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Research Article

# A Culture of Safety? An International Comparison of Radiation Therapists' Error Reporting

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## ABSTRACT

**Background:** The process of radiation therapy planning and delivery is increasing in complexity, and errors that occur can have serious repercussions for patients. Many radiation therapy departments use incident learning systems (ILSs) to report, analyze, and learn from errors. The success of an ILS relies on a nonpunitive workplace culture in which practitioners are comfortable reporting errors. This study examines the error reporting culture of radiation therapists and dosimetrists in Canada and the United States.

**Methods:** A survey assessing perceptions regarding communication among staff, comfort in error reporting, and associated obstacles was mailed to a national sample of 1,500 radiation therapists and 528 dosimetrists in the United States. A similar survey was sent electronically to 1,500 Canadian radiation therapists, and the results from both surveys were compared and summarized using descriptive statistics.

**Results:** The quality of communication between radiation therapists and physicians, physicists, and administrators is good in both countries, but there are differences between the three groups, with administrators ranked lowest. There was better perceived communication between radiation therapists, physicians, and physicists in the US cohort. Both cohorts felt they had opportunities to speak to physicians, physicists, and administrators, but the US cohort felt they had better opportunities than the Canadians. Most respondents felt there was a system for reporting errors in their departments, but this was higher in the Canadian group (88% in the United States, 98% in Canada). The majority of respondents felt that they were encouraged and felt comfortable to report errors in the clinic, and this result was significantly higher in the Canadian group. The majority of respondents felt that they had not been reprimanded for reporting an error; more people reported knowing of other staff being reprimanded rather than themselves. The largest obstacles to error reporting in both cohorts were fear of reprimand, poor communication, and hierarchy.

**Conclusions:** The majority of staff in both countries feel that communication in their department is good and that there are adequate systems for error reporting. However, a number of respondents felt that they, or a colleague, had been reprimanded in the past, and there are still perceived barriers to the use of an ILS. There is still work to do on improving positive perceptions of error reporting and departmental communication.

## RESUMÈ

**Contexte :** Le processus de planification et d'administration des traitements de radiothérapie devient de plus en plus complexe et les erreurs qui surviennent peuvent avoir de graves conséquences pour les patients. De nombreux services de radiothérapie utilisent un système de rapports sur les incidents (SRI) pour signaler les erreurs, les analyser et en tirer des enseignements. Le succès d'un SRI repose sur une culture non punitive dans le milieu de travail, dans laquelle les praticiens n'hésitent pas à signaler les erreurs. Cette étude examine la culture de signalement des erreurs chez les radiothérapeutes et dosimétristes au Canada et aux États-Unis.

**Méthodologie :** Un sondage visant à évaluer les perceptions concernant les communications entre les membres du personnel, l'aisance face au signalement des erreurs et les obstacles connexes a été distribué par la poste à un échantillon national de 1 500 radiothérapeutes. Les résultats des deux sondages ont été comparés et résumés à l'aide de la statistique descriptive.

**Résultats :** La qualité des communications entre les radiothérapeutes, les médecins, les physiciens et les administrateurs est bonne dans les

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deux pays, mais il existe des différences entre les trois groupes, les administrateurs se classant les plus bas. Les communications entre les radiothérapeutes, les médecins et les physiciens sont perçues comme meilleures au sein de la cohorte américaine. Les deux cohortes croient avoir la possibilité de discuter avec les médecins, les physiciens et les administrateurs, mais les répondants américains croient avoir de meilleures possibilités de communication que les Canadiens. La plupart des répondants pensent qu'un système de signalement des erreurs existe dans leur service, et cette proportion est plus élevée au Canada (98 %) qu'aux États-Unis (88 %). La majorité des répondants se sent encouragée à signaler les erreurs et à l'aise de le faire, un résultat significativement plus élevé chez les répondants canadiens. La majorité des répondants dit ne pas avoir été réprimandée pour avoir signalé une erreur; un nombre plus élevé de répondants disent connaître d'autres employés ayant reçu une réprimande qu'eux-mêmes. Dans les deux cohortes, les principaux obstacles au signalement des erreurs sont la crainte des réprimandes, les mauvaises communications et la hiérarchie.

**Conclusions :** Dans les deux pays, la majorité des membres du personnel croit que la communication est bonne dans leur service et qu'un système adéquat est en place pour le signalement des erreurs. Cependant, un certain nombre de répondants croit qu'eux-mêmes ou des collègues ont été réprimandés dans le passé pour avoir signalé une erreur et qu'il existe toujours des obstacles à l'utilisation d'un SRI. Il reste du travail à faire pour améliorer la perception positive du signalement des erreurs et les communications au sein des services.

*Keywords:* Radiation therapy; errors; quality assurance

## Background and Purpose

Radiation therapy involves a complex, multistep process of planning and delivering treatment using the expertise of an interprofessional team. Radiation therapy quality assurance (QA) is a key element of departmental practice and has been defined by the World Health Organization as "all procedures that ensure consistency of the medical prescription, and safe fulfillment of that prescription, as regards to the dose to the target volume, together with minimal dose to normal tissue, minimal exposure of personnel and adequate patient monitoring aimed at determining the end result of treatment" [1]. Errors in radiation therapy occur rarely, but when they do occur they can cause significant negative consequences for the patient that can include permanent injury or even death [2]. Serious error rates have been estimated at approximately 0.2% per patient [1, 3], which are comparable with rates in chemotherapy but higher than other areas of medicine such as transfusion and anesthesia [4]. Some of the most common causes of radiotherapy errors reported in the literature are poor communication [5] and ineffective transfer of essential information [6]. In the United States, a series of articles in the *New York Times* in 2010 focused public attention on the issue of radiation therapy errors [7]. Problems highlighted in the articles included the use of new equipment before safety protocols are established, lack of training, insufficient staffing, software errors, inadequate oversight, and lack of error reporting.

There has been recent significant work in Canada to develop national QA standards for radiation therapy focusing on programmatic organization, competence and training of personnel, equipment quality control, and department policies through the Canadian Partnership for Quality Radiotherapy (CPQR) [8].

The detection and reporting of errors are critical components of patient safety and QA. Lessons from effective learning and improved safety from error reporting systems in aviation and the nuclear power industry have been applied to radiation therapy [9]. These systems are commonly called incident learning systems (ILSs) and can be departmental, provincial, national, or international. An ILS is predicated on the idea that "safety in a complex operation over a period of time is a function of number of incidents identified, number of incidents reported, quality of investigation and analysis of reported incidents, the effectiveness of corrective actions, and the amount of organizational learning that accumulates" [10]. Local or departmental systems have been shown to significantly reduce error rates [11] and help standardize processes and improve efficiencies [4].

International ILSs are in place in Europe such as the Radiation Oncology Safety Information System, which was launched in 2001 by the European Society for Therapeutic Radiology and Oncology [12], and the International Atomic Energy Agency's Safety in Radiation Oncology ILS, which was started in 2013 [13]. To date, there are no national or international North American systems, although CPQR is currently collaborating with the Canadian Institute for Health Information [14] on a system called the National System for Incident Reporting for Radiation Therapy. In the United States, the Radiation Oncology Incident Learning System is in development; it is sponsored by the American Society for Radiation Oncology (ASTRO) and the American Association of Physicists in Medicine [15].

Radiation therapists have a unique role and responsibility to identify, report, and, at times, correct errors related to planning and treatment [16]. Errors can occur at any point in the radiation therapy pathway, but error detection is more likely at the treatment stage by the radiation therapist [17]. This willingness to report using an ILS relies on a workplace environment that is nonpunitive and encourages transparency in error reporting [18]. This environment can be described as a "culture of safety" wherein all members of the team are aware of the possibilities of harm and can work together to mitigate them [19].

A review of the literature indicated that there were no identified Canadian studies that investigated the willingness of Canadian therapists to report errors. However, a recent survey from the United States revealed the most significant barriers to reporting were a fear of reprimand, hierarchical structure, and poor interprofessional communication [20].