AbstractID: 4507 Title: Error analysis/reduction philosophy/theory

The purpose of this presentation is to discuss the philosophy and theory of error analysis and reduction. This talk will be equal parts conveyance of technical information and provocation to action on the important issue of medical errors. Although a somewhat obvious connection, we begin by providing a sound framework that relates errors and quality assurance. The scope of technical information within this presentation will be an attempt to wade through the myriad of theories and philosophy related to errors and quality, much of which is new to our field. For example, the JCAHO Lexicon describes quality as, "Designing a product or service as well as controlling its production so well that quality is inevitable." What does it actually mean to *control* a product or service? This will be described. The leadership of the AAPM has taken the ambitious step to change the emphasis of quality assurance from simply checking specifications to investigating processes via the new quality assurance task group (TG100). This is a significant and necessary paradigm shift in our approach to medical errors and quality that deserves a detailed discussion. An understanding of how to reduce errors and improve quality begins with an appreciation of two realities: 1) everything we do involves a process, and 2) every process has unavoidable variation. If one controls variation in a process, then one will reduce errors and improve quality. The implementation of process identification and control to clinical practice will be discussed in detail and by example where appropriate. Furthermore, there is a significant history of error reduction and quality research and this context will be maintained throughout the presentation. In addition to specific techniques of error analysis and reduction such as failure modes and effects analysis (FMEA), root cause analysis (RCA), pareto charts, fishbone diagrams and statistical process control (SPC) we will discuss the philosophies of define, measure, analyze, improve, control (DMAIC) and total quality management by the six-sigma approach.

Error analysis and reduction (and quality assurance in general) are built on a mature body of research from other fields. There is much work to do toward implementing these techniques in radiotherapy practices to minimize errors and optimize quality. There are no turn-key solutions to quality. As will be described, the business world has become fanatical about quality to stay competitive. Why should the medical world be any different with our patients' well-being at stake? Medical physicists, above anyone else in the typical department, have the analytical ability to understand and implement these techniques. We must accept the challenge and as a first step, future AAPM meetings should have a research session specific for quality, error analysis/reduction and cost analysis/reduction.