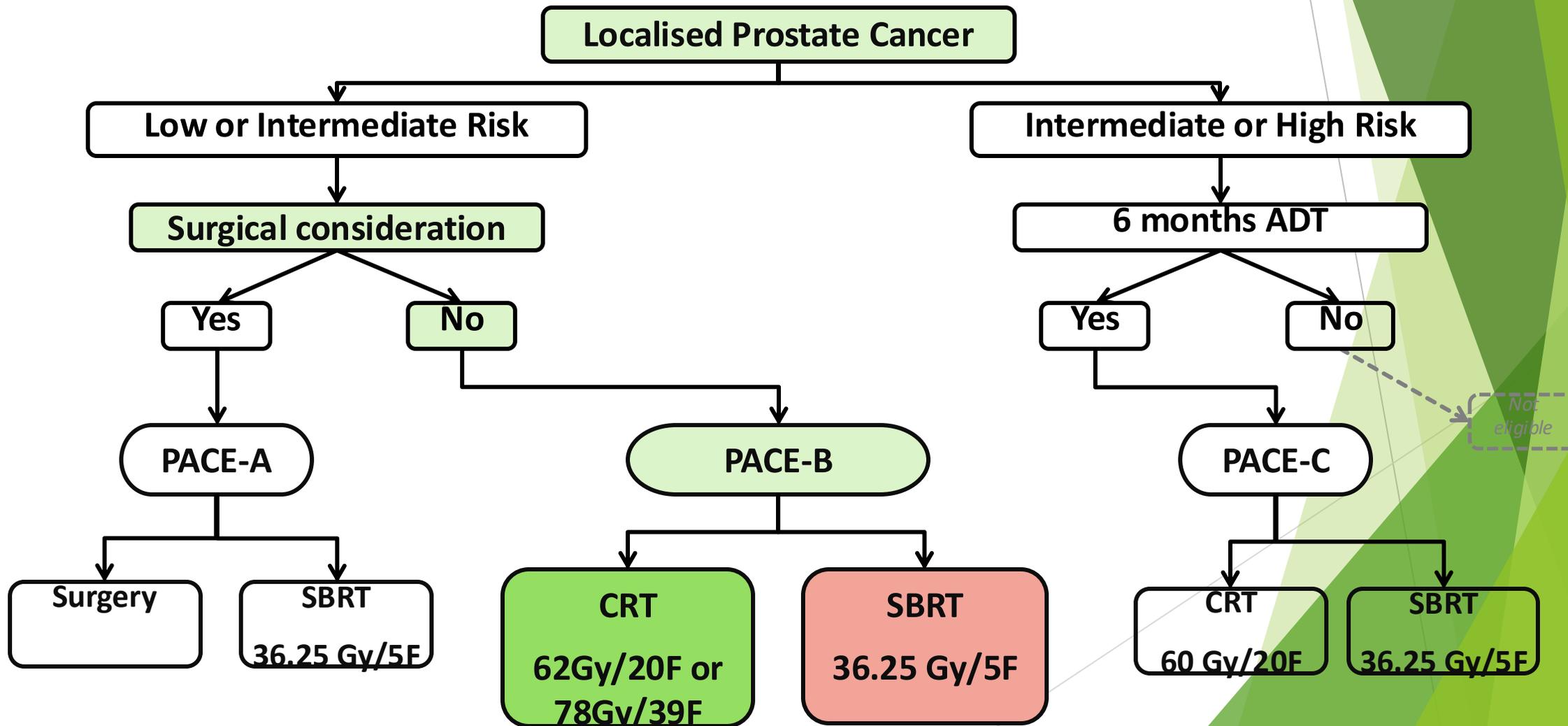
# Session Overview

**In this session, we will explore:**

- ▶ SBRT Patient journey
  - Pre-treatment: Fiducial Markers, CT and MRI
- ▶ Best-practice bladder and rectal preparation
- ▶ Immobilisation tools
- ▶ Managing patients with poor or inconsistent prep
- ▶ Comfort, anxiety management and patient-centred communication in SBRT

# Prostate sbrt

PACE-Trials



# Why pre-treatment Matters

- ▶ SBRT requires **millimetre-level accuracy**
- ▶ Prostate position influenced heavily by **bladder & rectal filling**
- ▶ Immobilisation must support **reproducibility across fractions**

**RTTs drive treatment quality, safety and patient experience**

# PRE-PLANNING PROCEDURES

## Fiducial Markers in Radiotherapy

- ▶ **Recommendation:** All patients should have fiducial markers implanted for image guidance.
- ▶ **MR-Guided Radiotherapy:** Fiducial markers are not mandatory.
- ▶ **Visibility Requirements:** Markers should be visible on both CT and MRI to facilitate image guidance and MRI/CT fusion.
- ▶ **Placement Procedure:**
  - At least three fiducial markers to be placed under transrectal ultrasound guidance.
  - Placement can be via transperineal or transrectal approach.
- ▶ **Antibiotic Prophylaxis:** For transrectal placement, administer oral ciprofloxacin or equivalent and metronidazole per rectum or equivalent.

# FIDUCIAL MARKER PROCEDURE

## ➤ Placement Criteria:

- ❑ Seeds should be positioned to be visible and not superimposed on orthogonal imaging.
- ❑ Ideally, markers are separated by 2 cm or more.

## ➤ Procedure Setting:

- ❑ Typically performed as an outpatient procedure.
- ❑ At least three seeds must be usable for tracking translation and rotation during treatment.

## ➤ Special Recommendation:

- ❑ For CyberKnife System SBRT treatment, use one paired fiducial and two free fiducials (total of four).

# Planning CT and MRI Scans

## ➤ **Fiducial Stabilization and Swelling Resolution:**

- Planning studies should be imaged at least 7 days after fiducial placement to allow for stabilization and swelling resolution.

## ➤ **CT Scans for Treatment Planning:**

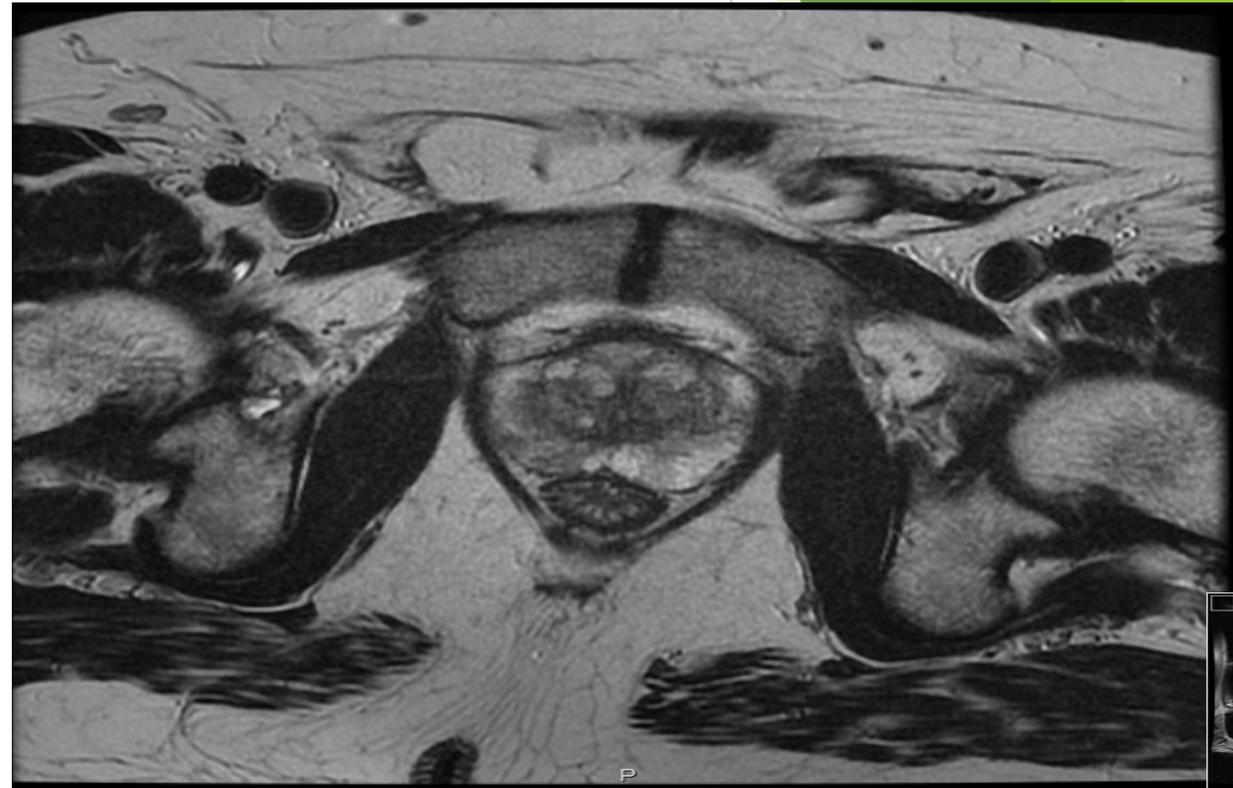
- CT slices for SBRT: 1–1.5 mm thickness.
- Approximately 200–300 slices centered around the prostate.
- For CyberKnife System SBRT: Scans should extend at least 15 cm above and below the prostate level, including the testes to serve as a blocking structure.
- For gantry-based SBRT: Scans should cover from L3/L4 intervertebral space to 2 cm below the ischial tuberosities.

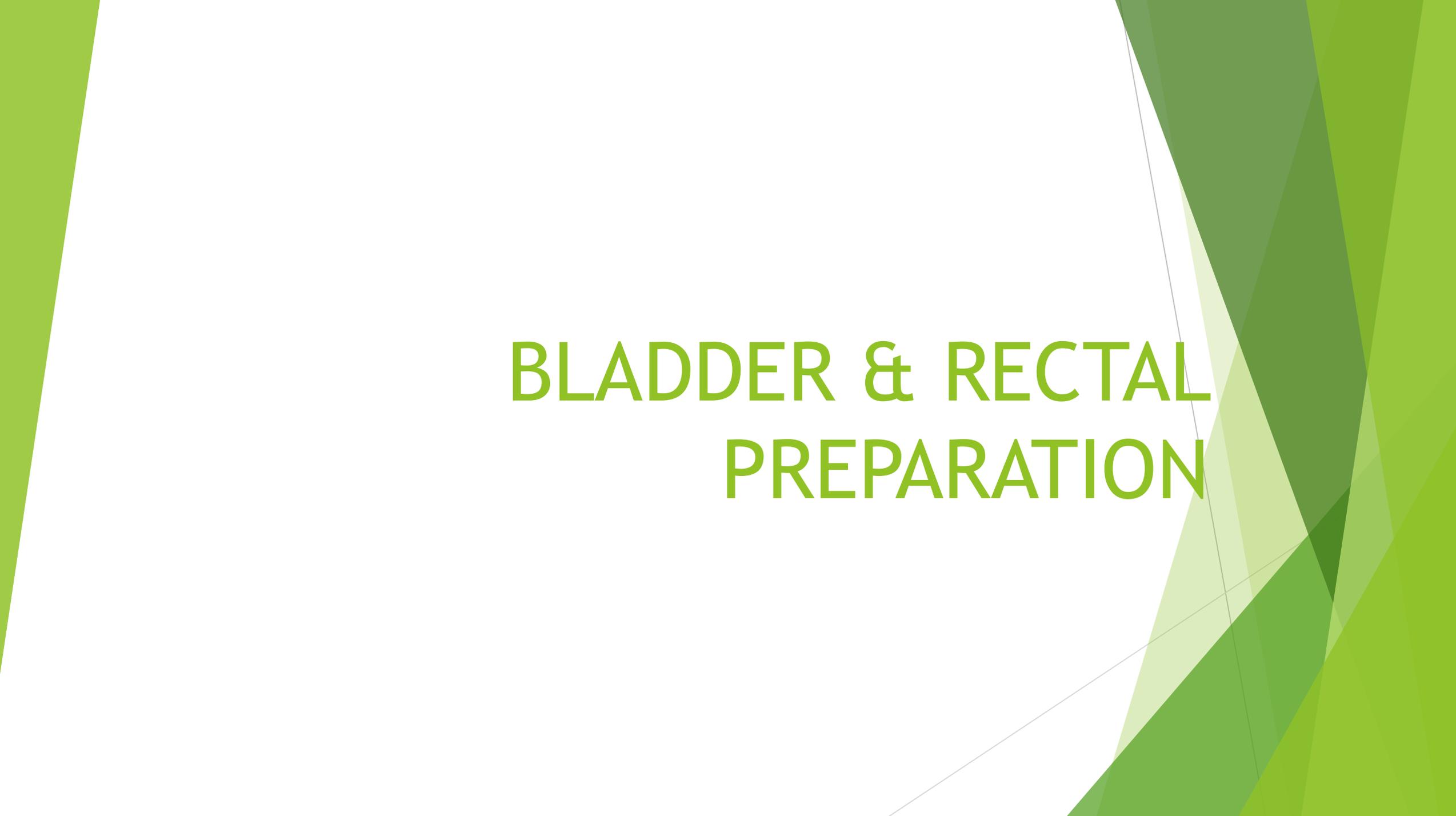
## ➤ **MRI Imaging:**

- Strongly recommended for radiotherapy planning to define anatomical borders of the prostate and, if possible, the urethra.
- MRI fused with treatment planning CT.
- MRI/CT fusion should be performed on implanted fiducials.
- Use of endorectal coil is not permitted.

# MRI improves contouring

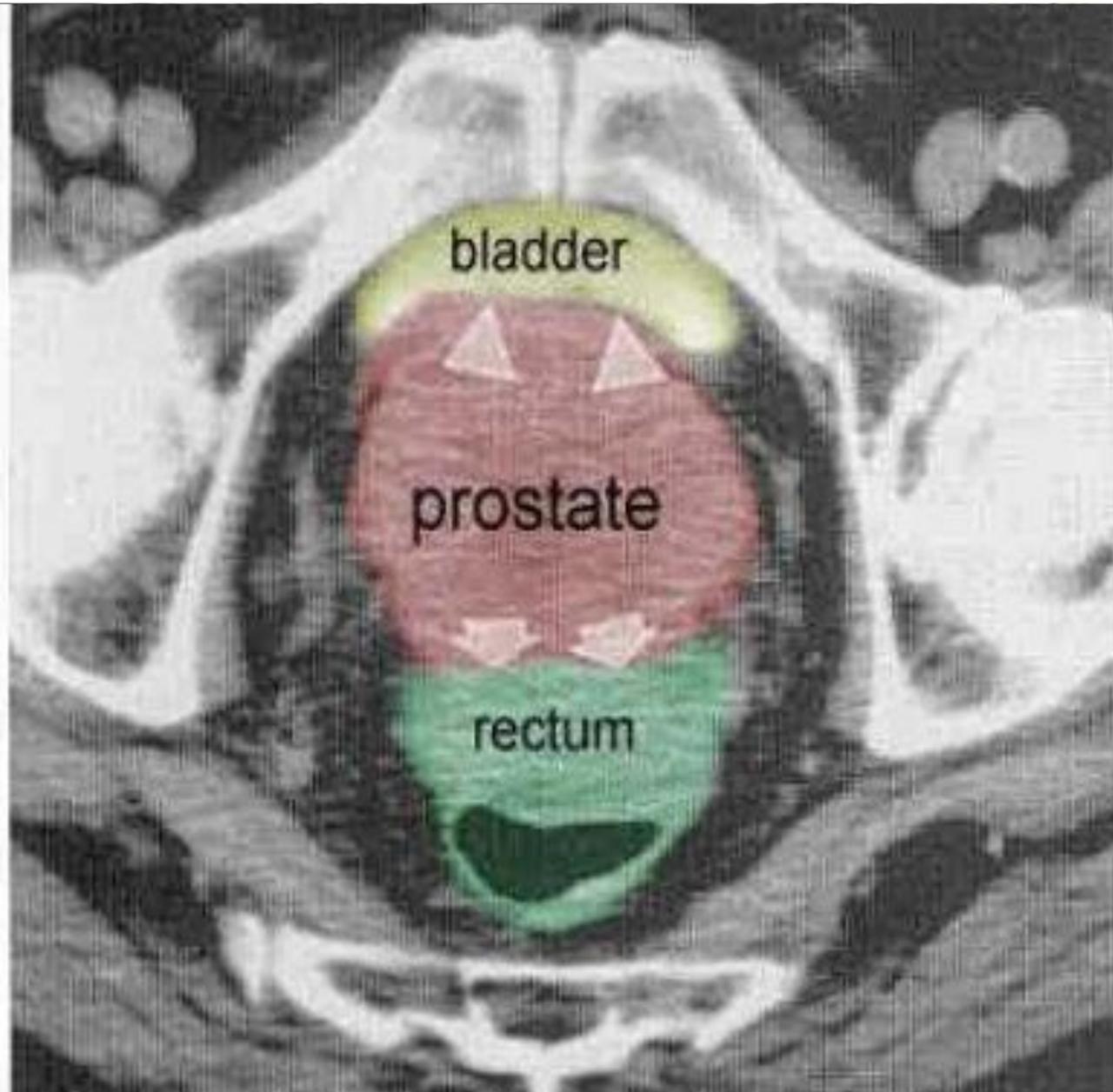
Planning MRI so much clearer delineation of prostate than CT



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# BLADDER & RECTAL PREPARATION

# Anatomy & Impact on Targeting



- The reproducibility of a acceptable treatment plan can also be depended on the size and positioning of surrounding structures in particular the Rectum and Bladder.
- Local protocols differ but standardly patients' should be scanned with an empty rectum and bladder comfortably full.
- Patients receive an information sheet explaining patient preparation which should be repeated daily prior to CT planning scan and treatment.
- It is also important to avoid over-full bladders and ensuring the patient is in a relaxed state as this will also help immobilisation and patient positioning.

**Patient preparation is important to help achieve a reproducible plan.**

## Best-Practice Bladder Prep

- Patients are advised to maintain a partially filled bladder during imaging and treatment.
- ▶ Instructions:
  - Empty the bladder.
  - Drink approximately 325 mL of water and wait 30 minutes
- Purpose: To ensure the bladder is reasonably filled during the planning scan and before each radiotherapy session.
- Target bladder volume: At least 150 mL for planning to proceed.
- ▶ Note: If 150 mL is not achievable, planning may still proceed with approval from the Radiation Oncologist.

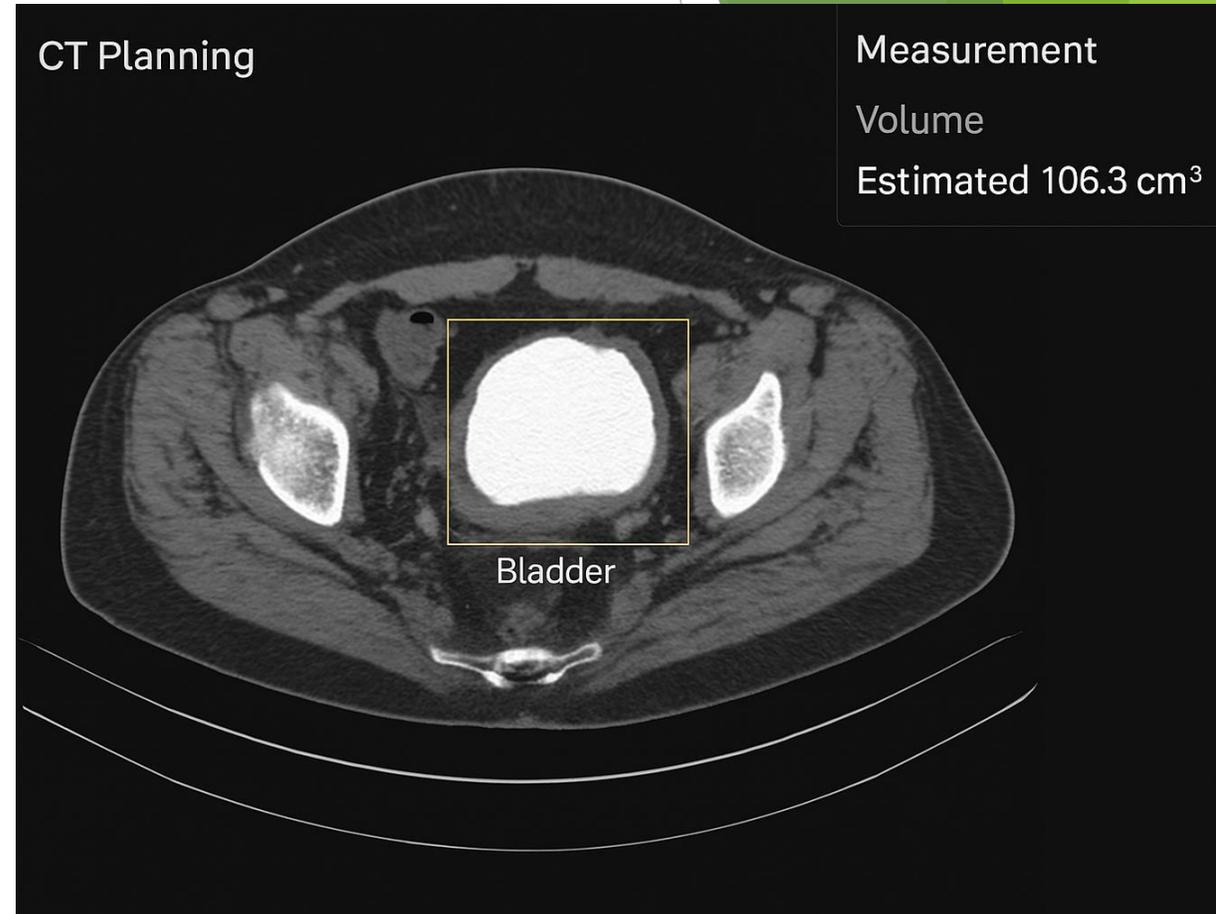
# How to check bladder volume

## 1. Quick Method

- On the axial or sagittal CT planning images, the planner/RTT uses the measurement tool to outline the bladder roughly (an ROI box).
- The system provides an **estimated volume** based on Hounsfield units and geometric approximation.

## 1. Purpose

- Quick validation that the bladder is not too small or overfilled before sending the patient away to re-drink.
- Helps avoid having to repeat CT simulation.



# Why it matters if a patient starts bladder prep already dehydrated

## A dehydrated patient cannot fill the bladder in a predictable or timely way

- ▶ Bladder filling during prep relies on renal perfusion and urine production, not just fluid ingestion. When a patient is dehydrated:
  - Renal blood flow is reduced
  - Antidiuretic hormone (ADH) levels are higher
  - The kidneys conserve water rather than producing urine
- ▶ As a result, drinking the “standard” volume of water shortly before treatment often leads to:
  - Delayed or inadequate bladder filling
  - Large inter-patient and inter-fraction variability
  - A mismatch between simulation and treatment bladder volumes
- ▶ SBRT is particularly sensitive to this because the bladder volume at imaging is assumed to be broadly reproducible across only 5 fractions.

***“You can’t fix dehydration with a single bottle of water on the day.”***

# Why it matters if a patient starts bladder prep already dehydrated

## Rapid 'catch-up' drinking produces unstable bladder filling

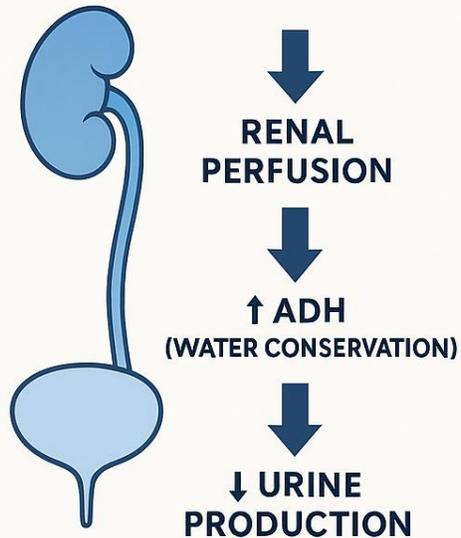
- ▶ When dehydrated patients are asked to "catch up" on fluids:
  - Early ingested fluid is preferentially absorbed into the intravascular and interstitial spaces
  - Urine production may start during imaging or delivery rather than before
  - This leads to active bladder filling intra-fraction
- ▶ In SBRT, where on-table time is longer and margins are tight, this increases:
  - Intra-fraction bladder expansion
  - Associated prostate displacement (particularly in the AP and SI directions)
  - Interruptions for repeat imaging or positional correction
- ▶ This phenomenon has been demonstrated clearly in MR-guided SBRT studies showing measurable bladder volume increases between baseline and post-treatment imaging.

- ▶ **Under-filled bladders receive higher bladder wall dose**
- ▶ A dehydrated patient is more likely to present with a **small or inconsistently filled bladder**, which directly impacts dose distribution:
- ▶ A smaller bladder means a **greater proportion of bladder wall lies in high-dose regions**
- ▶ This increases mean bladder and bladder wall dose compared with planning
- ▶ Accumulated bladder wall dose has been shown to correlate with **acute urinary toxicity** in prostate SBRT
- ▶ Even when adaptive planning is available, repeated low bladder volumes reduce the dosimetric margin for error.

“Poor hydration increases GU dose before symptoms ever appear.”

# WHY DEHYDRATION BEFORE PREP CAUSES PROBLEMS

## DEHYDRATED STATE



**Bladder prep cannot overcome dehydration on the day of treatment.**

If a patient starts bladder prep dehydrated:

- The kidneys prioritize fluid conservation, not urine production
- Drinking fluid shortly before treatment may not translate into predictable bladder filling
- Bladder filling becomes delayed, variable, or incomplete
- Rapid “catch-up” drinking often leads to active bladder filling during imaging or delivery

SBRT magnifies this effect because:

- Fewer fractions
- Tight margins
- Longer on-table time

## Best-Practice: Bowel Prep

- ▶ Bowel preparation is highly recommended for all patients undergoing radiotherapy to minimize rectal diameter.
- The goal is to maintain a **maximum anterior-posterior rectal diameter of 4 cm**, measured at the prostate midpoint.
- ▶ Daily enemas administered for two days before and on the day of CT planning.
- Patients should resume enemas two days before starting radiotherapy.
- An enema is recommended on each treatment day.
- Most setup inconsistencies arise from variations in bowel diameter.

# Why fibre matters in prostate SBRT

## The role of fibre in rectal preparation

- ▶ Rectal filling and gas are major drivers of prostate motion, particularly in the AP direction
- ▶ Day-to-day changes in rectal volume undermine:
  - ▶ Simulation-to-treatment reproducibility
  - ▶ IGRT assumptions
  - ▶ Tight SBRT margins
- ▶ Fibre supports regular, predictable bowel emptying
- ▶ A consistently empty rectum helps stabilise prostate position across all fractions

# Fibre timing and hydration: where things go wrong

When high-fibre advice backfires

- ▶ Fibre requires several days to improve stool consistency
- ▶ Sudden increases close to SBRT often cause:
  - Bloating
  - Increased rectal gas
  - Diarrhoea or incomplete emptying
- ▶ High fibre without hydration leads to:
  - Hard stool
  - Stool retention
  - Increased rectal distension

# Best-Practice Immobilisation

## Patient Positioning and Immobilization

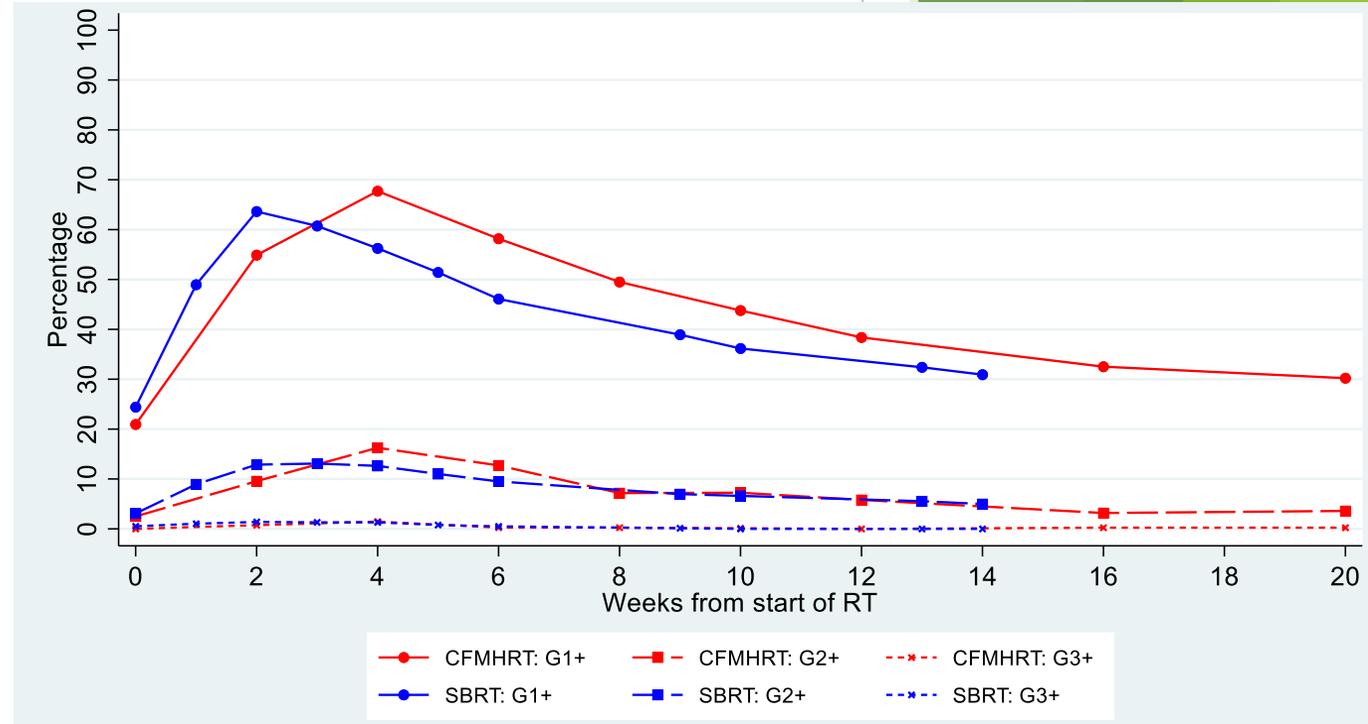
- ▶ Patients scanned in a supine position with arms crossed over the chest.
- Immobilization devices such as an Alpha Cradle, vacbag, or similar used as needed.
- ▶ Knee and ankle supports may be applied to enhance comfort and stability: Reduces pelvic tilt variability; Helps reproducible lower limb rotation
- ▶ It is essential that positioning and immobilization remain consistent (including during the planning MRI).



- ▶ What prep do you recommend in your department?
- ▶ What is the most common prep issue?
- ▶ Hybrid: Remote attendees type answers in chat.

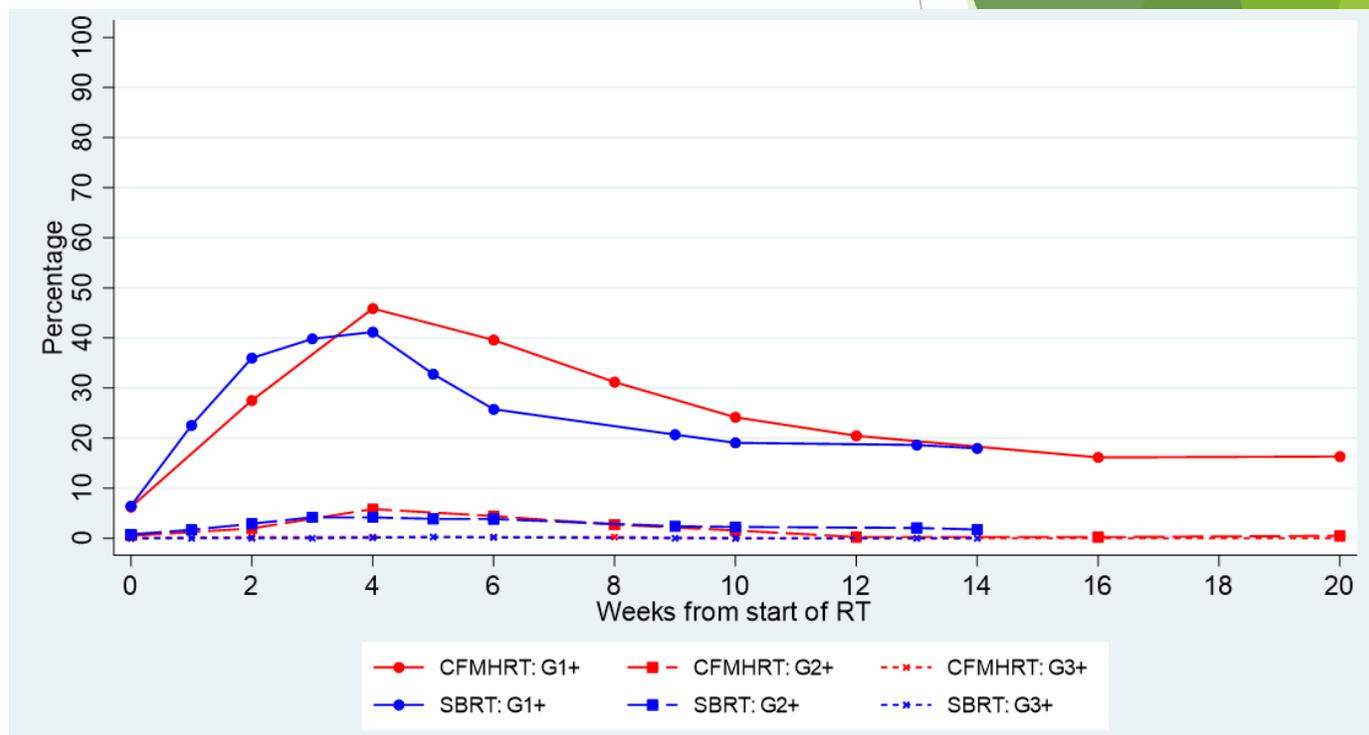
# Urinary SIDE EFFECTS

1. SBRT treatments may cause urinary symptoms:
  - Difficulty Urinating (hesitation, dribbling, weak stream, and incomplete emptying)
  - Painful Urination
  - Urinary Frequency
  - Urgency



# Bowel SIDE EFFECTS

1. SBRT treatments may cause bowel symptoms:
  - Loose bowel motions or diarrhoea
  - Discomfort in the back passage



## **Side effects (acute and chronic)**

- ▶ All treatments have side effects. These are due to the direct treatment of the prostate and the limitation of its role as a result, but also due to the disturbance during treatment of these other nearby structures in close proximity
- ▶ Sexual dysfunction is also a side effect and may be caused by a number of factors
  - Even if erectile function remains or returns, the prostate itself and other surrounding accessory glands will have been affected by treatment, reducing the amount of prostatic / seminal fluid. Infertility and 'dry' orgasms occur as a result
- ▶ And lets not forget the role of testosterone, or rather a reduction in the level of testosterone with the use of hormone therapy. A big cause of sexual, emotional and masculinity/body image issues.
  - Sex drive decreases and as a result can also cause impotence. Fatigue, osteoporosis, muscle weakness and weight gain are other common side effects also.

Questions?

# Patient Communication & Coaching for Prostate SBRT Success: Practical Tools for RTTs

Effective strategies to enhance patient care and treatment outcomes





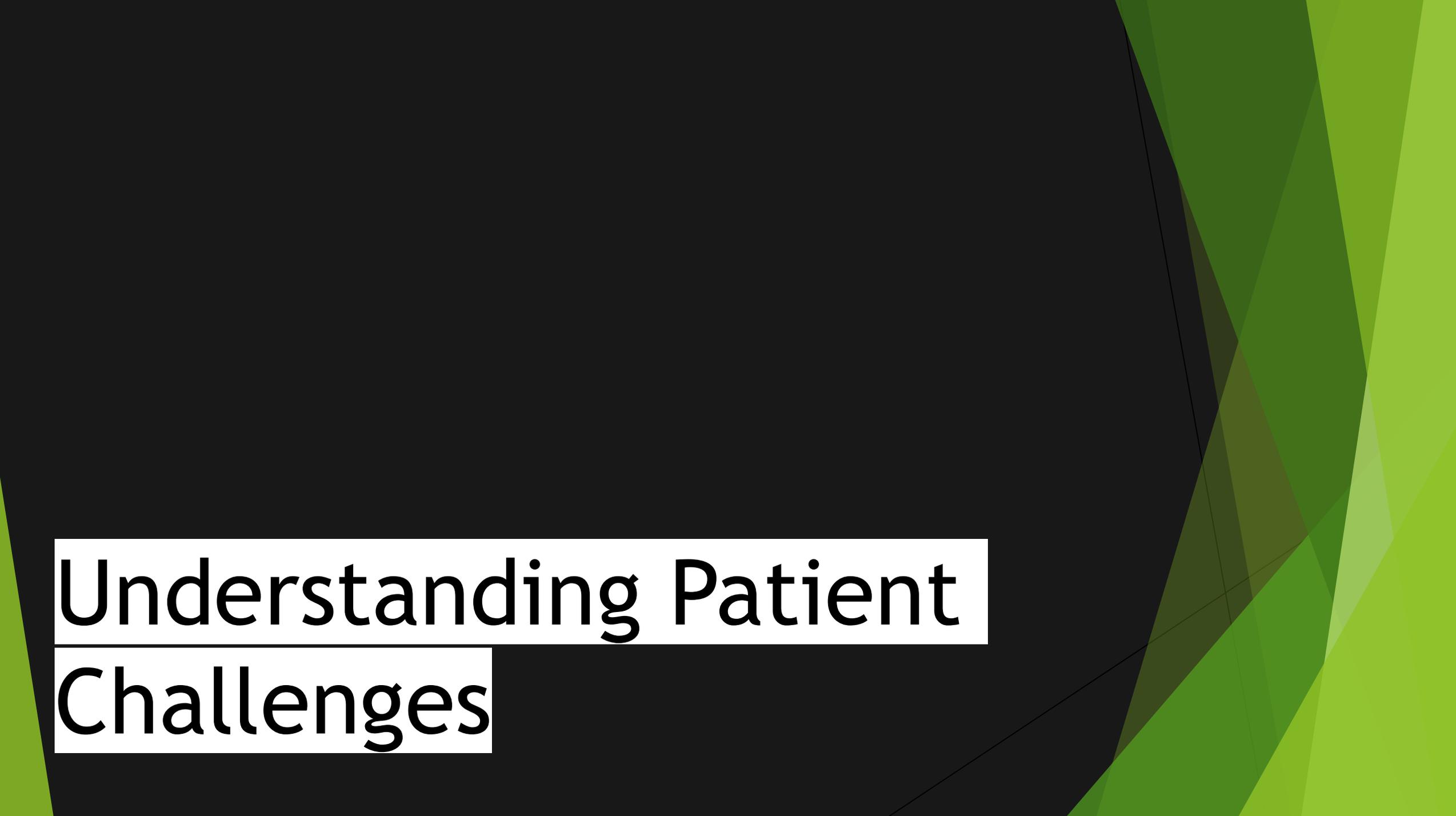
# Introduction and Importance

# Why RTT Communication Matters



## Role of RTTs in SBRT

- ▶ RTTs ensure treatment precision by managing patient positioning and compliance during SBRT procedures.
- ▶ Communication Builds Trust
  - Effective communication reduces patient anxiety and builds trust, improving treatment cooperation.
- ▶ Impact on Treatment accuracy
  - Clear instructions on immobilization and pelvic stillness techniques directly improve treatment accuracy.
- ▶ Enhancing Patient Experience
  - Empathy and confidence reinforcement transform stressful treatments into manageable experiences.



Understanding Patient

Challenges

# Common Prostate SBRT Patient Challenges

## Patient Anxiety Factors

- ▶ Anxiety arises from unfamiliar devices, pelvic stillness demands, and the high precision of SBRT treatments.

## Physical Discomfort Issues

- ▶ Discomfort during setup and immobilization causes restlessness, impacting patient ability to remain still.

## Misunderstanding Treatment Importance

- ▶ Patients may underestimate the need to stay still due to short treatment duration despite high precision requirements.

## Reducing Patient Stress

- ▶ RTTs can reduce stress by providing clear explanations, demonstrations, and coping strategies like relaxation techniques.





Communication

Principles for RTTs



# RTT Communication Principles

## **Clear and Simple Language**

RTTs use jargon-free language to explain procedures clearly, ensuring patients understand expectations.

## **Demonstration of Techniques**

Showing patients how to perform techniques builds confidence and reduces uncertainty during treatment.

## **Positive Reinforcement**

Encouraging phrases reassure patients and promote compliance throughout the treatment process.

## **Active Listening and Visual Aids**

Asking open-ended questions and using visual aids helps address patient concerns and reduce anxiety.

Coaching Workflow for

**SBRT**

# RTT Coaching Workflow



## Simulation and Explanation

- ▶ RTTs explain immobilization and pelvic stillness techniques clearly and provide practice with real-time feedback to build confidence.

## Patient Reassurance on Treatment Day

- ▶ RTTs reassure patients about machine sounds and session duration, confirming comfort and readiness before treatment begins.

## Anxiety Management Strategies

- ▶ RTTs assess anxiety levels and offer coping strategies like music or guided visualization to reduce patient stress.

## Maintaining Compliance and Accuracy

- ▶ Consistent coaching helps improve patient positioning accuracy and ensures effective delivery of SBRT treatment.

# Interactive Exercise: Patient Challenges

- ▶ What prostate SBRT challenges do your patients report?
- ▶ Hybrid: Remote attendees type answers in chat.

# Coaching Through Anxiety

How do you coach a patient through anxiety?

Hybrid: Remote attendees type answers in chat.

# Practical Tools for RTTs

# SBRT Checklists & Coaching Cue Cards

## CHECKLIST TYPE

## KEY ITEMS

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### **Simulation**

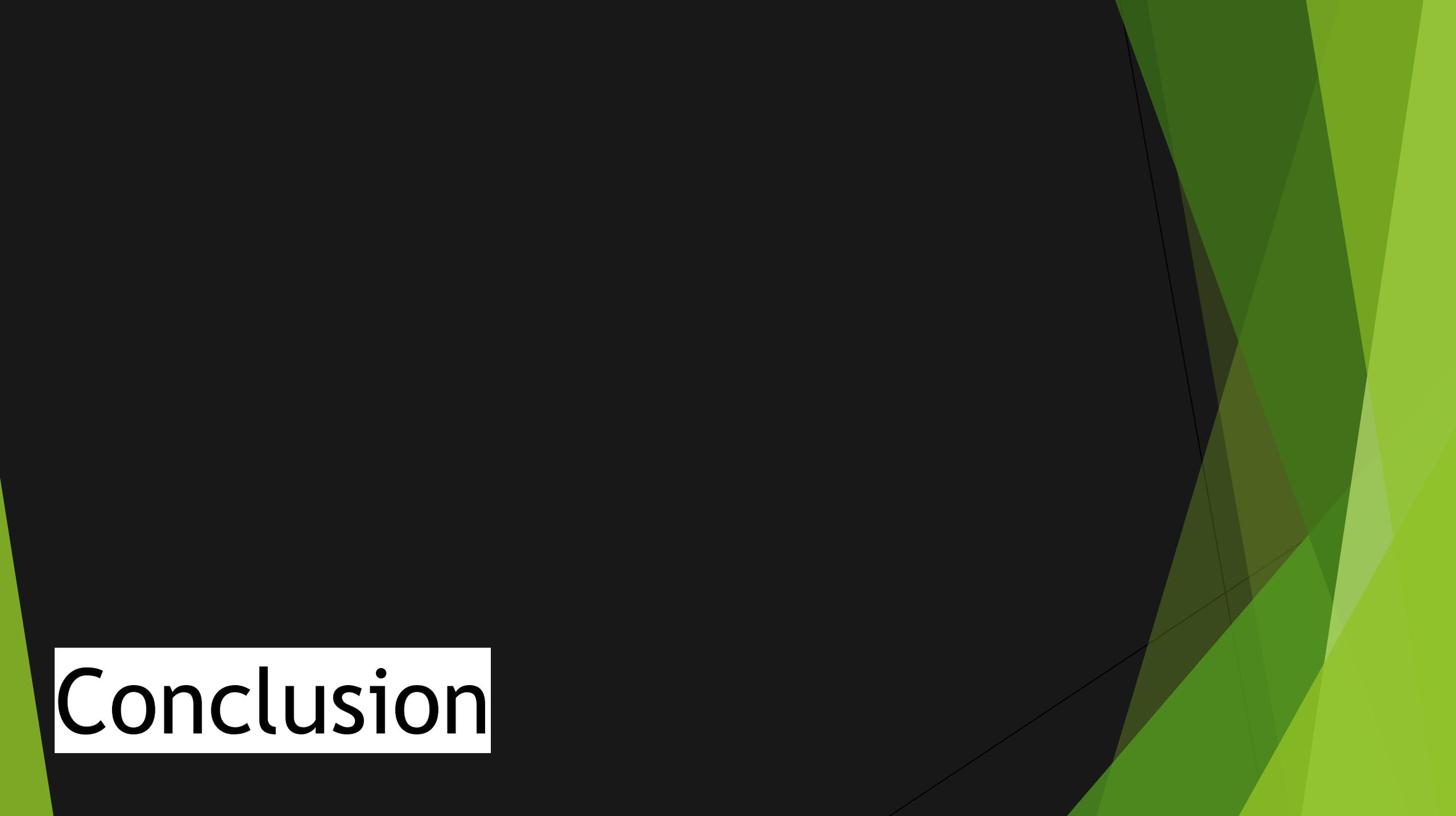
Explain immobilization, treatment prep, check anxiety level, offer coping strategies

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### **Treatment Day**

Confirm positioning, reassure about noises, encourage feedback post-treatment

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**Conclusion**



# Conclusion

## **Importance of RTT Communication**

RTTs' communication skills directly influence patient compliance and treatment accuracy in SBRT.

## **Practical Communication Tools**

Checklists and cue cards help RTTs apply communication principles effectively during treatments.

## **Additional Patient Resources**

Patient handouts, video demos, and relaxation scripts support better patient understanding and comfort.

## **Team Training and Role-Playing**

Role-playing scenarios in team meetings help RTTs refine communication skills and improve patient outcomes.

Questions?