AbstractID: 2647 Title: Medical Errors and Medical Physics

This session will be devoted to the occurrence of medical errors, approaches to error reduction and implications for the practice of medical physics. A background on errors in medicine through the Institute of Medicine reports and some more specific examples in medical physics will overview the critical nature of our responsibility to quality patient care. Medical errors occur for many reasons and as clinical medical physicists, we are responsible for discharging duties in imaging and therapeutic procedures that directly impact the quality of patient care. We have fiduciary responsibility to be properly trained and prepared to carry out these critical tasks.
Even under the best circumstances, errors occur. The three speakers will review errors in radiotherapy in detail, discuss approaches to patient safety and error reduction, including government and regulatory oversight, and applications and implications for medical physics training and practice, again with specific examples to highlight importance.

Errors in medical settings crashed into the forefront with the release in 1999 of the Institute of Medicine's report, 'To Error is Human' in which they give the estimate that up to 98,000 patients a year die because of errors in their healthcare delivery. After a slow start, healthcare providers are making great progress in improving the situation. Much of improvement follows application of techniques in error reduction that have proven effective in industries that require high reliability, such as aviation. Even so, differences in the nature of the work necessitate adaptation of the techniques to the clinical setting. The following observations follow from studies of errors that have occurred in radiotherapy: 1. While particular failures in medicine differ, the nature of the error parallel those in industry; 2. Errors don't happen from a single cause, but are surrounded by complicating situations and enabling factors; 3. Errors are often surrounded by indicators of things going wrong that are ignored; 4. Errors often follow violations in protocols; 5. Errors often occur with new procedures, variations on common procedures, or following hand-offs; 6. Equipment design often creates situations likely to lead to failures; 7. Lack of information, either from lack of training or information not being passed, plays a significant role in most events; 8. Persons involved often react to what they expect to be happening rather than what is actually happening; 9. Distraction and rushing due to pressure and other assignments often plays a critical role; and 10. Communication between parties often leads to erroneous actions. Most of these are not startling, but solutions that seem obvious often fail to correct underlying situations. The Joint Commission has made many error-reduction methods requirements for accreditation of healthcare providers. Applications of error prevention techniques will be discussed.

Quantitative risk analysis in radiation therapy can be performed and subsequently integrated into clinical operations. Many reports in the medical and popular press over the last several years have heightened the public's awareness of the risks they are exposed to when interacting with a health care system. In the radiation therapy community, we have learned of many major incidents involving multiple patients, occurring across the world. While quality assurance and quality control are reasonably well developed in radiation therapy, these and other operational issues are generally not firmly anchored to a risk analysis and management framework. Risk can be defined as some combination of the probability and consequence of an undesired outcome. To gain further insight into the probability component, we have concentrated on the development of a fault tree, similar to that previously applied to brachytherapy, and have shown that it is able to accommodate the external beam radiation therapy errors reported to date. The fault tree is based on a system map for radiation therapy but its major branches are applicable to other areas of medicine. It is apparent from our fault tree based analysis that the various error reports and databases available do not paint a consistent picture of the origins of serious misadministrations in radiation therapy. The Equivalent Uniform Dose is proposed as a suitable consequence metric, capturing, as it does, both dose and volume elements of a correct or incorrect treatment. The fault tree and consequence framework developed can be linked to operational and resource allocation decisions. These include such items as specific identification of responsibilities within a radiation treatment program, quality assurance measures and incident reporting. As risk management and quality management are different facets of the same issues, efforts to reduce risks to patients will lead to improved quality in routine radiation therapy activities. Following a review of common approaches to error analysis in medicine, a fault tree and consequence metric for use in radiation therapy are proposed. The value of this type of risk analysis approach to operational risk management activities is explored in detail. With a generic and structured approach to the quantification of errors in radiation therapy, it is possible to configure operational components of a clinical program so that risks to the patient and delivery organization are managed.

The session will end with a discussion of these critical issues with the audience.

Objectives:

1. To understand the nature of errors that have occurred in radiotherapy;
2. To understand how knowing the nature of errors can lead to remedial actions; and
3. To learn what the Joint commission on Accreditation of Healthcare Organizations has been doing to improve patient safety.
4. To understand the direct implications on the training and practice of medical physicists
5. To understand the application of quantitative risk analysis of medical errors.