

**Purpose** The failure mode effect analysis (FMEA) tool was customized for use in radiation oncology practice. The creation of systematic tables to classify severity, occurrence probability, and detection probability enhances the ability of the FMEA tool to minimize errors and, more importantly, their effect. Changes were made to an existing quality management program based upon an application of the customized radiation oncology FMEA (ROFMEA). **Methods** An existing quality assurance program included documentation of all treatment variances in a Radiation Oncology department. All variances occurring from 2000 through 2005 were analyzed. Variances were scored in the three categories used in a FMEA; the potential harm that could have been caused if the initial error had not been detected, how often this type of error occurred, and the probability of this type of error occurring and not being detected. Data analysis led to the creation of systematic tables specific to Radiation Oncology for scoring each of these three categories. The tables were applied during an FMEA of the prescription, planning and treatment processes. **Results** The results of a preliminary application of the FMEA tool in Radiation Oncology were limited due to a lack of terminological and classification precision which led members to score the potential severity of any error high. In contrast, application of the ROFMEA tool identified weaknesses in the planning process which had potential to cause the most harm, and resulted in modifications of the process. **Conclusions** More so than other medical disciplines, Radiation Oncology lends itself to a logical systematic application of the FMEA process. Application of the customized ROFMEA tables will allow staff to identify those parts of a process which have the greatest probability of causing harm to a patient. Evidence-based safe practices achieved from ROFMEA ally to target practice quality improvement