Purpose: The purpose of this study is to characterize the measurement system of daily patient setup. We also evaluate whether or not the level of therapists’ experience had an impact on aligning digitally reconstructed radiographs (DRRs) to the actual digital x-ray images.

Method and Materials: Expert and beginner level therapists were investigated in the processes of image matching. The levels of experience were based on the length in which the therapists have been working in the Radiation Oncology Department and on their experience level with the daily radiographic imaging equipment. To evaluate the measurement system and the therapists’ performance, a repeatability and reproducibility study (gauge R & R) was performed, which determines the error in the process of matching image sets. For an acceptable process, the Gage R&R should be below 30%. Nine therapists and one faculty expert matched 20 image sets (DRRs to kV x-ray images) for GYN bone and prostate seed cases. For each case, the treatment couch shifts in vertical, longitude, and latitude were recorded. As an independent baseline, the therapists were compared to the faculty expert’s evaluation of the same images sets. Identified shifts were analyzed as the magnitude of the three translational axes.

Results: The mean vector agreement with the baseline is higher for the prostate cases than the GYN cases and there is more variability for the GYN cases. For GYN cases, the Gage R&R was 87.7% and 85.9% for beginner and expert, respectively. For prostate cases (with outlier removed), the Gage R&R was 86.9% and 26.2% for beginner and expert, respectively.

Conclusions: We conclude that different level therapists cannot be distinguished for matching GYN cases. This implies that additional efforts on training alone may not help improve the process of bony anatomy image matching for the pelvis. Equipment improvements may be necessary.