POINT/COUNTERPOINT

Suggestions for topics suitable for these Point/Counterpoint debates should be addressed to Colin G. Orton, Professor Emeritus, Wayne State University, Detroit: ortonc@comcast.net. Persons participating in Point/Counterpoint discussions are selected for their knowledge and communicative skill. Their positions for or against a proposition may or may not reflect their personal opinions or the positions of their employers.

Radiation therapists should not have to wear personnel dosimetry badges

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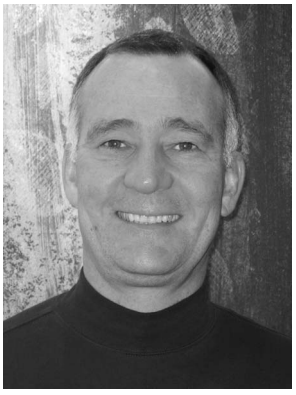
OVERVIEW

Most radiation therapists work outside treatment rooms which are heavily shielded. Their personnel dosimetry badges typically indicate that they have received minimal radiation exposures, yet they are still required to wear these badges. Consequently, it has been suggested that radiation therapists should not be required to wear personnel dosimetry badges, and this is the premise debated in this month's Point/Counterpoint.



Arguing for the Proposition is Scott Dube, M.S. Mr. Dube received his M.S. degree in Radiological Sciences from the University of Colorado in 1979. Subsequently he worked for Rocky Mountain Medical Physics, Mid-Pacific Medical Physics, Northwest Medical Physics Center, and The Queen's Medical Center in Honolulu. In 2006, he became the solo physicist at Queen of the Valley Medical Center in Napa, CA. Mr. Dube is certified by the American Board of Radiology in Diagnostic Radiologic Physics, Medical Nuclear Physics, and Therapeutic Radiologic Physics. In the AAPM, he has served as a member of the Clinical Practice and Professional and Public Relations Committees.

Arguing against the Proposition is R. Paul King, M.S. Mr. King earned degrees in Medical Physics and Electrical Engineering from the University of Florida and is nearing completion of a degree in Health Administration at the University of Southern Mississippi. He has worked in diverse settings in Florida, California, and Texas, and is currently Chief Physicist and RSO at the Anderson Regional Medical Center, Meridian, Mississippi. He is certified in Therapeutic Radiologic Physics by the ABR and has served on the Biological Effects Committee of the AAPM.

FOR THE PROPOSITION: Scott Dube, M.S.

Opening Statement

I would like to first address the question whether radiation therapists are or are not currently *required* to wear personnel dosimetry badges. Unfortunately, the answer varies from state to state. So let me address the question in general by turning to the gold standard of radiation protection regulations, namely, the Suggested State Regulations for Control of Radiation as developed by the Conference of Radiation Control Program Directors (CRCPD).[1] The pertinent sections include the following:

(1) Section D.1502.a.1 states that badges are required for individuals likely to exceed 10% of the annual limit.

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Response: It has been my experience that radiation therapists receive much less than 10% of the annual limit. Certainly they must wear badges if their exposure history indicates otherwise. But the majority of therapists work in heavily shielded control areas with minimal exposure levels. Therefore, badges are *not* required.

(2) Section D.1502.a.iv states that badges are required for individuals entering a high or very high radiation area.

Response: Radiation therapists do not enter a high or very high radiation area. They wait until the beam is terminated before entering the room. Therefore, badges are not required.

So we have established that badges are not required. Next, let us consider why others have recommended that radiation monitoring badges be provided to radiation therapists.

(1) The badge provides evidence of null exposure.

Response: A comprehensive area survey is always conducted for each new linear accelerator to determine exposure levels in the environs. Also, the best practice is to install area monitors for six months to document exposure levels at pertinent locations. These data provide all the documentation necessary to prove that there is a low exposure environment.

(2) The badge will provide exposure data in the unlikely event that a therapist is present in the linear accelerator room when the beam is energized.

Response: The exposure to the individual can be easily determined using the beam parameters documented in the Record/Verify system and the recollection of the incident by the exposed individual. Phantom measurements with appropriate instrumentation can provide an accurate estimation of the exposure.

(3) Badge data are better than historic area survey results or event specific dosimetry should the individual bring a lawsuit against the hospital for untoward effects.

Response: I doubt this is true but I admit that this could be a valid point.

Finally, let us consider the reasons why I advocate not providing badges to radiation therapists.

(1) There is a savings (admittedly small) in the cost to provide badges.

(2) There is a savings (again, admittedly small) in the effort to manage the badge program.

(3) Reason dictates that there is no benefit served by providing a badge. If anything, there is a detriment in that it sends the message that there is likely danger in working around a linear accelerator. This is simply not true, especially since physicists always employ the ALARA principle.

AGAINST THE PROPOSITION: R. Paul King, M.S.

Opening Statement

Seeking improved efficiency in the management of healthcare organizations, industry leaders sometimes turn to manufacturing practices such as the Toyota lean philosophy, with its emphasis on the elimination of practices that do not create value for the customer.[2,3] The question of whether radiotherapists should wear dosimetry badges is related to the development of a lean process. In managing a radiation protection program, we benefit three customers. The first is our society, which values demonstrable safety in the workplace. The second is our institution, which values its reputation in the marketplace. The third is our employees, who value protection from radiogenic illness and who look to us to provide that protection. By requiring that radiotherapists use personnel dosimetry badges, we serve each of these customers.

Because they think it to be important, policymakers require that we individually measure occupational doses received by those we either expect may receive a large dose or who work in areas where high dose rates occur.[4] Though it does not protect in the same way as a concrete shield, a radiation dosimetry badge is crucial to a radiation protection program and protects against radiation in the way that a speedometer protects against speeding tickets; enabling correction by indicating problems when they exist. Legalistic arguments might be made that we need not monitor radiation therapists because they are unlikely to occupy a high radiation area concurrent with the radiation. While this may arguably meet the letter of the requirement, society's interest is better served when we meet both the requirement's letter and its spirit.

This serves the institution's interest as well. Seeking ways around the requirement may draw unwelcome scrutiny. Any expense saved on dosimetry badges could be offset by the value lost in tarnishing the organization's reputation. Healthcare organizations spend great sums to build and protect their reputations.[5] Dosimetry monitors inexpensively demonstrate an organization's commitment to safety, both for its employees and the community. The value of a radiation protection program's reputation becomes apparent when there is an adverse event, misadministration, or violation. Regulators often approach an event quite differently in the context of an institution that "does the right thing" than one that "gets away with what it can."

The value of individual measurement to a therapist can be confusing because it differs from that of a radiographer. In contrast to diagnostic radiographers, for whom nontrivial doses are routine, radiotherapists normally receive inconsequential doses which, even if doubled, would remain inconsequential. A radiographer's dose can escalate slowly and, if it doubled, could become quite significant. For therapists, the greater concern is for an anomalous high-dose accident. Conditions that might produce an accidental overexposure might put the radiotherapist at risk of a second overexposure if the accident is not recognized and corrective actions are not taken. Preventing this second accident is the main goal of radiation monitoring. That such exposures are rare does not mean that measurement lacks value. Rather, it documents the ongoing adequacy of existing radiation control practices in radiotherapy.

Rebuttal: Scott Dube, M.S.

This debate actually began in November 2009 in the medphys listserver (medphys@lists.wayne.edu). There was such a lively exchange that my opponent and I were asked to participate in this Point/Counterpoint.

My motive for suggesting that therapists should not have to be provided badges had little to do with cost. I acknowledge that this would be unjustified. Rather, it is largely because I abhor giving into fear, such as fear of radiation, fear of repudiation, and fear of litigation.

Let me go back to the fundamental question as to whether badges should be required. To help me adequately address this question, I sent a copy of my Opening Statement to the CRCPD, as well as all 50 State Program Directors, and asked whether radiation therapists do, in fact, enter a high radiation area.

The CRCPD did not reply officially but I did hear from 11 directors. Some said therapists must wear badges without explaining why. Others said therapists may be required to enter the linear accelerator room while the beam is on during an emergency, and hence there is the potential for inadvertent exposure; therefore, badges *are* required. Only one said (unofficially) that badges should not be necessary since accelerators are controlled from outside the room and automatic shut-off systems are adequate.

It seems that the majority opinion is that the principle of providing badges only to those who are *likely* to exceed 10% of the annual limit does not apply to therapists. Rather, it is essential for therapists to be badged because of the *highly unlikely possibility* of an exposure that exceeds 10% of the annual limit if the therapist has to enter the treatment room during an emergency.

It is hard for me to argue against this so, in the end, I have to concede. Radiation safety policy generally errs on the side of safety for all the reasons my opponent has discussed. The linear-no-threshold model is a good example.[6] This is prudent given the pervasive fear of radiation held by so many. The recent articles in the New York Times only fuel that emotion. Certainly, the provision of a personnel monitor to a radiation therapist is a small but worthwhile act to alleviate that fear.

Rebuttal: R. Paul King, M.S.

My colleague is concerned that, by requiring radiotherapists to wear film badges, we send the message that a medical linear accelerator is dangerous to operate. I agree that, because ours is a leadership role, we must be cognizant of the messages that we send; both explicit messages and implicit. However, I contend that any message of danger that we communicate by issuing a dosimetry badge is both correct and helpful. Consider that the Clinac iX vendor's Safety Guide provides the following statements and instruction:[7]

(1) "The Clinac can produce a lethal radiation dose in a very short time."

(2) "Radiation exposure can cause serious illness or death, though not instantaneously."

(3) "When working on or near the machine, wear radiation monitoring devices approved by the cognizant (sic) regulatory agency."

This manufacturer sends the clear, and I contend, accurate message that the radiation produced by a linear accelerator introduces a measure of danger into its operation. In guiding the attitudes and directing the habits of radiation therapists, we should nurture their healthy respect for this danger.

Commonly encountered attitudes toward occupational radiation exposure span a continuum from "unreasoning anxiety," through "healthy respect," and into "disdainful contempt." If the goal of withholding dosimetry badges from radiotherapists is to temper an unreasoning anxiety into healthy respect, then the merits of this goal are clear. However, the greater risk is that this policy might corrode a healthy respect for the danger inherent to the delivery of therapeutic radiation into disdainful contempt. Returning to our automotive analogy, we need radiation therapists to exhibit some of the characteristics of long-haul truckers; to be attentive, calm, alert, and confident. If they are white-knuckled, sweating, and afraid of the road, they will be unsafe. But while we want them to be calm and confident, they must be neither so calm nor so confident as to fall asleep.

[1]http://www.crcpd.org/ssrcr.aspx
[2]"Going Lean in Healthcare," White Paper produced by the Institute for Healthcare Improvement, Cambridge, MA, 2005.
[3]S. E. Endsley, M. K. Magill, and M. M. Godfrey, "Creating a lean practice," Family Practice Management **34**(4), 34–38 (2006).
[4]Regulations for Control of Radiation in Mississippi, Section 400.18, Mississippi Department of Health, 2009.
[5]P. Kotler, J. Shalowitz, and R. J. Stevens, *Strategic Marketing for Health Care Organizations* (Jossey-Bass, San Francisco, 2008), pp. 382–383.
[6]C. J. Martin, "The LNT model provides the best approach for practical implementation of radiation protection," Br. J. Radiol. **78**, 14–16 (2005).
[7]Clinac Safety Guide, Clinac iX, C-Series Clinac, Silhouette Edition (Varian Medical Systems, Palo Alto, CA, 2006).