# Accel-RT database use case examples

**Data entry workflows**

**Patient registration**

This is performed when the patient first agrees to enter the database typically by the oncologist in the clinic. We create a study ID, and enter year of birth, registration date and performance status into the database table t\_patient\_registrations. We also register details for a new treatment episode, including the ICD10 code and text name of the tumour, location, grade, and surgery type, together with details of symptoms, storing this data into t\_treatment\_episodes.

*At present we have to way to import patient demographics from the Hospital PAS, though this might change with e-hospital. We don't actually need to store very much demographic data in our database anyway.*

**Target volume delineation**

The radiation oncologist would then go on to plan treatment for the patient. CT and MRI scans are acquired to enable a 3D model of the patient to be built in the treatment planning system. The oncologist defines the GTV, CTV and PTV for the tumour, together with details of the target dose and any defined dose constraints. At present these are entered on a planning sheet (see associated pdf for TP414). We would like the system to be able to print out a planning sheet for the oncologist, once the planning details have been specified.

At this point, we store references to the DICOM planning dataset, associated MRI or PET dataset, the protocols used for definition of GTV, CTV, PTV, and the prescribed dose into t\_rt\_planning\_instances, together with details of any other structures that have been contoured.

**Generation of treatment plans**

Having specified the dose constraints, the physicist is responsible for planning the treatment will produce one or more treatment plans. As the case becomes more complex, the more likely that alternative treatment plans will be generated that provided different compromises on dose to tumour and dose to normal tissues. This data would be stored into t\_rt\_planning\_instances.

At present, it seems we would use a new entry in t\_rt\_planning\_instances each time a plan is generated. This seems like duplicating data but actually alternative treatment plans might be for completely different dose levels, and with different dose constraints.

*It would be really nice to have some way in which the dose constraints could be exported automagically from the treatment planning system. It might be possible to do this from Tomotherapy and Marina would be the person to ask.*

After that, the patient will start treatment, and if they are being treated on Tomotherapy or VMAT, then each day they come they will have imaging performed to assess their setup. Any displacement necessary to correct the position of the patient is denoted as an X,Y and Z shift and an X,Y and Z rotation which will be entered into table t\_daily\_setups. There is also the possibility to store the daily images into the database, though this is less likely to be used. The information about the shifts will be helpful in determining sensible margins for CTV and PTV in future planning episodes.

**Clinical database and imaging database**

We need a sensible way of linking sets of Dicom files stored in the image database with patient data in the clinical database. One way is to store the study UID in the clinical database, and then have the image database bring up all the related DICOM files with the same study UID via a search. However, this is not the way most treatment planning systems work. They use some hierarchical structure to group and organise files.

**Usage workflows**

Having entered all the data on the database, how are we likely to want to access it?

**Simple and contextual search**

Users may which to recall previous cases of a specific diagnosis, or in a specific location in the body, or containing a specific region of interest (ROI). They may wish to query via the dose constraints i.e. "show me all plans where the spinal cord was allowed to receive more than 50Gy."

**Protocol search**

Users may wish to identify all plans where a certain protocol was used for target volume delineation (c\_gtv\_protocol, c\_ctv\_protocol, c\_ptv\_protocol in t\_rt\_planning\_instances).

Once appropriate data has been identified, the 3d image dataset will need to be reconstructed in a GUI from the original DICOM files. The main data that will need to be superimposed from the database are the dose constraints for each region of interest, as they are not held in the DICOM data.

**Image dataset based search**

This is where the user provide Accel-RT with a dataset, and a mark to indicate the location of the tumour. The system would then identify similar image datasets that could be co-registered onto the new dataset. This is where some automatic parsing of human anatomy could be used in order to generate the search terms for the database.