

Implementation of radiographer-led IGRT for cervix cancer

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Background

IGRT in cervical cancer treatment delivery is complex due to significant target and organ at risk (OAR) motion^{1,2,3,4}. Implementing image assessment of soft tissue target and OAR position to improve accuracy is recommended⁵. Yet no standard IGRT solution or guidelines for radiographer review exist. This drove us to develop our own dedicated cervical cancer soft-tissue image review training and competency programme (TCP).

Methodology

TCP content agreed by a multi-disciplinary team comprising clinical oncologists, radiographers, and physicists.

Training: Inter-professional didactic lectures and practical sessions, supported by a comprehensive workbook.

Competency assessment: Radiographers reviewed a database of 20 cervical cancer CBCT images. Their soft-tissue review proficiency (after bony anatomy registration) was assessed against the gold standard. All reviews were graded pass or fail based on assessment of target coverage and decision taken in concordance with the gold-standard.

Gold standard: Consultant clinical oncologist soft-tissue assessment of cervical cancer CBCT image database.

Target: Radiographer pass threshold set at 80% concordance with clinical oncologist review, akin with similar studies⁶.

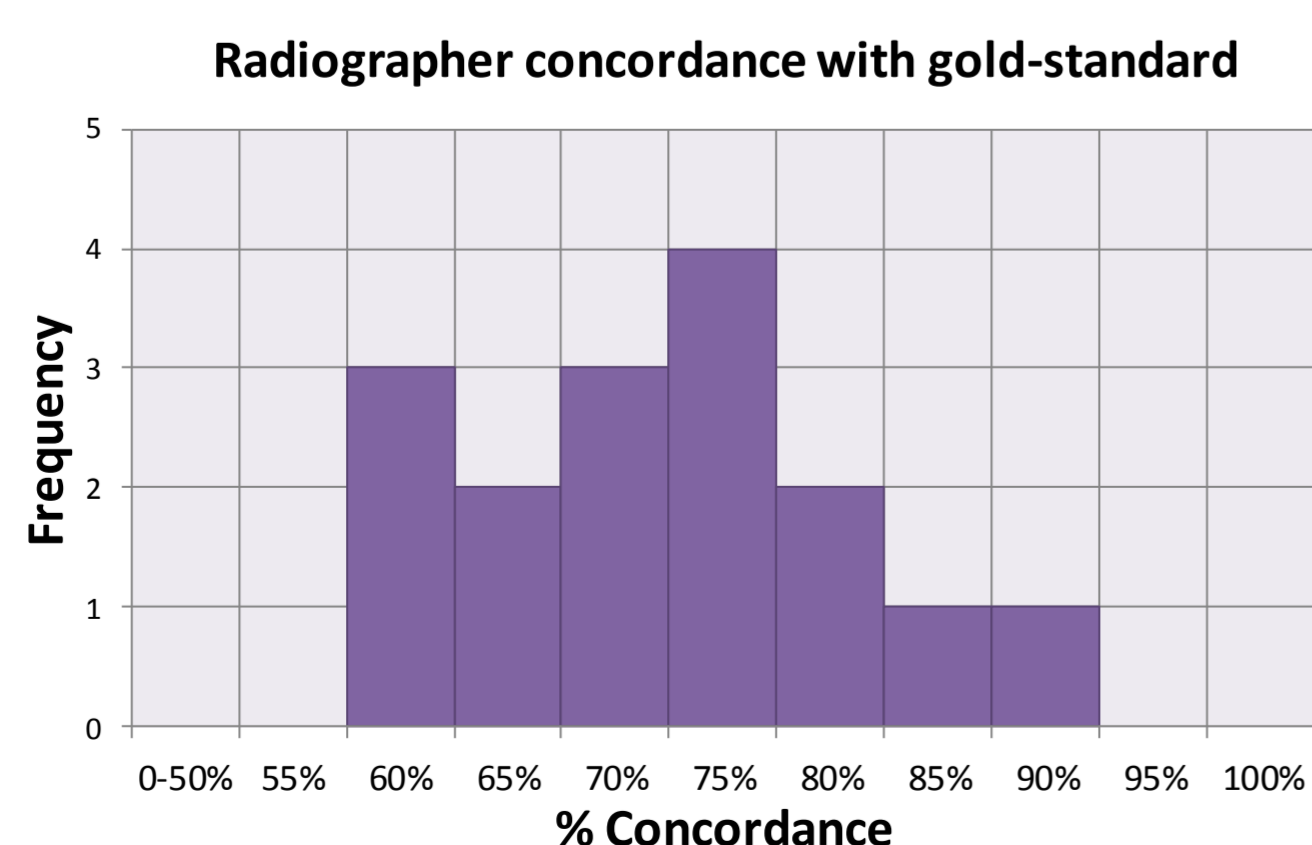
Audit round one

- 19 radiographers, of varying experience, volunteered
- Offline image review, verification and decision making process
- 5 areas of review guided by a traffic-light decision support system

	PTV coverage of primary CTV	Bladder volume	Rectal volume	Pitch	Change in body contour
	Not covering	Under/over full; causing poor coverage	Under/over full; causing poor coverage	> 4°	≥ 1 cm at all field entry points
	Primary CTV at edge of PTV contour	Under/over full; not affecting coverage	Under/over full; not affecting coverage	3° – 4°	≥ 1 cm at one field entry point
	≥ 3 mm margin around primary CTV	Similar to planned volume	Similar to planned volume	< 3°	< 1 cm
DECISION CHOICES	NO ACTION	INTERVENE BEFORE NEXT FRACTION	SEEK ADVICE		

Results audit round one

- 16/19 radiographers completed the TCP
- 231/320 (72%) of image reviews concurred with the gold-standard
- Four radiographers achieved ≥ 80%, signifying parity
- **Not** sufficient to support clinical implementation

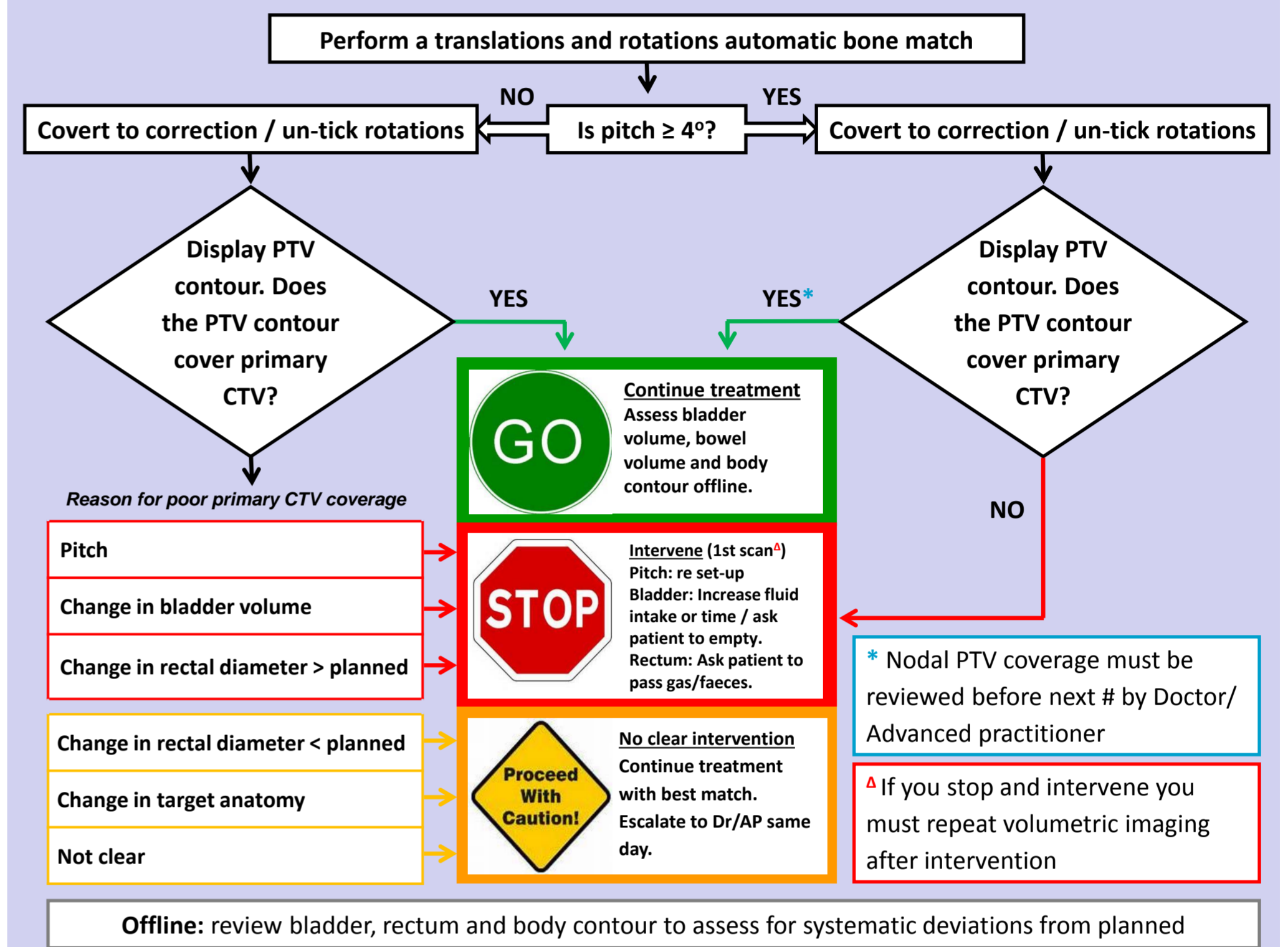


Action plan based on round one results

Further 3D anatomy teaching and more clinical examples added to TCP. Imaging flowchart implemented and image review process switched from offline to online verification.

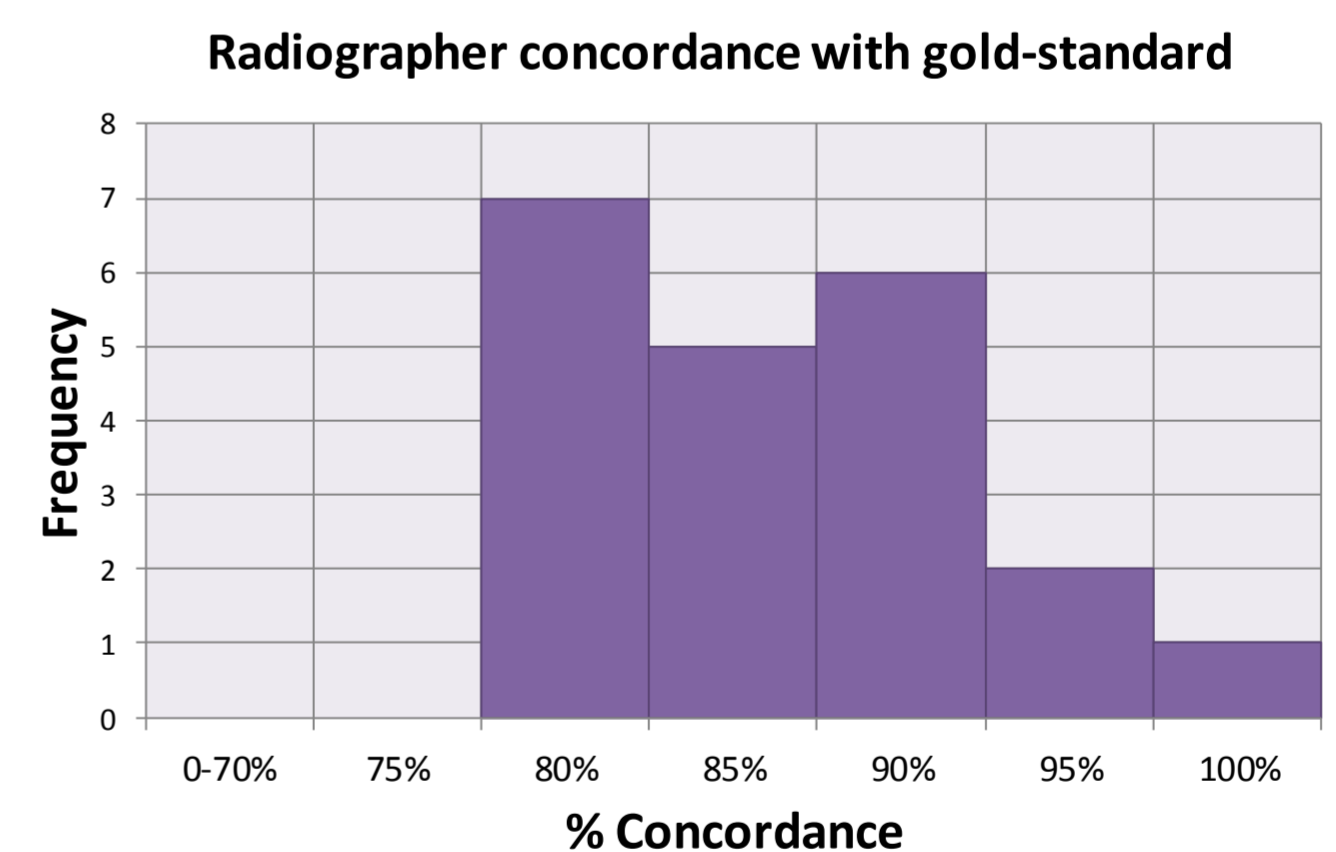
Audit round two

- 21 radiographers, of varying experience, volunteered
- Online verification and decision making



Results audit round two

- 21/21 radiographers completed the TCP
- 367/420 (87%) of image reviews concurred with the gold-standard
- All radiographers achieved ≥ 80%, signifying parity
- **Supported** clinical implementation of radiographer-led review



Action plan based on round two results

Radiographer-led cervical cancer soft tissue IGRT implemented clinically under prospective audit conditions. Online review performed by two competent radiographers. Prospective audit of first 13 patients; concordance of radiographer online review and clinical oncologist offline review measured. A high level of concordance prevailed; 192/200 images reviewed (96%) agreed. Supporting the adoption of radiographer-led cervical cancer IGRT into standard practice.

Conclusion

A dedicated TCP facilitated implementation of Radiographer-led cervical cancer soft tissue verification. Result variability bolsters the necessity for Radiographer training and competency assessment before role-extension in this area.



References:

1. Taylor A, Powell MEB. An assessment of interfractional uterine and cervical motion: Implications for radiotherapy target volume definition in gynaecological cancer. *Radiotherapy and Oncology* 2008 8;88(2):250-257.
2. Bondar L, Hoogeman M, Mens JW, Dhawtal G, de Pree I, Ahmad R, et al. Toward an individualized target motion management for IMRT of cervical cancer based on model-predicted cervix-uterus shape and position. *Radiotherapy and Oncology* 2011 5;99(2):240-245.
3. Collen C, Engels B, Duchateau M, Tournel K, De Ridder M, Bral S, et al. Volumetric Imaging by Megavoltage Computed Tomography for Assessment of Internal Organ Motion During Radiotherapy for Cervical Cancer. *International Journal of Radiation Oncology*Biophysics* 2010 8;1:77(5):1590-1595.
4. Tyagi N, Lewis JH, Yashar CM, Vo D, Jiang SB, Mundt AJ, et al. Daily Online Cone Beam Computed Tomography to Assess Interfractional Motion in Patients With Intact Cervical Cancer. *International Journal of Radiation Oncology*Biophysics* 2011 5;1:80(1):273-280.
5. National Radiotherapy Implementation Group. *Image Guided Radiotherapy: Guidance for implementation and use*. 2012.
6. McNair H, Hafeez S, Taylor H, Lalondrelle S, McDonald F, Hansen V, et al. Radiographer-led plan selection for bladder cancer radiotherapy: initiating a training programme and maintaining competency. *Br J Radiol* 2015;88(1048):20140690.

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