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A nationwide investigation of radiation therapy event reporting-andlearning systems: Can standards be improved?

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ABSTRACT

Introduction: Variation exists between event reporting-and-learning systems utilised in radiation therapy. Due to the impact of errors associated with this field of medicine, evidence-based and rigorous systems are imperative. The implementation of such systems facilitates the reactive enhancement of patient safety following an event. The purpose of this study was to evaluate Irish event reporting-and-learning procedures against the current literature using a developed evidence-based process map, and to propose recommendations as to how the national standard could be improved.

Methods: Radiation Therapy Service Managers of all Irish radiation therapy institutions (n = 12) were invited to participate in an anonymous online questionnaire. Included in the questionnaire was a reporting-and-learning process map developed from evidence-based literature, which was used to assess the institution's practice through the use of vignettes. Frequency analysis of closed-ended questions and thematic analysis of open-ended questions was performed to assess the data.

Results: A 91.7% response rate was achieved. The following areas were found to have the most variation with the evidence-based process map: event classification, external reporting, and dissemination of lessons-learned to a wider audience. Recommendations to standardise practice were made.

Conclusion: Opportunities for improvement exist within event reporting-and-learning systems of Irish radiation therapy institutions and recommendations have been made on these. These findings can provide learning for other countries with similar reporting systems.

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Introduction

The rapid rate of advancements in radiation therapy (RT) practices and the continuing increase in cancer incidence worldwide will likely lead to a future increased potential for error.^{1,2} Reportingand-learning systems are implemented within RT as a means to reactively learn from incidents and near-misses, thereby minimising risk and promoting patient safety.^{3–8} These systems consist of a sequence of steps taken in the aftermath of an incident or nearmiss. The pathway can be divided into the following stages: reporting, investigation, causal analysis, corrective action, and feedback-and-learning.⁵ The European risk management project, ACCIRAD, identified a large variation among the systems in RT.⁹ While the principle stages outlined above are consistent throughout, the processes implemented within these stages vary.⁹ The Health Service Executive (HSE) of Ireland has defined the role

* Corresponding author. Discipline of Radiation Therapy, Trinity College Dublin, Trinity Building for Health Sciences, St James's Hospital Campus, Dublin 8, Ireland. *E-mail address:* barrets7@tcd.ie (S. Barrett). of reporting radiation incidents as "enhancing patient safety by learning from failures".¹⁰ Reporting and investigating alone, are not enough to reduce the risk inherent to RT. Distributing lessons-learned is an essential aspect of the process. European Union (EU) legislation states that reporting-and-learning systems must be used, and emphasises the importance of disseminating lessons-learned.¹¹

Although major/critical incidents are infrequent, their effect on the health of patients can be fatal.⁷ Minor incidents and nearmisses are much more common, and can potentially result in more serious incidents over time.^{1,12} Their management is equally as important as that of major incidents. Due to the large variety of event classification and reporting systems worldwide, the lack of conformity in the taxonomy used can stunt the potential benefits of event reporting.³ With increased uniformity in classification, reactive learning is more effective due to increased transferability of results.³ Throughout this study, the term "event" is used to include incidents and near-misses, as proposed by the European Commission.³

This study aims to identify the standard of reporting-andlearning procedures of Irish RT institutions by developing a

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process map outlining an evidence-based pathway and evaluating the level of conformity to this map using an anonymous questionnaire.

Methods

Ethical approval was granted by the School of Medicine Research Ethics Committee, Trinity College Dublin and by Saint Luke's Radiation Oncology Network's Research Management Committee.

Participant population

The Radiation Therapy Services Manager (RTSM) of each RT institution in the Republic of Ireland (n = 12) was invited to participate in an online anonymous questionnaire via email.

Process map and questionnaire development

A process map outlining an evidence-based event reportingand-learning pathway was developed (Fig. 1). The literature was identified through a systematic search of electronic databases (PubMed, Google, Google Scholar, Science Direct). The process map was then used as a guide to develop the questionnaire.

The anonymised questionnaire consisted of forty-six (openended and closed-ended) questions across three sections. Section 1 identified the demographic of the RT institution (size, public or private etc.), the event classification systems used and the event investigation team make-up. Section 2 was divided into three sections, each accompanied by a vignette describing a clinical event scenario. According to national taxonomy, scenario A outlined a critical incident (involving a 3 cm discrepancy between target volume and treated volume for eighteen of twenty-eight 1.8Gy fractions); scenario B was a minor incident (involving a bolus sheet not being used, as was planned, for four of twenty 2.25Gy fractions), while scenario C detailed a near-miss (involving a pretreatment administrative plan check being completed after the first fraction, with no changes being required afterwards).¹³ A set of questions followed each vignette establishing how each event would be managed -a risk matrix (Fig. 2) (based on a nationally designed matrix¹⁴) was designed and provided to assist with this. Section 3 gathered information regarding event reporting-andlearning systems with particular focus on the later stages of the process. The questionnaire was piloted and any identified issues were addressed.

Data analysis

Frequency analysis and descriptive statistics was performed for closed-ended questions. Thematic analysis, as outlined by Braun and Clarke,¹⁵ was employed for the data from open-ended questions. Frequency analysis of codes and themes was used when applicable.

Results

Six private and five public institutions participated in the study [91.7% response rate]. Six of the participating institutions had two



Figure 1. Sources used during process map development (European Commission^{3,19}; Cooke⁵; Health Service Executive^{10,25}; The Medical Exposure Radiation Unit¹³; Donaldson⁷; ACCIRAD⁹; American Society for Radiation Oncology³⁶; Ford et al.⁶; Mutic et al.¹⁶; Chang et al.²²; Clark et al.²⁷; Ganesh²⁸; Mahajan³⁴; Cooke et al.³⁹; Reporting and learning subgroup of the European Commission⁴⁵; Department of Health, State Government of Victoria⁴⁶).

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