Workflow for brachytherapy in cervical cancer patients at Aarhus University Hospital

Time	Tasks and processes	Staff
Pre-brachytherapy		
~1 week prior to BT	Pre-planning*: patient under general anesthesia, insertion of tandem-ring applicator, **MR imaging**, dose planning, removal of applicator. Same workflow as detailed below under "BT", but without treating.	Radiation oncologist, radiologist, medical physicist
~1 week prior to BT	Decide **which applicator** to use: - IC tandem ring applicator (~30% of patients at AUH): standard commercial applicator - IC/IS parallel needles (~50% of patients at AUH): tandem-ring applicator is combined with needles in parallel to the tandem by using a standard ring cap (in-house design of cap)* - IC/IS applicator with oblique needles (~20% of patients at AUH): 1) tandem-ring applicator combined with in-house 3D printed ring cap for oblique needles or 2) individualized applicator (3D printed)**	Radiation oncologist, medical physicist
~3–5 days prior to BT	Printing of individualized applicator when needed	Technical Workshop
BT (repeated for two PDR fractions separated by one week)		
8.00–8.20 am	Anesthesia (general)	Anesthesiologist
8.20–9.00 am	Operating theatre: **insertion of brachytherapy applicator** under transabdominal and trans-rectal US guidance	Radiation oncologist, radiologist
9.00–10.00 am	Patient recovery	Nurse
10.30–11.00 am	**MR imaging** at Department of Radiology	Radiation oncologist, radiologist, MR technologist
(10.00–10.15)	CT scan in case of advanced implants with oblique needles (adds ~20–30 minutes to the procedure)	CT technologist
11.00–11.30 am	Transfer of **images to dose planning system** and preparations for contouring and dose planning	Medical physicist
11.30–12.00 pm	**Contouring of target and organs at risk**	Radiation oncologist
12.00–1.00 pm	Reconstruction of applicators and first optimization of dose plan	Medical physicist
1.00–1.30 pm	EQD2 calculation in spreadsheet, priorities of tumor coverage and organ sparing, further dose optimization, documentation, **approval of treatment plan**, and QA	Medical physicist, radiation oncologist
1.30–2.30 pm***	Initiation of **PDR treatment** and in-vivo dosimetry (rectal diodes) (20 hourly pulses)	Medical physicist
10.00–11.00 am following day	**Removal of applicato**r (morphine and benzodiazepine on indication, general anesthesia in selected cases)	Nurse (Anesthesiologist radiation oncologist)

*Fokdal L, Tanderup K, Hokland SB, Røhl L, Pedersen EM, Nielsen SK, et al. Clinical feasibility of combined intracavitary/interstitial brachytherapy in locally advanced cervical cancer employing MRI with a tandem/ring applicator in situ and virtual preplanning of the interstitial component. Radiother Oncol 2013;107:63–8

** Lindegaard JC, Madsen ML, Traberg A, Meisner B, Nielsen SK, Tanderup K, et al. Individualised 3D printed vaginal template for MRI guided brachytherapy in locally advanced cervical cancer. Radiother Oncol 2016;118:173–5

*** Start of delivery varies depending on occasional delays and implant complexity (±1h). Application of oblique needles requires extra CT scan (+20–30 min), and time consumption for needle reconstruction and dose planning varies with the number of needles (±30 min).