



# Changing the Face of Head and Neck Cancer

## *The Workflow Design Challenge*

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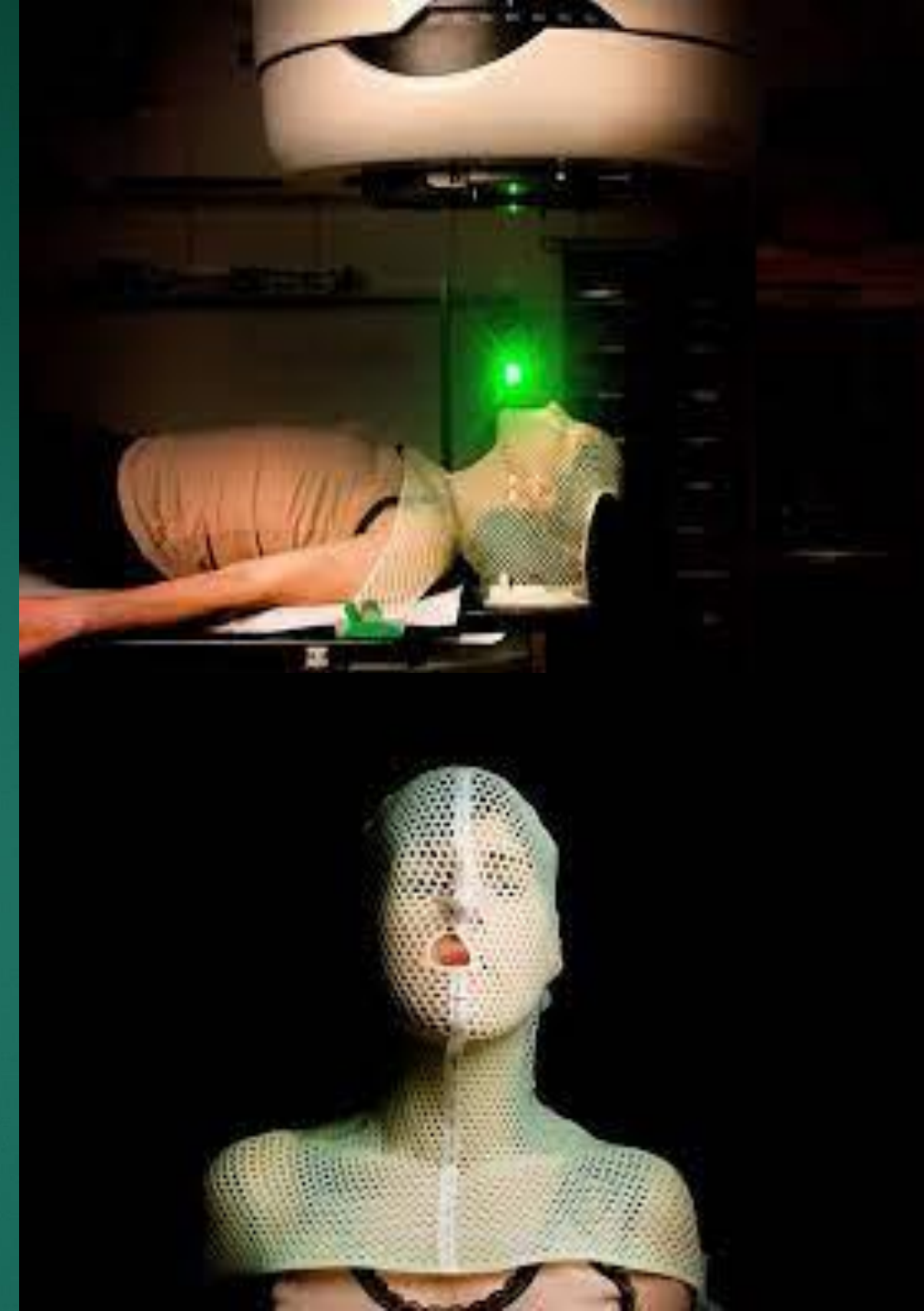


# Background

**'Having the mask on didn't worry me until ... they clamped my head down so I wouldn't move' (Forbes et al, 2023)**

More than 20% of patients undergoing radiation therapy for head and neck cancer report anxiety specifically related to the immobilisation mask.

In research conducted by the same group, radiation therapists rated disruption to sessions on a scale of 1–5, and found an 11% rate of disruption to CT simulation and a 24% rate of disruption to Day 1 of treatment was attributed to mask anxiety (Clover et al )





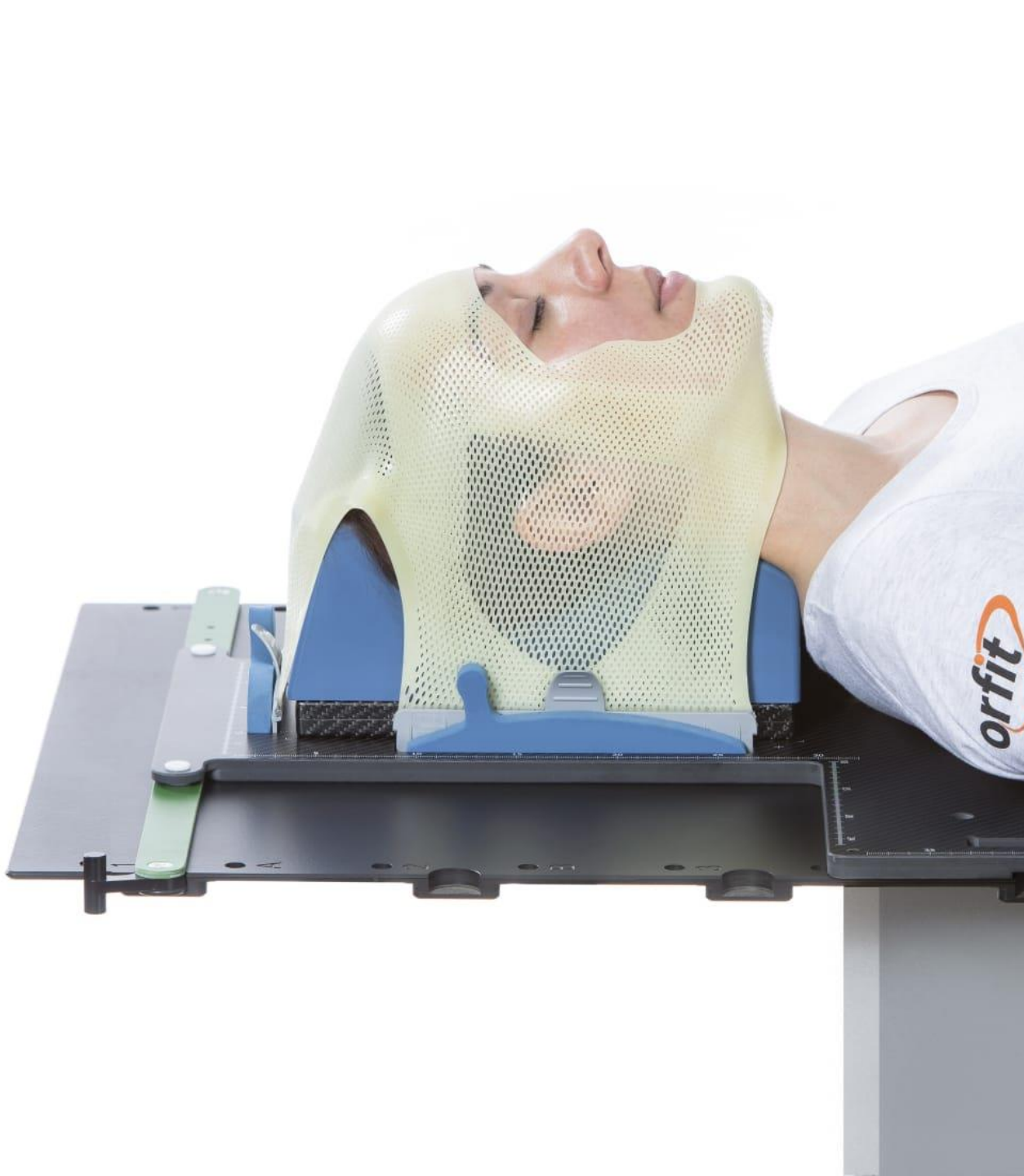
'Tried unsuccessfully to treat patient, gave advice on relaxing and breathing techniques. Had a traumatic childhood experience that has lead him to be very afraid of being in the mask.

Had panic attacks on three consecutive occasions whereby the mask had to be removed at speed. Unable to remain in the mask for the duration of imaging and treatment. Team informed of same.

For review before further attempts at treatment'

Extract from patient note





# Immobilization

## Masks

Head rest

Shrinkage = Bulging = Error seen on the vert

## Other

Shoulder Retractors – or equivalent

Kneefix



Next we need a workflow  
with SGRT



We need a solution that would be

**Accurate**

Comfortable for the patient

Simple to set up

Fast and efficient

# CHALLENGES

A man in a dark suit is shown from the back, pushing a large, white, rectangular block up a steep, teal-colored slope. The block is tilted and has the word "CHALLENGES" written on it in large, white, capital letters. The background is a dark teal color with a subtle geometric pattern.

Long Length of  
volume

Movement

Weight loss

Breathing

Resources  
Available



1

## ROI Design

First Option: Two Separate ROI's

Head ROI for Set Up Only

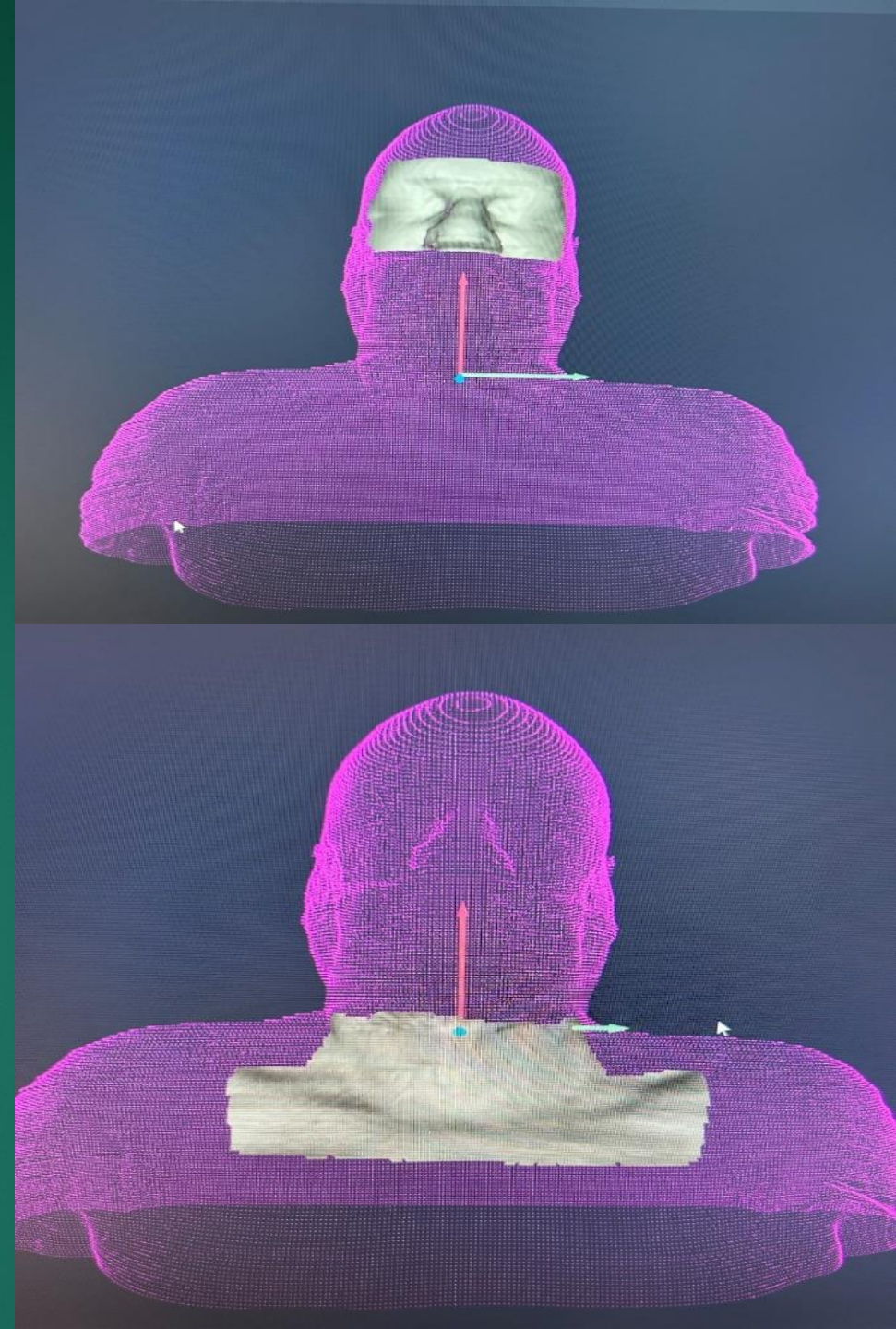
- Its immobilized
- No Beam Monitoring

Neck and Thorax

- Isocentric ROI
- Beam Monitor

Why?

If the ROI is too large - less sensitivity to movement





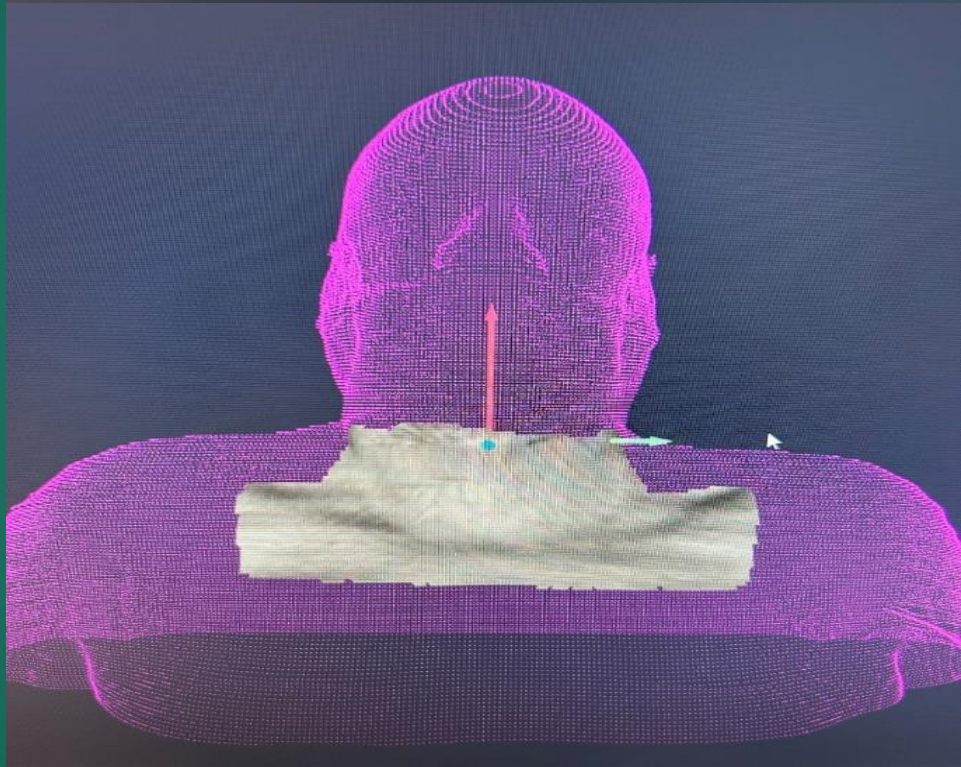
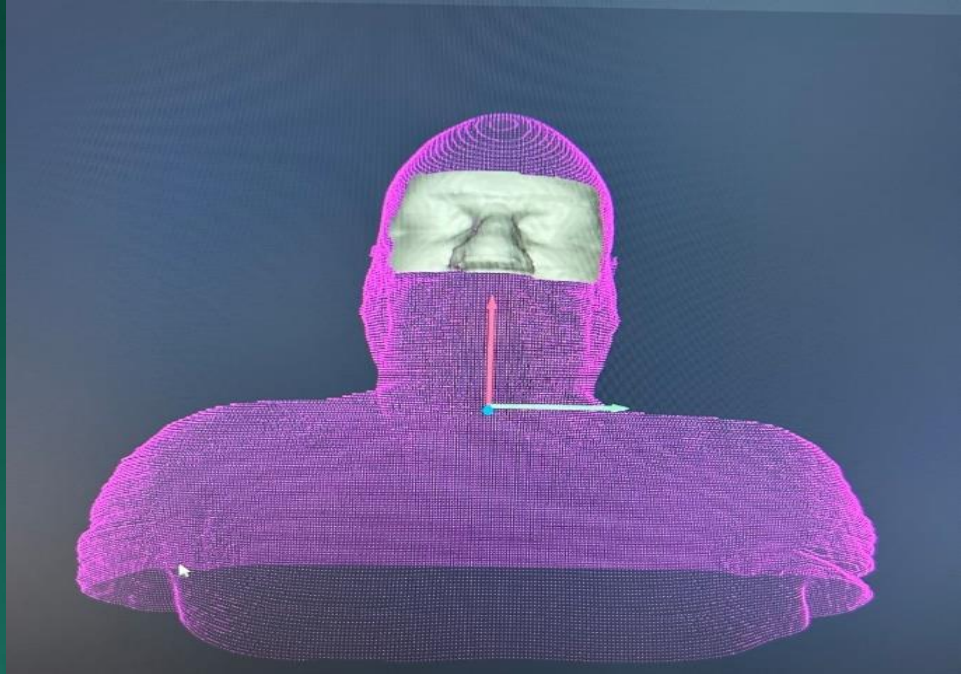


## We Abandoned it!

Why?

Head ROI and Neck ROI needing corrections in two different directions.

- We found it time consuming going between the two different ROI's
- In theory it sounded good, in practice - it was frustrating







2

## ROI Design

- A composite ROI is both Face ROI and Neck and Thorax **combined**.
- It will be Isocentric i.e. it will be used for **beam monitoring**.





# The Composite ROI

Set up was much easier

We Abandoned it!

Why?

- Moves on images were much bigger







3

## ROI Design

### Combined ROI

Winner!

A balance between both where by it was easier to set up - and a good level of accuracy







## Weight loss

Weight loss is a common and significant concern for patients undergoing head and neck radiotherapy.

A challenge for a full mask set up . . .

What will it mean for SGRT?



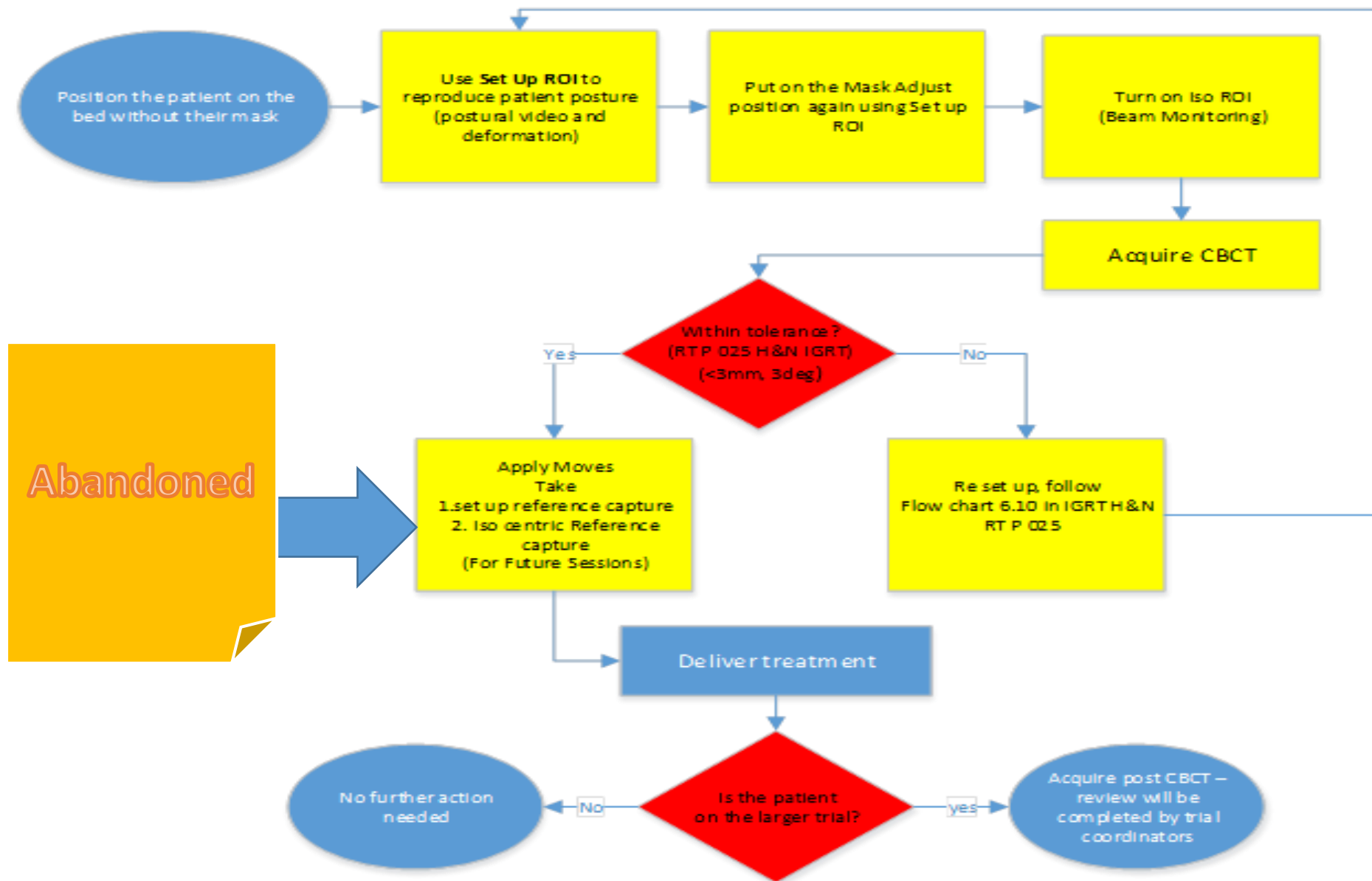
# Solution



Thought: Set the patient up to the previous days CBCT daily – The effect of weight loss is mitigated

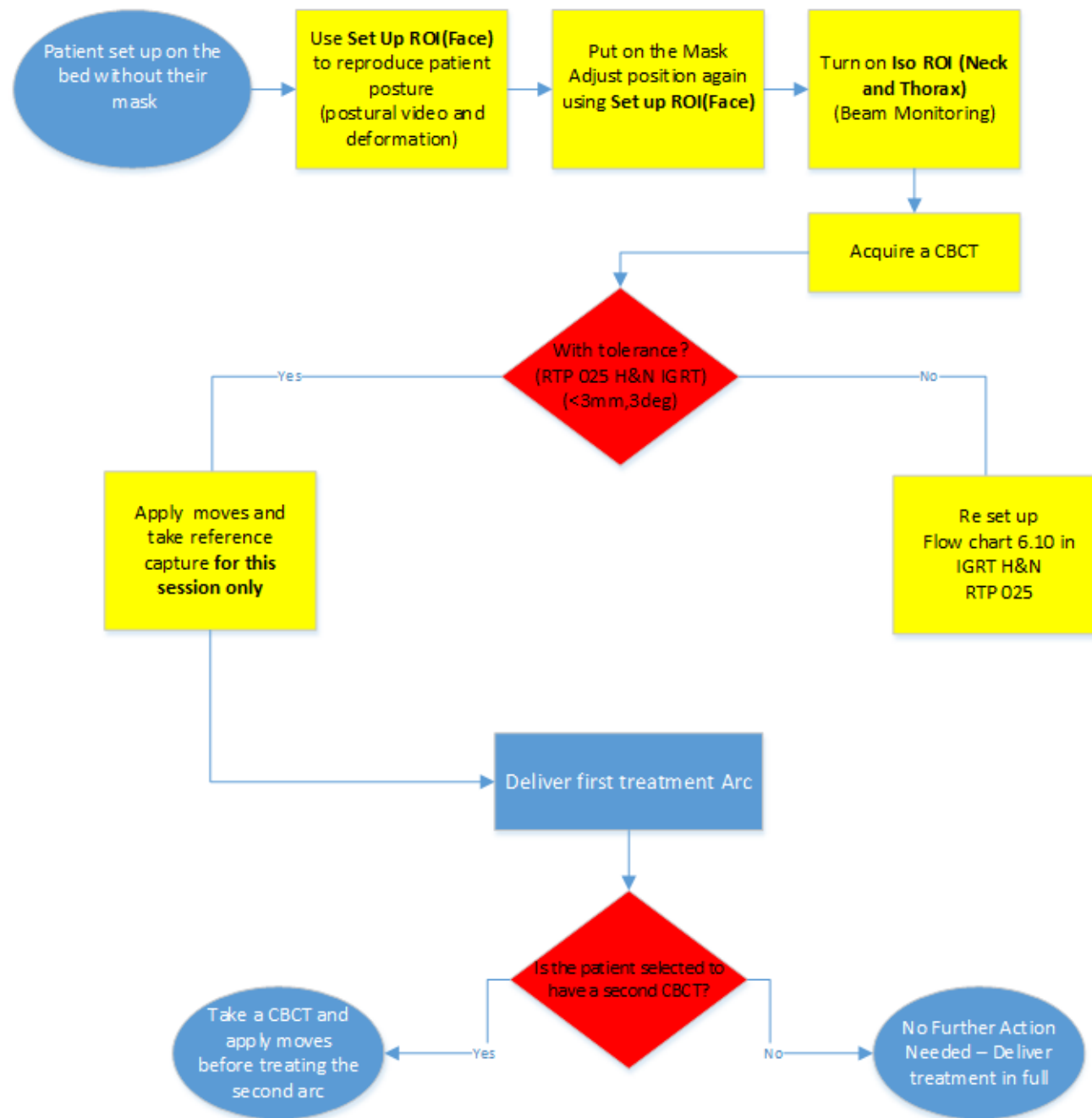
Reality: Daily reference capture means the quality of the image is decreased everyday

Clinacs: Increased set up error True beams: Cant apply the 6DoF



Abandoned







3 point open  
facemask may mean  
less rescans due to  
less mask

Beam monitoring  
we never had  
before

A method of  
collecting  
intrafraction motion  
minus the dose



## The OPEN Trial

A Comparative Randomised Clinical Trial Evaluating the Setup Accuracy and Patient Experience of Faceless Radiotherapy Masks versus Conventional Full-Face Masks for Head and Neck Radiotherapy Patients.

- **Three arms**
  - 3 point open, 5 point open and conventional
- **Patient Experience– Questionnaires week 1 and final week of treatment**
  - RT lead consent

**Multidisciplinary effort with the team of fellows**







# OPEN

## Primary Objectives

1. To compare the setup accuracy of three different types of masks:

## Secondary Objectives:

1. To compare patients' distress levels at two time points throughout the course of their treatment, using the psychological measure General Health Questionnaire-12 (GHQ-12)
2. To evaluate the practicality and potential advantages of Surface Guided Radiotherapy (SGRT) as a tool for intra-fraction motion monitoring compared to CBCT imaging.
3. To assess the difference across the three arms in treatment set up time and use of resources on the treatment unit.

## Exploratory/Translational:

Evaluate the efficacy of radiomics/machine learning approaches in predicting anatomical changes necessitating replanning and redesign of patients radiotherapy plan.





# Any Questions?

Huge thanks to the SLICR Fellows and Rachel and Mags and all the RT's in Beaumont and Rathgar for their help, patience and collaboration

# Reference

- Forbes, E., Clover, K., Baker, A.L., Britton, B., Carlson, M. and McCarter, K. (2023), 'Having the mask on didn't worry me until ... they clamped my head down so I wouldn't move': A qualitative study exploring anxiety in patients with head and neck cancer during radiation therapy. *J Med Radiat Sci.* <https://doi.org/10.1002/jmrs.658>
- Clover K, Ultram S, Adams C, Cross L, Findlay N, Ponman L. Disruption to radiation therapy sessions due to anxiety among patients receiving radiation therapy to the head and neck area can be predicted using patient self-report measures. *Psychooncology* 2011; 20: 1334-41.
- Mulla Z, Alwassia RK, Senan EM, Soaida S, Mohamed AAMA, Almerdhemah H, Iqbal HA, Muamenah HM. A comparative study between open-face and closed-face masks for head and neck cancer (HNC) in radiation therapy. *Rep Pract Oncol Radiother.* 2020 May-Jun;25(3):382-388. doi: 10.1016/j.rpor.2020.03.009. Epub 2020 Mar 18. PMID: 32322177; PMCID: PMC7171256.