PITSTOP: Process Improvement Techniques, Software Tools, and Operating Principles for a Quality Initiative Discovery Framework

Innovation/Impact: Most incident learning systems analyze single or related incidents, but our framework also determines underlying common causes of seemingly unrelated incidents. Such issues can be discovered via data mining techniques. Our framework handles not only major incidents but also the collection of all process deviations.

Methods and Materials: Process deviations are entered into a radiotherapy incident reporting database. Supervisors use an in-house Event Analysis System (EASy) to discuss incidents with staff. Major incidents are analyzed with an in-house Fault Tree Analysis (FTA) system to identify root causes and evaluate the effectiveness of proposed mitigations. In addition, a meta-Analysis is performed using association, text mining and key word clustering, and differential frequency analysis. A key operating principle encourages the creation of forcing functions via rapid application development. Other operating principles are based on a culture of safety and quality.

Results and Discussion: 504 events have been logged this past year. Fig. 1 shows the FTA for a dose related event and a screen shot of EASy. The results for the key word analysis are shown in Fig. 2A. The root cause for the top ranked key words was miscommunication. This was also the root cause found from association analysis, where 24% of the time that an event involved a physician it also involved a nurse. In Fig. 2B, the sharp peaks at week 27 were followed by 3 major incidents, two of which were dose related. The peak was largely due to the front desk which caused distractions in other areas. The analysis led to many PI projects but there is still a major systematic issue with the use of forms. The solution we identified is to implement Smart Forms to perform error checking and interlocking. Our first initiative replaced our daily QA checklist. Fig. 2C shows custom validation routines, preventing therapists from proceeding with treatments until out of tolerance conditions are corrected. It is a windows 7 tablet database application implemented using Visual Studio Lightswitch. Once this gains acceptance and the design matures, other forms in the department will be converted, with the image request form being the next one. Conclusion: PITSTOP has increased the number of quality initiatives in our department, and we have discovered or confirmed common underlying causes of a variety of seemingly unrelated errors. It has motivated the replacement of all forms with smart forms.