SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

25 Years REVOLUTIONISING HEALTHCARE

From Conventional to Surface-Guided Radiotherapy

A Retrospective Analyzing Changes in Setup Time and Shift Accuracy

HAJARRUL NISHA AMJATH HUSSAIN

hajarrulnah@sunway.com.my

+60127107019

☒ DISCLOSURE

I have no relevant financial or nonfinancial relationships in the products or services describe, reviewed or evaluated in this presentation

Introduction to Sunway Medical Centre

Sunway Medical Centre (SMC)

Established in November 1999, SMC is the **largest private quaternary hospital in Malaysia** offering comprehensive medical services to local and international patients.

SMC by Numbers

724 Beds *(including 95 critical care)*

18 Operating Theatres

>230 Consultation Suites

>350 Consultant Specialists

>60 Medical Specialties

>3,500 Healthcare Professionals

Patient Care FY23

>900,000 Patient Visits
>20,000 Surgeries

Recognition

Non-exhaustive list

And other specialties: Pediatrics, Cardiology, Cardiac Surgery, Neurology, Neurosurgery

Centres of Excellence

Non-exhaustive list

- **Sunway Cancer Centre**
- **Robotic Surgery & MIS Centre**
- **Transplant Centre** (Kidney, Cornea, Cochlea, Bone Marrow & Stem Cell)
- **Children's Health & Development Centre**
- **Neuroscience Centre**
- **Bone & Joint Centre**

SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

The proposal and recommendations contained herewith remain the sole property of Sunway Group. Any unauthorized duplication or content use without consent of authority from Sunway Group, is deemed as breach of copyright.

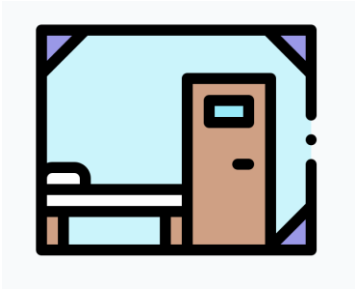
Sunway Cancer and Nuclear Medicine Centre at a Glance

29

Chemo chairs

6

Chemo beds



3

Isolation rooms

16

Oncologists and Hematologists

3

Nuclear Medicine Physicians

4

Diagnostic Equipment

6

Radiotherapy Equipment

83

Team members

SUNWAY MEDICAL CENTRE Sunway City

Introduction to Sunway Medical Center

Leksell Gamma Knife

Varian TrueBeam STx

Radixact-X9 Tomotherapy

INTRABEAM
Intraoperative

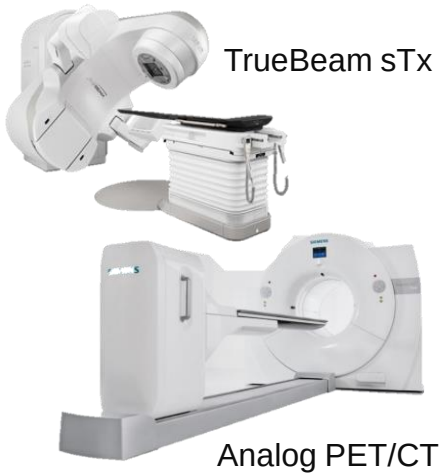
Brachytherapy

SUNWAY MEDICAL CENTRE
Sunway City

The material and related contents are the property of Sunway Group. Any unauthorized use without consent from Sunway Group, is deemed as breach of copyright.

Our Technology and Equipment

Oct 2016



TrueBeam sTx

Analog PET/CT

Dec 2016

Brachytherapy

Aug 2017

Intrabeam IORT

Nov 2017

Gamma Knife Icon

SPECT/CT

Sept 2019

Aquilion Lightning CT Simulator

Dec 2019

Radixact Tomotherapy

July 2022

Digital PET/CT

Dec 2023

TrueBeam

SUNWAY® HEALTHCARE

WHY DO SUNWAY IMPLEMENT SGRT?

Patient Comfort

Non-invasive and eliminates the need for traditional markers or immobilization devices, enhancing patient comfort during the procedure.

Faster treatment

The use of SGRT reduces setup times, leading to more efficient and timely treatments.

Cutting-Edge Technology

As part of our commitment to offering the latest in medical technology.

Sunway Medical Centre, has been recognized as part of an exclusive group in Southeast Asia region offering SGRT for tattoo- and mark free radiation treatment

SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

25 Years REVOLUTIONISING HEALTHCARE

INTRODUCTION

PROBLEM

Traditional patient setup methods in radiotherapy can introduce variability in setup time and alignment accuracy, affecting treatment outcomes

SOLUTION

Surface-guided Radiotherapy (SGRT) has potential to enhance positioning accuracy and reduce setup time

OBJECTIVES

Compare setup times and shift values between conventional methods and SGRT

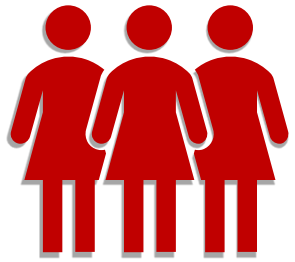
SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

25 Years REVOLUTIONISING HEALTHCARE

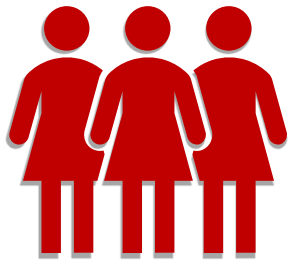
STUDY OVERVIEW

- Retrospective study – Consist total of 60 patients receiving breast radiation treatment

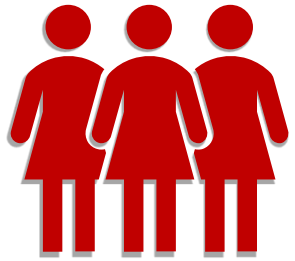
- Data: 300 EPID shifts from:



Early-phase SGRT



Conventional Setup



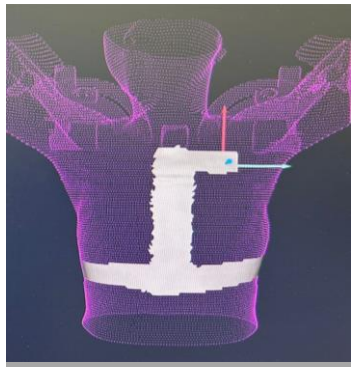
Latest phase SGRT

EARLY PHASE SGRT

- ROI drawing cover the whole chest include folded skin

IMPROVISED SGRT WORKFLOW

- ROI drawing with inverted T excluding folded and abdomen area



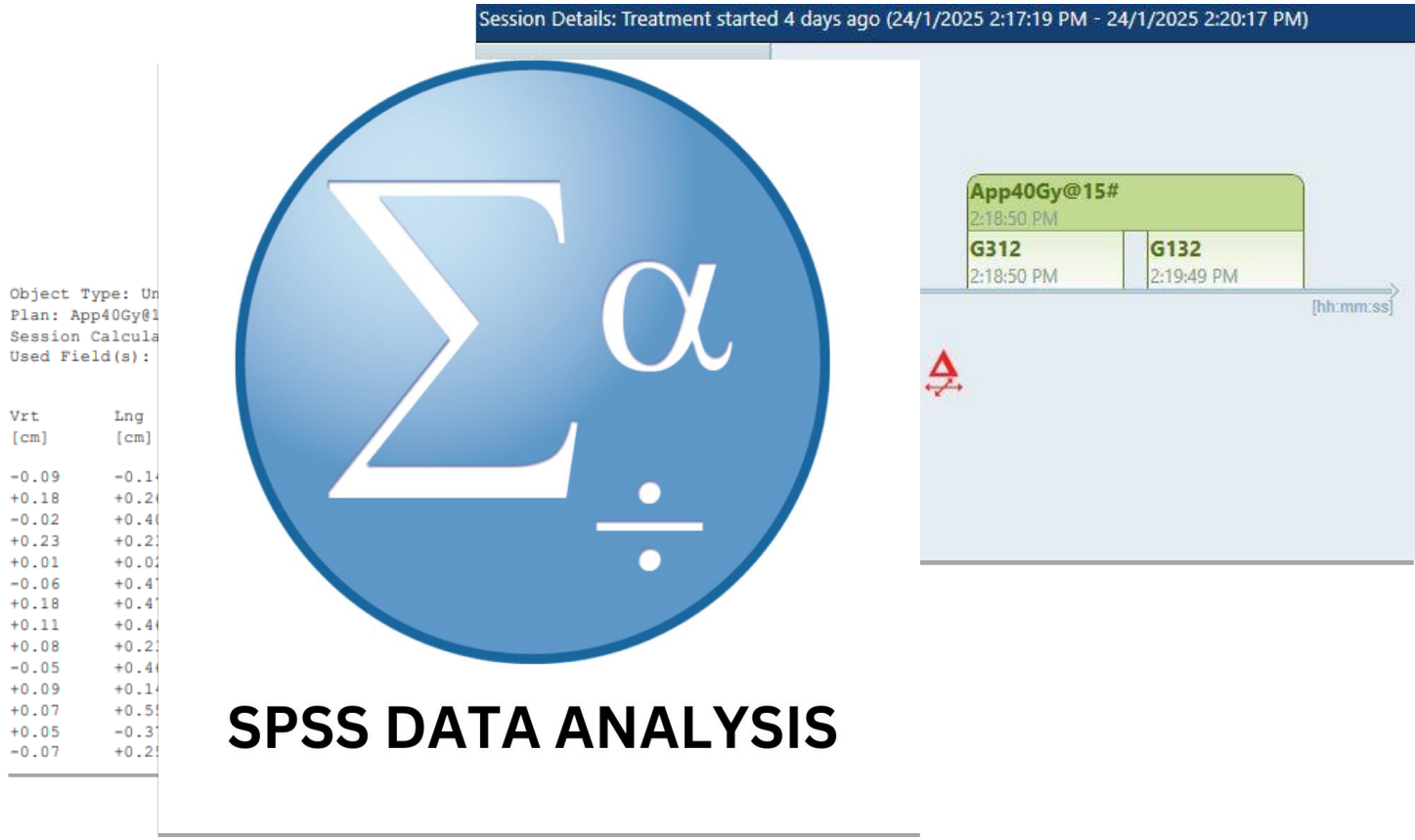
- " Send to couch" feature

METHOD

Setup time :
5 fraction of treatment session picked randomly

Shift value of MV EPID

Non-parametric statistical test - Kruskal- Wallis test



RESULT

SETUP TIME (latest data)

Kruskal-Wallis H= 31.821, p < 0.001
Significant reduction in setup tie using Latest SGRT, demonstrating its efficiency

	Vertical	Longi	Lateral	Time
Kruskal-Wallis H	17.492	.034	6.605	31.821
df	2	2	2	2
Asymp. Sig.	.000	.983	.037	.000

Kruskal-Wallis Ranks :

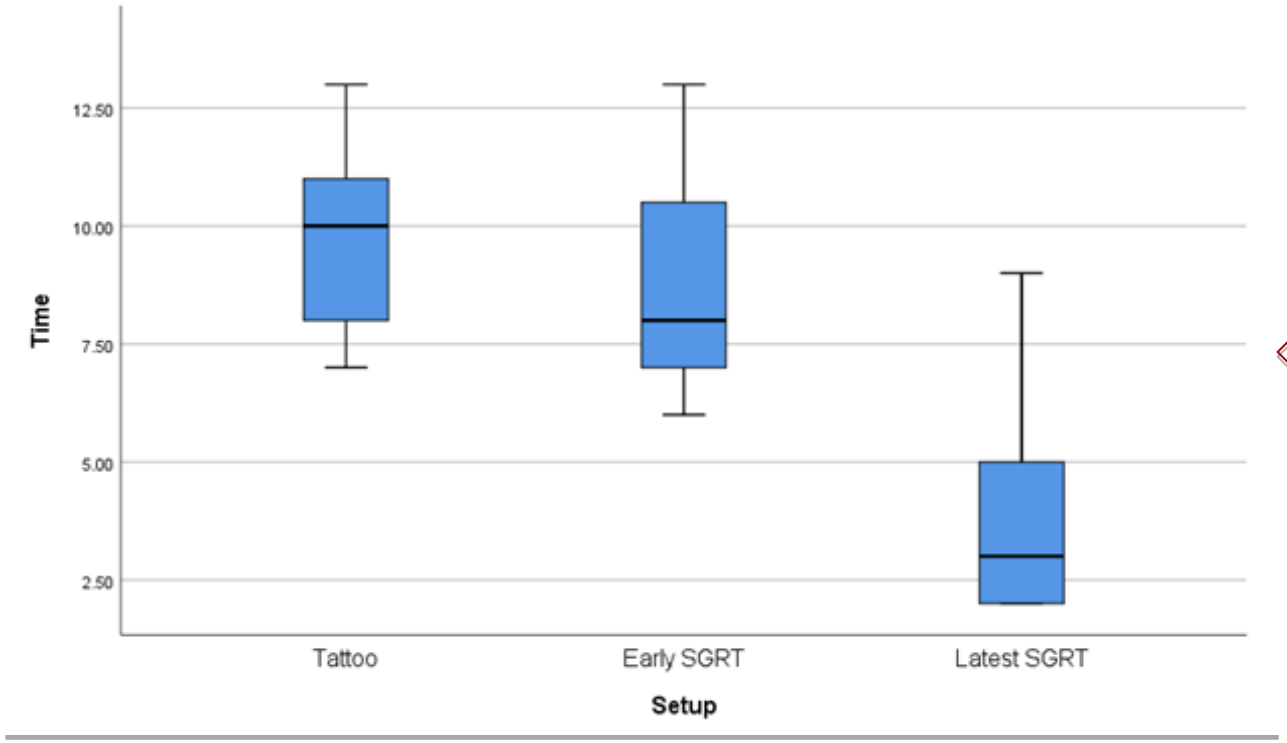
Time	Tattoo	20	42.38
	Early SGRT	20	36.15
	Latest SGRT	20	12.98
	Total	60	

Setup Group	Mean Rank	Observation
Tattoo	42.38	Longest setup time
Early SGRT	36.15	Improved efficiency
Latest SGRT	12.98	Most time-efficient setup

SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

25 Years REVOLUTIONISING HEALTHCARE

Stem and Leaf Plots



- **Tattoo setup**:
  - setup times are higher, ranging between 6 and 13.
  - Median shows the longest setup time
  - More variability in setup time.
- **Early SGRT**:
  - Median < tattoo
- **Latest SGRT**:
  - setup times are lower, ranging between 2 and 9, with high frequency around 2 and 3
  - Median show shortest setup time
  - Minimal spread = consitent

RESULT

VERTICAL SHIFT (latest data)

Kruskal-Wallis H= 17.492, p < 0.001

Significant differences observed. Latest SGRT demonstrates notable improvement compared to Tattoo and Early SGRT

	Vertical	Longi	Lateral
Kruskal-Wallis H	17.492	.034	6.605
df	2	2	2
Asymp. Sig.	.000	.983	.037

Kruskal-Wallis Ranks :

Setup Group	Mean Rank	Observation
Tattoo	38.13	Highest rank, indicating the largest vertical deviation
Early SGRT	36.15	Moderate rank, with some improvement over Tattoo
Latest SGRT	17.23	Lowest rank, indicating the most accurate vertical setup

Ranks

	Setup	N	Mean Rank
Vertical	Tattoo	20	38.13
	Early SGRT	20	36.15
	Latest SGRT	20	17.23
	Total	60	
Longi	Tattoo	20	30.68
	Early SGRT	20	30.90
	Latest SGRT	20	29.93
	Total	60	
Lateral	Tattoo	20	23.83
	Early SGRT	20	36.63
	Latest SGRT	20	31.05
	Total	60	

RESULT

LONGITUDINAL SHIFT (latest data)

Kruskal-Wallis H= 0.034, p = 0.983
No statistically significant differences. All methods show comparable performances

	Vertical	Longi	Lateral
Kruskal-Wallis H	17.492	.034	6.605
df	2	2	2
Asymp. Sig.	.000	.983	.037

Kruskal-Wallis Ranks :

Setup Group	Mean Rank	Observation
Tattoo	30.68	Moderate performance
Early SGRT	30.90	Slightly lower than Tattoo
Latest SGRT	29.93	Comparable to Early SGRT, with minimal difference

Ranks

	Setup	N	Mean Rank
Vertical	Tattoo	20	38.13
	Early SGRT	20	36.15
	Latest SGRT	20	17.23
	Total	60	
Longi	Tattoo	20	30.68
	Early SGRT	20	30.90
	Latest SGRT	20	29.93
	Total	60	
Lateral	Tattoo	20	23.83
	Early SGRT	20	36.63
	Latest SGRT	20	31.05
	Total	60	

RESULT

LATERAL SHIFT (latest data)

Kruskal-Wallis H= 6.605, p = 0.037
Significant difference observe.

	Vertical	Longi	Lateral
Kruskal-Wallis H	17.492	.034	6.605
df	2	2	2
Asymp. Sig.	.000	.983	.037

Kruskal-Wallis Ranks :

Setup Group	Mean Rank	Observation
Tattoo	23.83	Strong accuracy
Early SGRT	36.63	Moderate accuracy
Latest SGRT	31.05	Improved accuracy, then Early SGRT

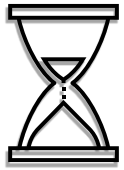
Ranks

	Setup	N	Mean Rank
Vertical	Tattoo	20	38.13
	Early SGRT	20	36.15
	Latest SGRT	20	17.23
	Total	60	
Longi	Tattoo	20	30.68
	Early SGRT	20	30.90
	Latest SGRT	20	29.93
	Total	60	
Lateral	Tattoo	20	23.83
	Early SGRT	20	36.63
	Latest SGRT	20	31.05
	Total	60	

CONCLUSION

- The adoption of Latest SGRT offer the best time efficiency, improving patient capacity in clinical practice.
- Latest SGRT method demonstrate the best vertical and longitudinal setup accuracy.
- **SGRT approach** generally delivers more reliable and higher-ranking results, indicating its superiority for optimizing performance across various setups

Key Advantages of SGRT Implementation

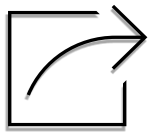


Real-Time Monitoring- Faster patient positioning

Provide real-time feedback on the patient's position as soon as they are placed on the treatment table

Improved Workflow and Efficiency

- reducing time spent on manual corrections and improving overall clinic workflow.
- Faster setup times can lead to more efficient patient throughput and a better experience for both patients and providers



"Send to Couch" feature

- Send alignment corrections directly to the treatment couch
- Reducing any potential discrepancies in patient alignment

High Precision and Accuracy

- Provides high precision in tracking the patient's surface, ensuring that even little movements (such as slight shifts in breathing) are detected and corrected.
- The system uses infrared cameras to capture detailed surface information, helping align the patient to the treatment isocenter accurately.

Beam Hold feature

- Allows the treatment beam to be paused or "held" if any unwanted motion is detected

SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

25 Years REVOLUTIONISING HEALTHCARE

THANK YOU

HAJARRUL NISHA AMJATH HUSSAIN

hajarrulnah@sunway.com.my

+60127107019

SUNWAY MEDICAL CENTRE
Sunway City Kuala Lumpur

SUNWAY MEDICAL CENTRE
Sunway City

The proposal and recommendations contained herewith remain the so
of authority from Sunway Group, is deemed as breach of copyright.