

Doracy P. Fontenla, Ph.D., FACMP, FAAPM Program Director for Medical Physics Education Memorial Sloan Kettering Cancer Center

AAPM, Washington DC, USA, 2016



During their one year External Beam Treatment Planning Rotation, Residents attend monthly Radiation Oncology QA Meetings.

Events reported on RISQ: (Reporting to Improve Safety and Quality) are presented and discussed at these meetings.

Residents work under the supervision of treatment planning clinical manager to address and resolve one of the reported events.



QA project #1: Problem report on RISQ **Pt positioning during simulation** 

Residents working on this project: Oleksandr Dzyubak and Rajesh Regmi QA Mentor:Sandra Fontenla

## **((())**

#### Motivation

- For some cases, it is not known in advance whether a patient needs to be simulated head or feet first.
- In the interest of patient comfort and time, consistent positioning is ideal but not always possible.
- **Particularly challenging**: Two isocenters, where one can clearly be simulated with head first (or feet first) and the second may or may not be able to clear in the same position.

CAMPEP RESIDENCY PROGRAM, N

(1)

AAPM. 2016

AAPM, 2016

 The purpose of this project is to establish a method to determine whether a patient will clear on the treatment machine if simulated with head first or feet first position, and avoid last minute changes and treatment delays.

CAMPEP RESIDENCY PROGRAM, MSKCO

# Instructions For CT Simulator RTT :

- Please provide the following measurements:
  - Patient's height, H, in cm.
  - Distance from patient head to isocenter, HISO, (cm).
  - -Distance from patient's feet to isocenter: FISO = (H - HISO) cm.

CAMPEP RESIDENCY PROGRAM, MSKCC

AAPM, 2016



AAPM, 2016

### (**a**) Criteria to determine if patient can be simulated head first:

- If distance from patient head to isocenter, HISO ≤ range of couch motion (93.6 cm), treatment could be delivered. So, proceed with simulation.
- If HISO > 93.6 cm, flip the patient.
- A spreadsheet was created to make it quick and convenient for therapist at simulation time.
- An example of the check for a patient, using the spreadsheet, follows.

(1) Spread sheet Example 1		
Machine 243 Lng couch edge location when aligned with vertical laser, cm From alinged position, max motion toward gantry, cm	68 93.6	
PATIENT SPECIFIC PARAMETERS Patient's height, H, in cm Distance from patient head to iso, HISO, in cm Distance from patient's feet to iso, FISO = H – HISO, in cm		202 143 59
Check to see if patient can be simulated head first:		i ip
If patient is flipped, use second check as follows: Verification check that patient can be simulated feet first:	P	ROCEED





### Problem reported to QA meeting

- There were at least four "RISQ" events involving the printer and block/cut out ordering.
- The problem was in the handling of large blocks.
- The block printout had to be split into multiple pages and then cut and pasted together. This was a time consuming process and led to loss of patient demographics on final printout.
- In one event, block shop did not receive the order on time and this led to a 1 hour delay in treating the patient.
   CAMPE, 2016



### Proposed solution

CAMPER RESIDENCY PROGRAM MSKC

- A printer providing large print output was set up for clinical use at the Block Shop.
- Printer driver was installed so that planners at both main campus and regional sites could send the order directly to the block shop along with an auto generated email.
- The printer quality assurance procedure was completed to assure the printer magnification accuracy:

100% for photons and 140% for electrons.



AAPM. 2016

#### Large Printer QA Procedure Advantages:

- Save time to print directly to the block shop.
- Save time by not having to print several pages, cutting and pasting.
- Higher accuracy due to printing on one page .

CAMPEP RESIDENCY PROGRAM, MSKCC

• Improved workflow by having the patient information, Linac information and block diagram sent to same printout.



### Large Printer QA Procedure:

- To verify the magnification, we measured 10 ticker marks (corresponding to 100 mm for 100% magnification and 140 mm for 140 % magnification).
- The X-axis was only 0.5 mm off and therefore within the 2mm tolerance when measured with a ruler.

CAMPEP RESIDENCY PROGRAM, MSKCC



AAPM. 2016

AAPM, 2016

### Large Printer QA Procedure:

- The y-axis was 1mm off when measured with a ruler. This 1mm y-axis warp stayed consistent when printed at multiple days and it is acceptable.
- To avoid any further deviation, monthly QA will be performed to ensure that the correct magnification is printed.

CAMPEP RESIDENCY PROGRAM, MSKC

### (1)

AAPM, 2016

### Implementation

- As part of the solution, multiple computer workstations were tested at the main campus and pilot tests with patient's data were run.
- During the pilots, the workflow was tested to ensure the printer and process work as planned.
- Block shop staff were trained to perform daily quality assurance tests.
- Planners on main campus and regional sites are being trained to use the new process.



AAPM, 2016

From: QA Committee: Radiation Oncology Sent: Friday, July 15, 2016 3:13 PM

- Subject: RadOnc 4020
- Blocks for Regional Sites
- GO LIVE MONDAY JULY 18<sup>TH</sup>!!!
- Special Thanks to Nazanin for all her help with this project.

CAMPEP RESIDENCY PROGRAM, MSKCC



# $(\widehat{\mathbf{A}})$

AAPM, 2016

#### **QA project Motivation**

To calculate MU, for all non planned treatment, it is necessary to compare apertures: Very difficult to see differences, specially for MLC's This difficulty is repeated for second calc verification Several RisQ events  $\rightarrow$  requires quick & easy tool



### VeriField for Calc v.1.0

#### Background and objective:

AAPM. 2016

- To make the process more efficient and avoid the possibility of visual mistakes, an independent tool was developed for quick and automated comparison of beam apertures, along with other parameters.
- The use of this software will replace the need for opening the MD plan and TP plan side by side while visually analyzing each field within the plan.





#### **Procedure for VeriField for Calc v.1.0** Created by J. Jeong 3/24/20 ,Revd by S. Fontenla,

Updated by J. Jeong on 4/20/2016 (for Eclipse 13.6)

- Developed on Matlab as a stand alone software.
- Tested for several weeks & updated.
- Being installed into all TP workstations in main campus.
- Being tested in regionals.
- Tested for New version of Eclipse (13.6) AAPM, 2016 CAMPEP RESIDENCY PROGRAM, MSKCC

# (1)

#### Summary

- **Purpose of this activity**: Make young medical physics residents alert to error events that might/do happen in the clinic: **Errors do happen**.
- Action: Residents contribute, under supervision, to provide corrective actions to avoid error recurrence.
- Aim: Build alertness to diagnose problems before occurence and look for solutions when events do occur.

CAMPEP RESIDENCY PROGRAM, MSKC

# (1)

AAPM. 2016

### Acknowledge/Thanks

#### Residents:

- Oleksandr Dzyubak (<u>Oleksandr.Dzyubak@wfhc.org</u>)
- Rajesh Regmi (regmi.raj@gmail.com)
- Nazanin Masoodzadehgan (<u>masoodzn@mskcc.org)</u>
- Jeho Jeong (jeongj@mskcc.org)

#### **QA Mentor:**

#### Sandra Fontenla (fontenls@mskcc.org)

AAPM, 2016 CAMPEP RESIDENCY PROGRAM, MSKC

# (<sup>1</sup>/<sub>4</sub>)

AAPM, 2016

- I would like to thank the organizers for the opportunity to participate in this event in honor of Franca Kushnir, a good friend of mine.
- Our lives had similar paths: We both grew up in Brazil at times when women did not go to Universities (even fewer to study science). We started our career in physics, obtained our Ph.D. in nuclear physics, and ended up working in medical physics.
  Our hearts, however, were in education and we both ended up directing residency programs in medical physics.
  Participating in this event has a very special meaning for me.

