# AbstractID: 4515 Title: The application of error reduction QA philosophy in HDR brachytherapy

Routine quality assurance (QA) in brachytherapy developed quickly through the 1990s, and fairly standard practices became common. The reports of Task Groups 40, 56 and 59 established formalized, accepted standards for QA in brachytherapy, and textbooks covered QA procedures in detail (1). Why, with a solid understanding of QA procedures, were there still many reported brachytherapy medical events, and likely many more unreported or unrecognized? A review of such events (2) notes that for many cases, the facility had QA procedures in place, but they were ineffectual because they either did not cover the situations that evolved or, often, simply were not performed, frequently because of time constraints.

Current high dose-rate (HDR) brachytherapy QA focuses heavily on equipment and instrumentation. Very few events resulted from errors in the equipment (although, equipment failures often set the stage), due in part to the extremely high reliability built into the devices and, possibly in part, because of the attention paid to equipment QA by the medical physicists. A soon to be released report from the International Atomic Energy Agency will note that the greatest danger in radiotherapy is not equipment malfunctions but the human activities related to the procedures. (3)

Much of the current QA for HDR brachytherapy stems from regulations of the Nuclear Regulatory Commission. Some of the regulations expend effort with little expected return. For example, daily QA requires a check of the door interlock at the room entrance. For many facilities, the operator has the door in clear view during treatments; the probability of a person trying to enter the room during a treatment with a failure of the interlock becomes vanishingly small. With each new source, the length and function of transfer tubes and applicators must be checked. Most of these instruments cannot change their length, and the functioning would be (and should be) determined at each use. Measuring exposure readings outside the HDR room with each source change wastes time. Such requirements divert resources from useful activities.

The new paradigm for QA first assesses all the possible ways things can go wrong (and the list is a long one), rating the likelihood of occurrence, and severity of the result if it does happen, and the probability of detecting the failure before it propagates into the event. These ranking provide the priorities for allocating resources for activities to prevent failures This process will naturally place a greater emphasis on the human role in the procedures.


(1) e.g. BR Thomadsen *Achieving Quality in Brachytherapy* [Bristol, IOP Press 2000]

(2) B Thomadsen, S-W Lin, P Laemmrich, T Waller , A Cheng, B Caldwell, R Rankin, J Stitt. Analysis of Treatment Delivery Errors in Brachytherapy Using Formal Risk Analysis Techniques. *Int J Radiat Oncol Biol Phys* **57**: 1492 – 1508 (2003).

(3) IAEA Techdoc, *Case studies in the application of probabilistic safety assessment techniques to radiation sources.* [Vienna, IAEA In press].


Learning objectives: To understand

1. The problem with the current QA paradigm, and
2. The advantage of the new paradigm.