the present study was to investigate the effect of using different pulse current and time combinations for CBCT acquisition, and provide local guidelines on how to choose the x-ray current/time.

**Materials and Methods**: All CBCT scans were acquired on Elekta Synergy or Versa HD accelerators equipped with the XVI 4.5 CBCT system. Three series of 200 projection images were acquired without a phantom on the treatment couch, using different combinations of pulse current and time to provide an x-ray intensity of 0.4 mAs per projection image. All three series were acquired at 120 kVp with the S20 F0 filter combination. The pulse current/time combinations were 10mA/40ms, 20mA/20ms and 40mA/10ms. To further investigate the potential effect on the reconstructed image quality, two CBCT scans of a cylindrical water phantom (20 cm diameter, 48 cm length) were acquired at 120kVp using the S20 F0 filter combination. 200 frames were acquired over an arc of 200 degrees, and projection images were exposed to 10mA/40ms in the first scan and 40mA/10ms in the second scan.

**Results**: Plotting the mean signal in each projection image of the open scans as a function of projection image number revealed that the shorter pulse times had larger signal variation between the projection images. On top of this, a series of sudden spikes was observed for the 10ms pulse time, and these were completely removed when using the 40ms pulse times. The latter, more consistent x-ray output from the generator will in theory provide a less noisy CBCT reconstruction. Reconstructions of the two scans of the water cylinder are shown in the figure below. It is evident that homogeneity and image noise is reduced when using the long pulse times. The latter, more consistent x-ray output from the generator will in theory provide a less noisy CBCT reconstruction. Reconstructions of the two scans of the water cylinder are shown in the figure below. It is evident that homogeneity and image noise is reduced when using the long pulse time compared to the short pulse time. These effects are most substantial towards the outer edges of the reconstructed volume, where the undersampling of the data required for reconstruction becomes more severe.

**Figure**: Axial and coronal view of a homogeneous water cylinder. All images are displayed with the same window/level settings.

**Conclusions**: The use of longer pulse times and lower pulse currents when acquiring CBCT projection images was found to improve image quality in the reconstructed CBCT volume. Based on this finding, our clinical CBCT acquisition protocols were changed to use the longest possible x-ray pulse times while keeping the imaging dose the same as before this study. We have not observed a significant improvement in image quality of patient CBCTs, possibly because there are other more severe sources of image noise in the system. The change to longer pulse times is however a quick fix in changing the acquisition protocols once, and does not increase the CBCT scan time as the x-ray pulse time remains much shorter than the frame time of the XVI system.