The current practice for reporting daily positioning errors during external radiation, is to use the mean of the errors as a systematic error and the standard deviation of the mean as a measure of the spread of the error. This assumes that the distribution of errors is a normal distribution and that the number of samples from that distribution is large enough.

To perform this assessment a study was initiated on 24 patients with the following selection criteria: Treatment for cancer of the cervix or endometrium, obese and post-menopausal. The patients were treated using a standard four-field box technique and portal images of at least two perpendicular ports were obtained for each fraction. A total of 1645 images was obtained. An in-house developed programs for image networking (EPICURE) and registration (OPIDUM) were used to quantify the various shifts. Mean and standard deviation in the primary directions where calculated.
A convolution plan(CP) with a normal distribution generated using the parameters obtained above was applied to the dose grid generated by a 3D planning system (GRATIS) and Dose Volume Histograms (DVH) were calculated. In addition a new plan was generated using measured patient shifts and superimposed (SP). Finally, an effective error was determined as being the systematic and random error that generated a CP with minimal difference to the SP.

This paper shows that CP can be used to asses clinical implications of patient movement more adequately starting from measured data.