Purpose: To describe results from our comprehensive incident learning system gained over 4 years.

Methods: An incident learning system specifically tailored to a radiation treatment program and based on published principles was implemented in our large academic cancer centre in late 2006. In the adopted system, every incident, whether or not there is a resulting direct impact on a patient treatment, is recorded, investigated to determine basic causes and strategies developed to correct system weaknesses. Our centre operates 10 megavolt accelerators and treats nearly 4,000 patients per year. Incidents are categorized into one of 5 types and classified according to 4 levels of severity. Interventions introduced as part of the learning from these reports have included changes in staffing levels in more vulnerable areas and several human factor error reduction strategies.

Results: Our data are derived from a total of 2,221 incidents reported during the four years of operation, with 98.1% classified as either minor or potential. Of the actual incidents reported, we have seen a significant decline from 117 in 2007 to 84, 62 and 52 in the subsequent three years (chi-squared non-parametric test). The actual incident rate at the point of treatment delivery has decreased from 0.095% in 2006 to 0.022% in 2010. During this period, the system provided rapid feedback to monitor several new initiatives including a new external beam treatment planning system, three different types of image guidance hardware and software and several new techniques such as stereotactic body radiosurgery and volumetric modulated arc therapy.

Conclusions: We report a sustained significant increase in the safety of treatment through the use of root cause analysis. Our results indicate that an effective incident learning system implementation will strongly encourage the reporting of potential incidents as a proactive means of enhancing safety and quality.