Practical Radiation Oncology (2015) **xx**, xxx–xxx

practical radiation oncology
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Original Report

Factors associated with event reporting in the pediatric radiation oncology population using an electronic incident reporting system

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Received 3 March 2015; revised 7 May 2015; accepted 1 June 2015

Abstract

Purpose: Pediatric patients may receive complex treatment. In our department, an electronic incident reporting system (condition reporting system [CRS]) was developed and made available to all members.

Methods and materials: The CRS system is available on all departmental computers. Entered events are evaluated and graded by a supervisor as follows: "A"(dose deviation or patient harm), "B" (near miss), "C" (interruption in care process), or "D" (inconvenience). Data for pediatric patients for whom events were entered were reviewed retrospectively and compared to the entire treated pediatric population.

Results: Over 2 years, 503 pediatric patients received radiation therapy (median age 10.1 years; range, 0.5-18.8 years), and 592 pediatric CRS events were entered (9.8% of 6020 total institutional CRS entries). These concerned 275 patients with an average of 2.1 entries each; 59% (348) were graded as severity D, 39% (230) as C, 2% (14) as B, and none as A. Events were most commonly related to treatment process (32%, n = 188), followed by planning/dosimetry (19%, n = 109), anesthesia (15%, n = 86), scheduling/transport (13%, n = 73), and physics (10%, n = 62). Delays associated with events were ≤ 1 hour for most cases (83%, n = 474). Patient and treatment factors associated with CRS entry included total duration of radiation therapy, primary brain tumor, receipt of proton therapy, and receipt of double-scattered proton therapy. No significant differences were found based on age, sex, race, treatment intent (curative vs palliative), type of photon treatment (conformal vs intensity modulated radiation therapy vs arc), use of total body irradiation, or use of pencil beam scanning proton therapy.

Presented in part at the 56th Annual Meeting of the American Society for Radiation Oncology, San Francisco, California, September 14–17, 2014.
Conflicts of interest: None.

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http://dx.doi.org/10.1016/j.prro.2015.06.001

Conclusions: An incident reporting system is a widely used part of the safety culture at our institution, which treats one of the largest pediatric patient volumes in North America. Most pediatric CRS-reported events are of minor severity. Longer treatment course and use of new and complex technologies appear to increase the likelihood of a CRS event within the pediatric population, which supports the need for increased safety processes when new techniques are initiated.

Introduction

Pediatric patients requiring radiation therapy are a small and unique population. They constitute a population with diverse disease characteristics that may require diverse and complex types of treatment, including proton therapy, craniospinal irradiation, concurrent chemoradiation, and total body irradiation. In addition, many require general anesthesia or procedural support to tolerate daily treatments. A systematic understanding of processes specific to radiation oncology within this population is limited because the patient population is relatively small compared with the general population receiving radiation therapy; however, significant information can be gleaned from high-volume pediatric centers with diverse patient populations.

Over the most recent decade, significant positive efforts have gone into improving the safety culture within radiation oncology departments nationwide. Certain aspects of general radiation oncology practice, including rapid introduction of new technology, are recognized to potentially increase the risk of patient harm.[1] Efforts to introduce and promote safety culture are aimed at reducing the secrecy that may surround incidents and near misses that could generate learning,[2,3] as well as improving communication initiatives that may assist with identification of patient and other factors that increase risk of incurring harm.[4] Electronic reporting systems have been identified as an optimal method of openly reporting near misses, incidents, and errors.[2] In fact, use of systematic incident learning through electronic incident reporting systems has been found to encourage the reporting of incidents,[5] assist with identification of areas for improvement in patient safety, improve event communication, and improve identification of clinical areas that require process and safety improvements.[6,7] Such systems may also empower employees, a key factor that contributes to patient safety.[8]

Our center is a large, hospital-based department that treats, on average, more than 200 patients per day, with diverse available treatment modalities. In February 2011, an electronic condition reporting system (CRS) was developed and made available to all departmental members, with a goal of improving safety culture and maximizing safe practice through learning details of events or concerns that may occur.[9] The CRS tool was designed to meet several previously outlined goals, including easy reporting that proves meaningful to the reporter and can be used to promote system change.[10]

Our center is the sole provider of radiation therapy for a dedicated children's hospital and delivers treatment to one of the largest pediatric radiation oncology populations in North America. Multiple dedicated pediatric resources are available departmentally (pediatric general anesthesia, social work, nursing, clinical faculty, and child life support [CLS]). These characteristics make our institution well suited to evaluate conditions that may arise and impact care within the pediatric radiation oncology population. The study that follows is a systematic review of entered CRS events, performed with a goal of allowing improved understanding of factors associated with events that raise concern among staff.

Methods and materials

A dedicated Internet-based application for reporting conditions was developed internally within the department of radiation oncology.[9] It was made available on all departmental computers, both through unique icon and on a shared drive. Each member of the department was issued a unique login that allowed access to enter conditions at any time, and departmental members were instructed and reminded to enter any issues of concern (ranging from inconvenience to patient harm) into this system. Users were also instructed to communicate directly with a manager or supervisor with any urgent issues, in addition to using the CRS. Conditions are specifically defined within the department and within the CRS tool as "any variation or deviation from documented protocol or instructions, expected outcome, standard workflow, or what you think is right (ie, any concern)." The system requires users to provide the following information regarding the condition being entered: condition category (dropdown menu), condition title (free text), description (free text), action taken (free text), location (dropdown menu), treatment modality (dropdown menu), method of identification (dropdown menu), whether anyone was harmed (checklist), whether a delay in care resulted (radio buttons), the reporter's group/division, the reporter's name, and the name of the associated patient. Reporters have the ability to attach needed documents to the CRS system. Depending on complexity, the process of CRS entry requires less than 1 minute up to 5 minutes.

After condition entry, conditions are assigned to a supervisor within the department based on the reporter's group. Supervisors evaluate conditions and assign a grade of A (dose deviation or patient harm), B (near miss), C (interruption in care process), or D (inconvenience). All conditions of severity A or B are also entered into the