Department. Thus, the patient becomes a key actor in the quality and safety of its own treatment.

In conclusions: empowerment of the patient is essential for two reasons, on one hand at the individual level by strengthening its capacity to act on health determinants and on the other hand at the organizational level with continuous improvement of the Radiotherapy Department. Our goal is to strengthen the quality and safety of treatments, adjust them to the life project of the patient and promote a participative approach focused on the patient’s needs and expectations.

SP-0192
Beyond accuracy: how can medical physics help improve treatment quality?
H. Nyström
1The Skandion Clinic, Uppsala, Sweden

It has often been claimed and acknowledged that Radiotherapy (RT) as a modality to combat cancer has become technology driven, or even physician driven. Higher energies, better accuracy, computerised delivery systems, improvements in imaging are all examples of this. Together with increased knowledge of how to combine RT with e.g. systemic treatments, RT has remained one of the most important tools in cancer therapy. The continuous improvements of RT has often involved complex technology, less intuitive to its nature than earlier technologies. It has been one of the most pronounced duties of the medical physicist to ensure that the clinical introduction of such new technologies has been done with the highest possible safety standards and that any risk associated with the new technology could be brought to an absolute minimum. As a result RT, in particular advanced RT, is a very safe modality compared to almost any other hospital activities. In their quest for the highest possible level of safety, the medical physicist is often left alone with high demands, ambitions but with limited means and lack of understanding from the hospital management of the resources needed. As a consequence the clinical introduction of new, superior treatment options are delayed, months, years and sometimes even decades, and the patients have to be content with older methods, e.g. less conformal RT. This dilemma can be boiled down to the search for the optimal balance between quality (e.g. modern high precision treatments) and safety (reliable, well proven and understood methods). The priority often tends to go towards safety rather than quality since the focus from the general public as well as regulatory authorities is always favours the latter at the expense of the former. As medical physicists, however tempting it might be to focus on safety only, must take a patient oriented approach and in all considerations include the aspect of what will be the most beneficial way from a patient’s perspective. Just as a high quality cannot be justified to apply if the safety issues are not properly handled, safety without quality is of limited value. In the search for the ultimate balance between quality and safety, the medical physicist is in a key position since no other profession has a better understanding of the technology, the physics and the interactions between different complex systems. A more patient-centred approach to accuracy, safety and quality can, however only result from a multidisciplinary strategy where different profession work together towards the common goal to offer the best possible treatment to all patients in need thereof.

OC-0193
Evaluation of models for plan QA using fully automated Pareto-optimal plans for prostate patients
Y. Wang1, S. Breedveld1, B. Heijmen1, S.F. Petit1
1Erasmus Medical Center Rotterdam Daniel den Hoed Cancer Center, Radiation Oncology, Rotterdam, The Netherlands

Purpose or Objective: Current IMRT treatment planning with commercial treatment planning systems is a trial-and-error process, based on a series of subjective human decisions. So the quality of the IMRT treatment plans may not be consistent among patients, planners or institutions with different experience. Different plan quality assurance (QA) tools have been proposed recently, that could flag suboptimal plans that may benefit from an additional treatment planning effort. However, since conventional treatment planning was used to validate these models, the inherent accuracy of the existing treatment planning QA models is unknown. Therefore we fully automatically generated a dataset of Pareto-optimal prostate IMRT plans using Erasmus - iCycle, an in-house TPS for fully automated, multi-criterial plan generation. This dataset was used to assess the prediction accuracy of an overlap volume histogram (OVH) based plan QA tool.

Material and Methods: 115 prostate plans were fully automatically generated using Erasmus-iCycle. These plans were based on a fixed ‘wish-list’ with constraints and objectives in a predefined order of priority. An existing OVH model was modified and used to predict DVHs for these patients. First, the entire DVH of the rectum, bladder and anus of a validation cohort (N=57) were predicted, using the plans of an independent training cohort (N=58). To investigate the impact on prediction accuracy of an enlarged training cohort, the DVHs were also predicted by a leave-one-out method. The predicted rectum Dmean, V65, and V75, and Dmean of the anus and bladder were compared with the achieved values to validate the OVH QA tool.

Results: For rectum, the prediction errors (predicted-achieved) were small: -0.2±0.9 Gy (means±1 SD) for Dmean, -1.0±1.6% for V65, and -0.4±1.1% for V75. 72% and 96% of the predicted rectum Dmean had prediction errors within 1 Gy and 2 Gy, respectively. For Dmean of anus the prediction error was only 0.1±1.0 Gy, whereas for the bladder it was much larger: and 4.8±4.1 Gy (see also Fig 1). Increasing the training cohort to 114 patients (using leave-one-out) led to minor improvement.

Conclusion: A dataset of consistently prioritized Pareto-optimal prostate IMRT plans was generated. This dataset can be used to validate any planning QA model and will be made publicly available at the Treatment Planning QA Section of http://www.erasmusmc.nl/radiotherapie/research/radiationoncologymedicalphysicsandimaging/research_projects. It was applied here to assess the accuracy of the OVH model. The OVH model was highly accurate in predicting rectum and anus DVHs. For the bladder large prediction errors were observed, which indicates that the OVH has difficulty in capturing the interdependence of sparing different OARs. We are currently