for auto-segmentation: Velocity v.4.0 (Varian, atlas/model based approaches) and Eclipse v.15.5 (Varian, combined atlas/model based approach). Their performance is being evaluated for future clinical use. This first analysis concerns the segmentation of organs at risk of the male pelvis for the irradiation of the prostate.

The evaluation was conducted retrospectively on ten cases randomly picked from an RTOG study patient cohort. These patients underwent radiotherapy of the prostate and seminal vesicles and were contoured manually according to RTOG guidelines. Five representative cases were selected to complete the prostate atlas set of Eclipse and create a prostate atlas set in Velocity. Both atlas sets as well as the model-based segmentation by Velocity were tested on the patient cohort. The five organs-at-risk (OARs-bladder, femoral heads, penile bulb, and rectum) were then graded from 1 (unacceptable) to 5 (excellent) by two MDs. The auto-segmentation and the correction of the auto-segmented contours were timed. This time was compared to the average time necessary for contouring the same five OARs manually.

The Smart Segmentation module of Eclipse achieved a higher score rating for the five OARs of this treatment site. It was also assessed to be more flexible and transparent in clinical use. In average the resulting contours were graded partially acceptable to acceptable. Though generating auto-contours takes little time, correcting the contours takes longer than contouring the OARs of the male pelvis manually.

The disappointing times and partially acceptable contours are in line with the performance of auto-contouring modules in the male pelvis in other centers. However, an Eclipse ATLAS set including OARs conforming to the most crucial criteria to reduce uncertainties is still being worked on. Evaluations of both modules for other treatment sites, where different manual and automatic segmentation times are expected are also being conducted.

Impact of skin: to-target distance on treatment plan quality for mixed beam radiotherapy

Type: Physics

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Aims: Mixed beam radiotherapy (MBRT) can outperform photon-only IMRT for targets which have a superficial part with a skin-to-target distance (STTD) smaller than 1 cm. The aim of this work is to investigate for which range of STTD MBRT provides potential dosimetric benefits and to quantify whether or not the dose delivered to the skin is increased for MBRT compared to IMRT.
Methods: An academic situation consisting of a cubic water phantom which includes contours of several PTVs varying in the STTD from 0.5 up to 7.5 cm and two organs at risk (OARs) was defined. For each PTV, IMRT and MBRT plans were created without special attention of reducing the dose to the skin. An additional MBRT plan was created for each PTV aiming in achieving a similar dose to the most superficial 5 mm of the skin–by means of dose constraint in the optimization–as achieved with the corresponding IMRT plan. To estimate the skin dose, gafchromic film measurements were performed in a 140 µm-deep layer for the IMRT and MBRT plans with an STTD of 0.5 cm.
Results: MBRT plans outperform IMRT plans in terms of PTV dose coverage, OARs sparing and volume of low dose bath for STTDs up to 3.5 cm. However, the maximal dose delivered to a 0.5 cm-thick skin is on average 30% higher for MBRT if no special constraint is given in the optimization. By setting an appropriate skin sparing constraint, the advantages of MBRT over IMRT diminish, but for STTDs up to 1.5 cm MBRT still gives dosimetric benefits compared to IMRT. Measurements show that the dose delivered to the 140 µm-deep layer is 300% higher for MBRT than for IMRT.
Conclusions: The results indicate dosimetric advantages for MBRT over IMRT for targets with a short STTD. The range of STTDs for which this is the case strongly depends on the maximal tolerated dose to specific skin layers. This work was supported by Varian Medical Systems.

InSightive—a business intelligence solution for a paperless clinic

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Aim: An essential part of managing a paperless clinic is how to maintain an overview of all tasks and processes without paper files or running sheets; and at the same time ensure that all necessary data is available in the required quality.

Within ARIA**:** (v.15.5) the tool InSightive (v.1.6) offers a platform that will allow such questions to be answered dynamically and in real time via dashboards by accessing all data stored in the ARIA database.
Methods: In order to maintain an overview of the paperless processes the use of InSightive was limited for this project to the following questions:

How efficient are the electronic workflows?
What does data quality look like?
What does the patient volume look like?

In a first phase**:**, the available and ready-to-use dashboards were tested with the aim of finding the right dashboards for the questions mentioned. In a second step, these dashboards were analysed whether the displayed data are correct. Thirdly, these dashboards were adapted or new ones created from scratch.
Results: It quickly became apparent that the existing dashboards were unable to answer our questions–at least without making extensive adjustments. The analysis of the original and adapted dashboards showed that the data was often not precise and sometimes even wrong. This is because certain processes in ARIA are not exactly defined (e. g. when is the start of a task?) or because the dashboards are incorrectly programmed and therefore output incorrect data. This led to us having to limit ourselves to a very few dashboards which we had reprogrammed from scratch. The effort and training required to do this demands a deepened database and IT knowledge, as well as a lot of time.
Conclusion: InSightive is an analysis tool that offers the possibility to overview clinical data and processes easily and quickly. The tool itself and the provided dashboards fulfil this requirement in a very simple basis. However, if specific and detailed queries are needed, this is only possible with enormous effort and precise testing of the outcome.