

AbstractID: 7335 Title: Determination of Site Specific Couch Tolerance Tables Using Analysis of Treatment Histories

Purpose: Record and verify (R&V) systems allow for a planned couch position and tolerance limit to serve as check for patient setup. This limit can server as a warning to operators that the setup may be in error. Operators will learn to ignore a tolerance that is set too tight. Too loose and it defeats the purpose of the tolerance. We investigate the use of statistical analysis of couch coordinates from treatment records to determine what planned position and tolerance should be used.

Methods and Materials: Treatment histories from the R&V system for four combinations of treatments and immobilization: prostate, head and neck, breast and thorax were used. These records were used to determine the variation from a planned couch value using different strategies. The first was to use the position of the couch on the first treatment for n days, then change the average position over the n treatments. The second was to use the cumulative average of the n-1 fractions for the nth fraction. The variation was calculated as the RMS value of the difference from the planned and treatment positions. The RMS value was used to set the tolerance limits for the difference of the treatment value to the planned value.

Results: In all treatment sites the vertical position of the couch showed the least variation in daily setup. Different treatment sites show a wide variation in RMS value consistent with the quality of the immobilization. Averaging over several fractions showed no significant advantage over other methods.

Conclusion: The variation in the couch is large enough to defeat any advantage sought by averaging over several fractions to determine the planned couch position. Significant variation in the RMS values of the couch coordinates indicate that different sites need different tolerance tables to best represent the variation of setup.