In prostate implants, random variations on the order of 0 to 10 mm from the planned seed locations have been observed. The seed activity has also been found to vary (e.g. up to $\pm 8\%$ for ¹²⁵I seeds) from seedto-seed and from the nominal value supplied by seed manufacturers. In this work, the dosimetric effects of random variations in seed activity and locations were examined for prostate seed implants. Dosimetry quality indicators were calculated for 18 idealized implants with various implant characteristics and for 5 pre-plans of actual patients. For each of the 23 configurations, source strengths were allowed to vary randomly from -10% to +10% of the nominal value. Samples of 200 dose distributions for each of the 23 configurations, a total of 4600 dose distributions, were calculated. Even though the average source strength was the same as the nominal, the average minimum target dose in the samples was observed to be lower from the prescribed value by 2% and 3% for ¹²⁵I and ¹⁰³Pd, respectively, with maximum under-dosage of 7% and 8%, respectively. Similarly, the source locations were allowed to vary randomly, from 0 to 2 mm from the ideal locations. The effect of under-dosage was much more pronounced: the average minimum target dose decreased by 10% and 14% for ¹²⁵I and ¹⁰³Pd, respectively, with maximum under-dosage of 22% and 28%, respectively. We concluded that random variations in activity are less important compared to seed location variations in ¹²⁵I and ¹⁰³Pd prostate seed implant.