



Ente Ospedaliero Cantonale

MR Only Workflow

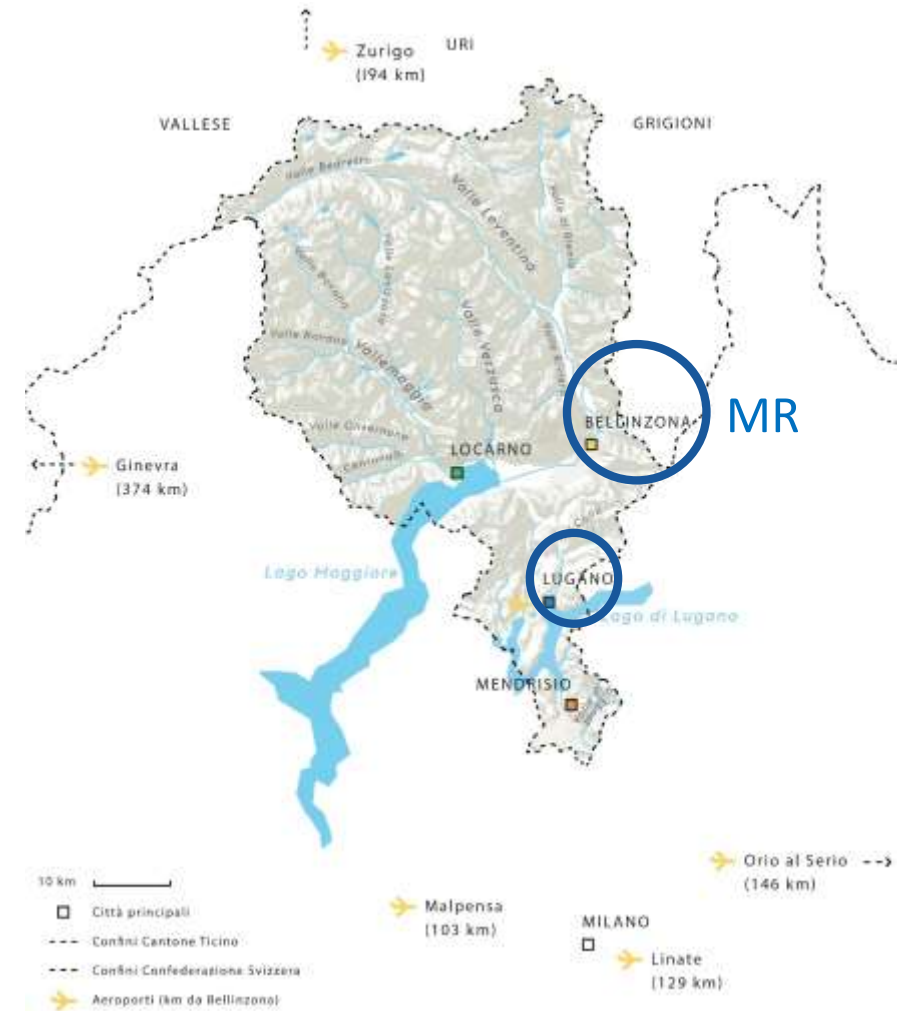


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Outline

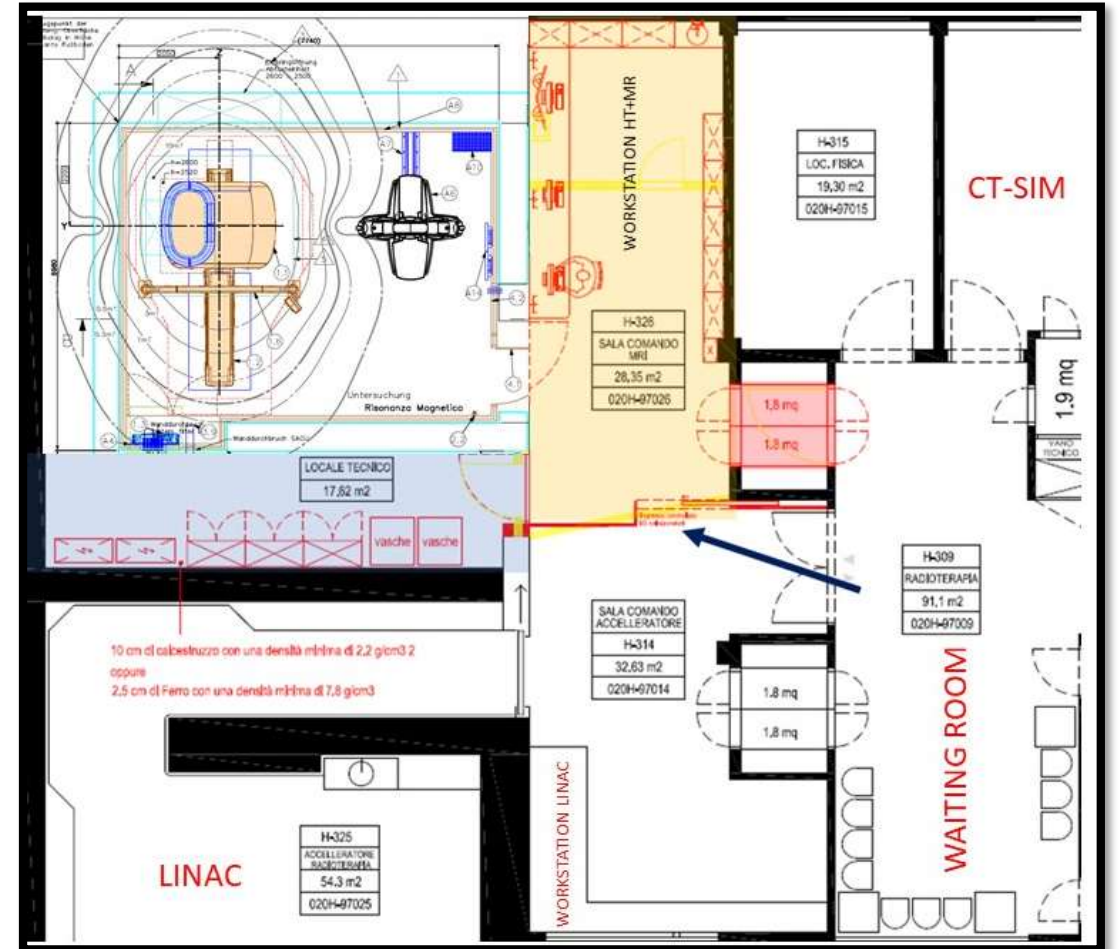
- Our Dept and machine
- MRCAT study and results
- MRI only workflow
- Conclusions: RTT Role



Our Department

Bellinzona:

- 1 Linac TrueBeam (Varian)
- 1 CT (Philips)
- 1 MR (Philips Ingenia Ambition X)
- 1 Deep HT Machine (Alba 4D)
- 1 Superficial HT Machine (Alba On 4000D)



Our Department



Philips Ingenia Ambition X

- 1.5 Tesla
- RT dedicated
 - Couch and Supports
 - Coil Bridge
 - Laser Bridge
 - Exam Cards ad hoc
- MRCAT → QA

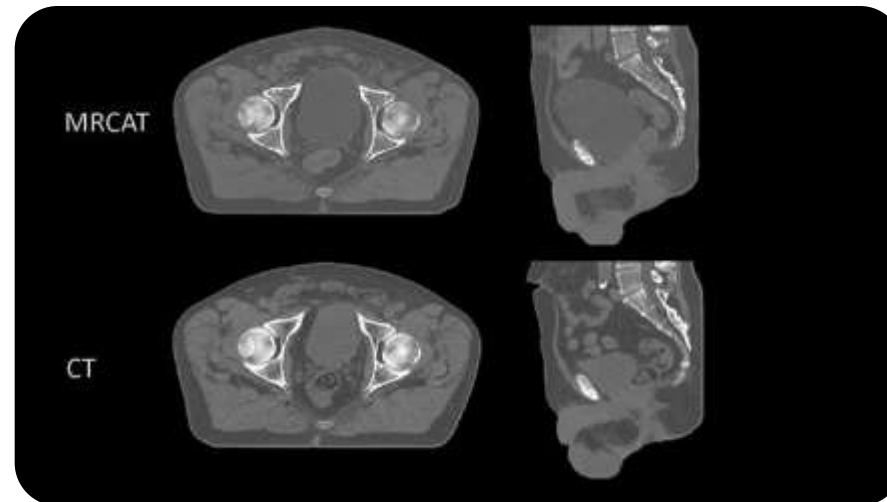


Magnetic Resonance for Calculating **A**Ttenuation

Available for: Pelvis and Brain

For the pelvis - Dedicated Exam Card - Sequence mDixon T1:

1. IP/OF (In Phase/Out of Phase) → Provides bone info
 2. W (Water Only) ↘
 3. F (Fat Only) → Provides soft tissue info and assigns related HU
- ✓ If all the parameters are correct, the software proceeds to generate the MRCAT



MRCAT peculiarities

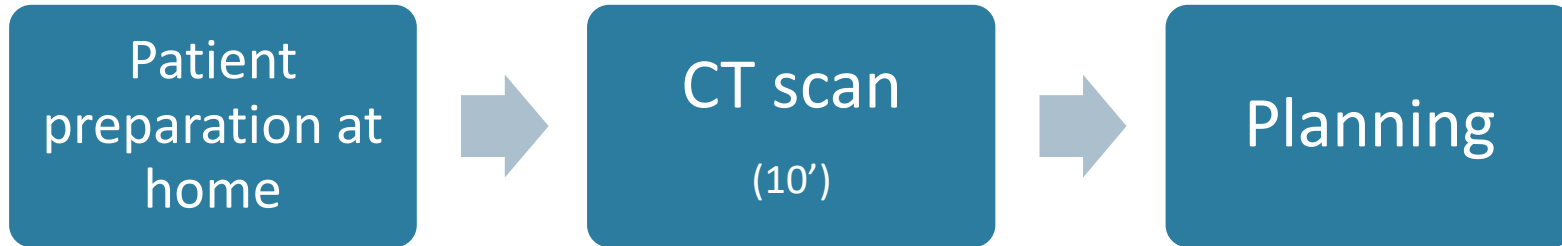
MRCAT pelvis does not work if:

- There is Contrast Fluid on the bladder
- The bone anatomy has some anomalies (like osteoporosis,...)
- There are metallic objects in the body (like hips implants, spine bone screws,...) → surgical clips are instead allowed
- The elbows are included in the scan area
- The measures of the body are greater than 50cm x 30cm
- There are foreign objects in contact with the body

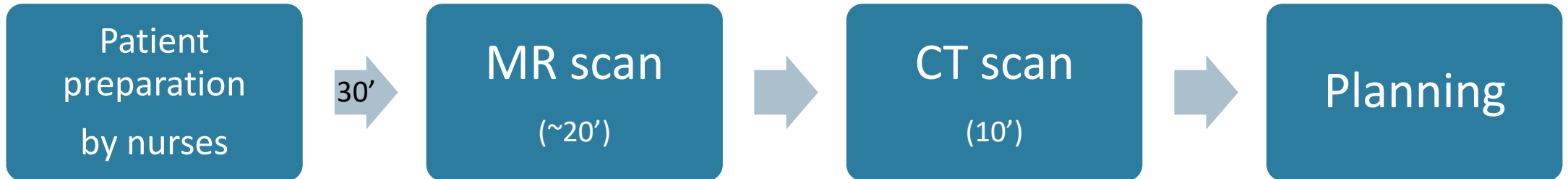


MRCAT VS CT study

Regular CT only
Workflow



Study: 50 patients
From 01.01.2022
To 31.07.2022

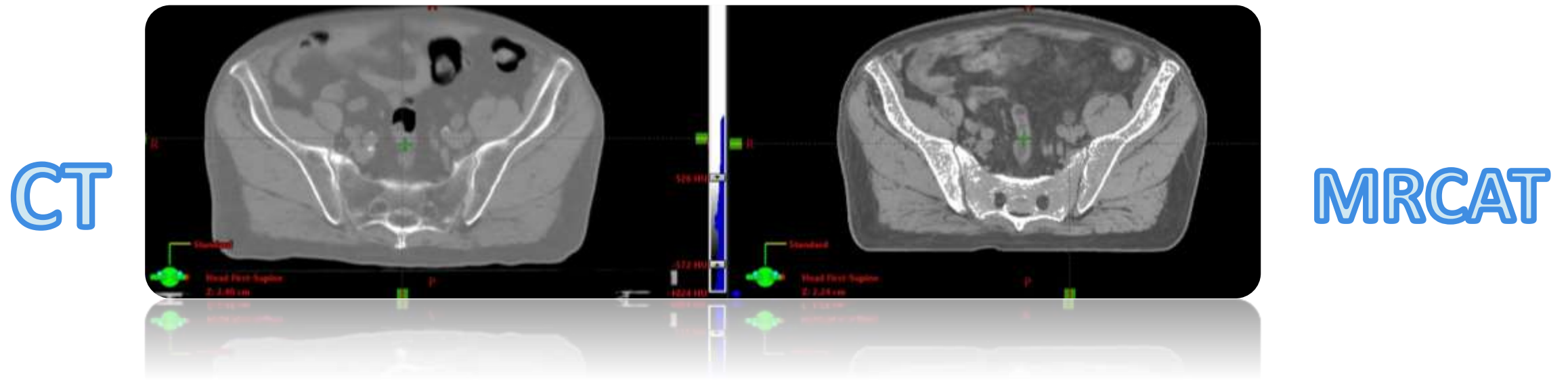


Study results – physics pov

The intestinal gas in the MRCAT images is not well shown as in the CT scan. The gas is considered as soft tissue and the HU are therefore incorrect.

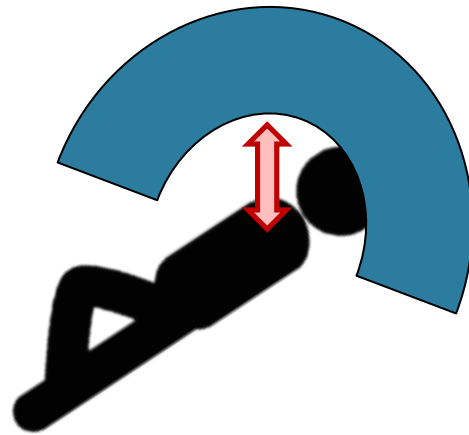
For this reason we found an increment of the $\sim 1\%$ of the mean dose at the PTV.

Little issue: MRI markers are invisible in the MRCAT.



Study results – RTT pov

Issue	Solution
Patient preparation	Added a new sequence: 1' long, 23cm length
Patient size	Created a frame



Bladder scanner



Assessing the accuracy and precision of the Verathon Bladder scan i10[®] in men receiving radical, adjuvant or salvage radiotherapy for prostate cancer.

MRI Only Workflow

- Assessment
 - Supplies
 - Patient information
 - Survey
 - Patient preparation



Ha già eseguito una risonanza magnetica?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Se sì, in quale istituto?		
È portatrice/portatore di uno o più oggetti nel corpo?		
→ Pace-maker / defibrillatore	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Valvole cardiache	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Stent cardiaci, vascolari o bypass (anno dell'operazione:	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Endoprotesi aorta addominale e/o aorta toracica	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Ha attualmente o ha avuto in passato stimolatori elettrici per nervi?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Clips cerebrali (anno dell'operazione:	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Valvole di derivazione (Shunt)	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Pompe, microinfusori e/o sensori per insulina	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Protesi ortopediche, placche o clips chirurgiche	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Qualsiasi altro dispositivo medico (protesi peniena...)	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Corpi estranei metallici o schegge metalliche di qualsiasi tipo	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Protesi o apparecchi dentali	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Apparecchio acustico	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Impianti cocleari (orecchio interno)	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Lenti a contatto, protesi o impianti oculari	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
→ Piercing, tatuaggi, trucco definitivo (make-up), cerotti medicati	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
È stato sottoposto a interventi chirurgici? Quali?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
In particolare, è stato sottoposto a interventi cardiocirurgici?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Soffre o ha sofferto in passato di problemi renali?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Soffre di diabete o glaucoma?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Soffre di allergie? Se sì quali?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Soffre di claustrofobia?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Ha una protesi al seno?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Peso: Altezza:		
Per le donne: È in stato, o presunto stato, di gravidanza?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO
Data dell'ultima mestruazione		
Ha un dispositivo intrauterino (spirale)?	<input type="checkbox"/> SÌ	<input type="checkbox"/> NO

Confermo di aver letto le informazioni e di aver risposto in modo accurato.
Ho avuto la possibilità di porre domande al personale e autorizzo l'esecuzione dell'esame.

Firma del/della paziente (o rappresentante legale/terapeutico): → Firma del Tecnico di radioterapia:
 →
 Firma del medico responsabile: → Data:
 Data:

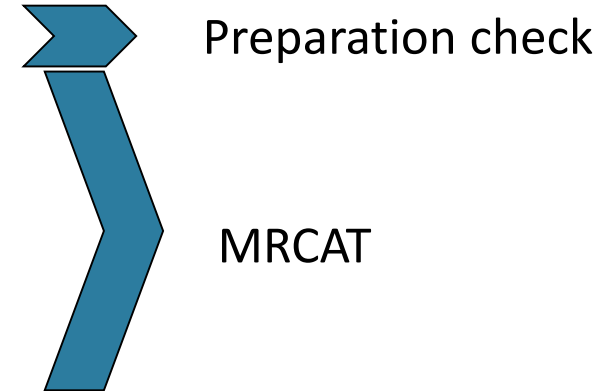
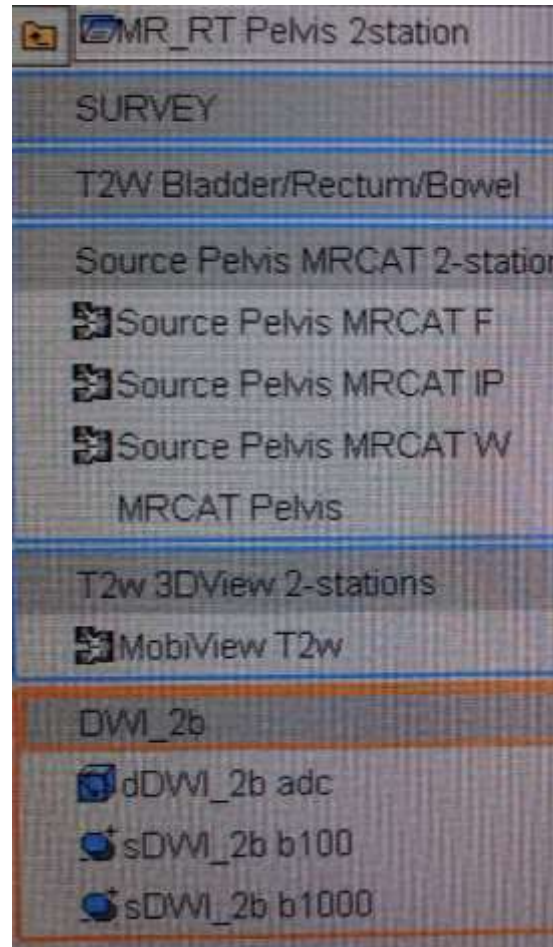
MRI Only Workflow

- Positioning
 - Same as the CT
 - + Coil and supports
 - + MRI Markers



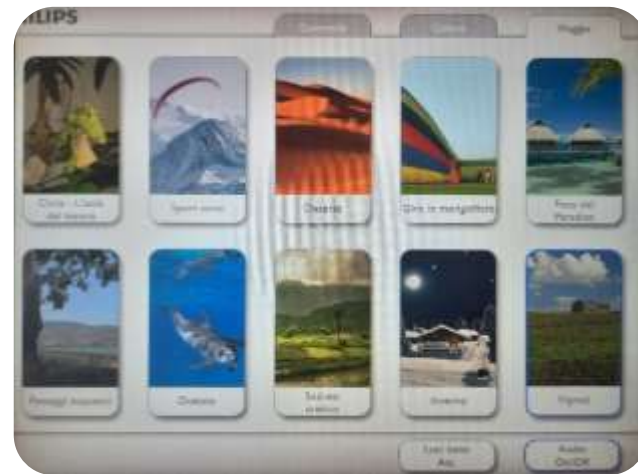
MRI Only Workflow

- Acquisition
 - Dedicated Exam Card
 - Single/Dual Station
 - Eventually DWI
 - ~ 15 minutes



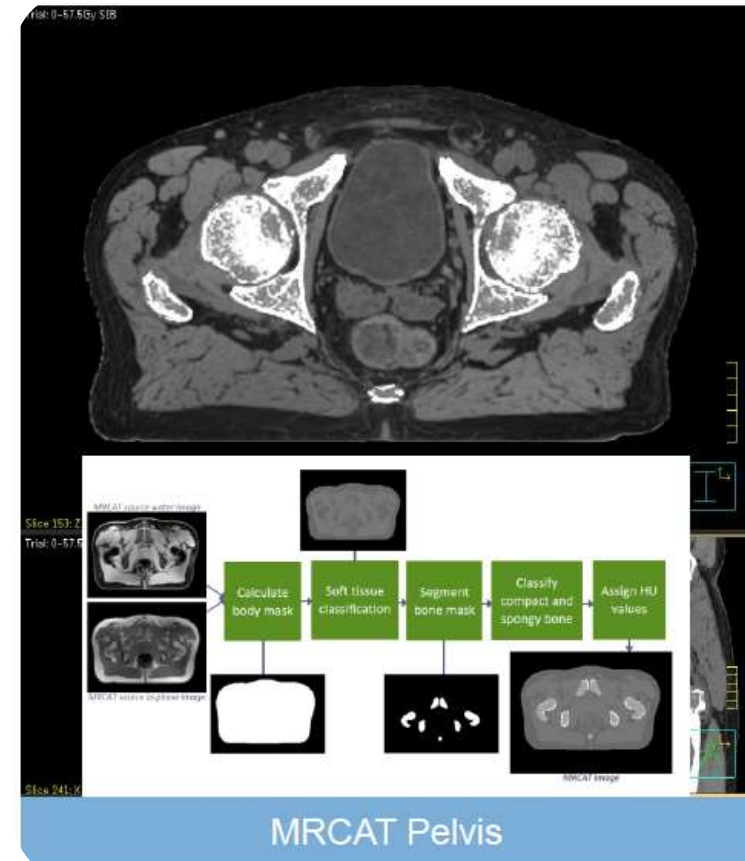
MRI Only Workflow

- Positioning
 - In-Bore experience



MRI Only Workflow

- At the end
 - Imaging validation → RTT + medical physicist
 - Setup documents
 - Tattoos outside the room



New Workflow

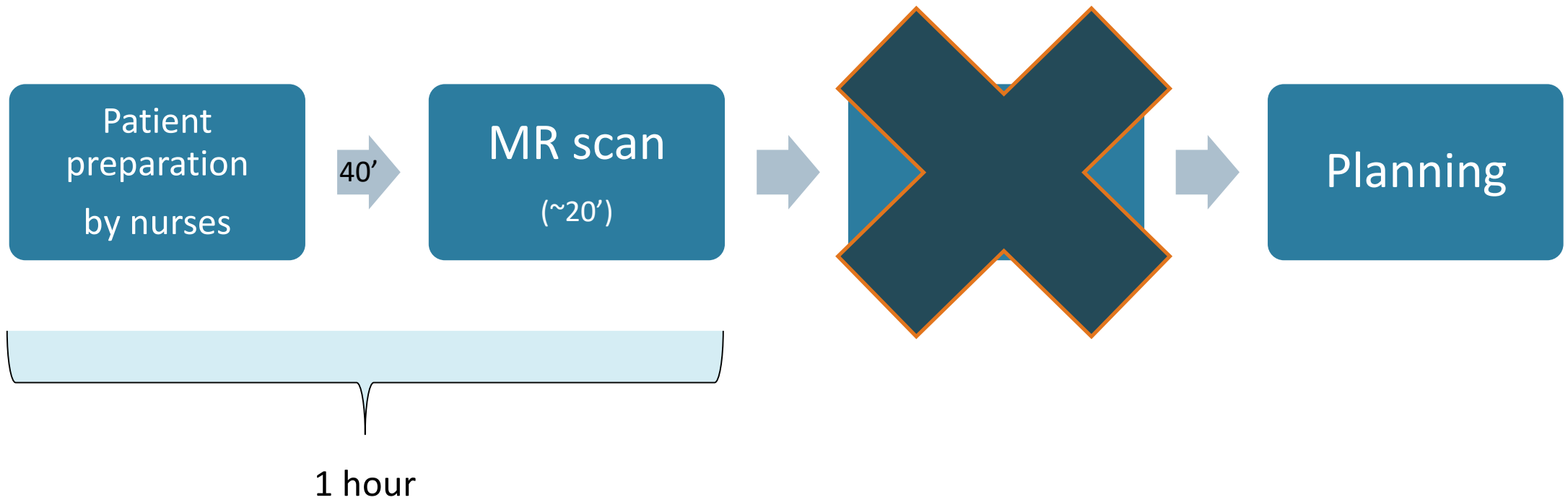


Image comparison: MRCAT/CBCT



Conclusions

- 1) Different ambient: room sharing with D-HT and Radiology department
- 2) Expanded teamwork
- 3) Safety first: RTT is the main responsible
- 4) Different timings
- 5) Different patient care
- 6) Images validation
- 7) New machines
- 8) Ongoing education



Thank you for the attention



Disclosure

I have no actual or potential conflict of interest in relation to this presentation.