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Original Report

Interrater reliability of a near-miss risk index for incident learning systems in radiation oncology

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Abstract

Purpose: Tools for assessing the severity and risk of near-miss events in radiation oncology are few and needed. Recent work has described guidelines for the use of a 5-tier near-miss risk index (NMRI) for the classification of near-miss events. The purpose of this study was to assess the reliability of the NMRI among users in a radiation oncology department.

Methods and materials: Reliability of the NMRI was assessed using an online survey distributed to members of a radiation oncology department. The survey contained 70 events extracted from the department's incident learning system (ILS). Survey participants rated each event using the NMRI guidelines, reported their attendance to weekly ILS meetings (used as a surrogate for familiarity with the ILS), and indicated their familiarity with the radiation oncology workflow. Interrater reliability was determined using Krippendorff's alpha. Use of the NMRI to rate actual events during 5 weekly ILS meetings was also assessed and interrater reliability determined.

Results: Twenty-eight survey respondents represented a wide variety of care providers. Krippendorff's alpha was calculated for the whole respondent cohort to be 0.376, indicating fair agreement among raters. Respondents who had the most participation at ILS meetings (n = 4) had moderate agreement with an alpha of 0.501. Interestingly, there were significant differences in reliability and median NMRI scores between professions. NMRI use during weekly NMRI meetings (80 events rated), participants showed moderate reliability (alpha = 0.607).

Conclusions: Using the NMRI guidelines, raters from a wide variety of professions were able to assess the severity of near-miss incidents with fair agreement. Those experienced with the ILS showed better agreement, and higher agreement was seen during multidisciplinary ILS meetings. These data support the use the indices such as the NMRI for near-miss risk assessment in patient safety and prioritization of process improvements in radiation oncology.

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Introduction

As with other areas in medicine, the field of radiation oncology has developed increased interest in patient safety and quality improvement. With this interest has come the implementation of incident learning systems (ILS) across many radiation oncology practices throughout the United States and internationally. Guidelines for the development of ILS have been developed and advocated by the American Society for Radiation Oncology and the International Atomic Energy Agency.[1,2] In the United States, an ILS has been initiated by American Society for Radiation Oncology and the American Association of Physicists in Medicine in the form of the Radiation Oncology-ILS. Radiation Oncology-ILS allows any radiation oncology practice to submit patient safety events to an online database for multi-institutional tracking of events and process improvement.[3,4] Internationally, the safety in radiation oncology learning system supported by the International Atomic Energy Agency is available with similar objectives.[5]

The implementation of ILS has led to a change in the perception of patient safety from not only addressing events that reach patients, but also focusing on safety events that have the potential to cause harm, but are detected before reaching a patient (ie, near-miss events[3]). By collecting near-miss event data into ILS, cause-effect relationships can be garnered (eg, through failure modes and effects analysis, FMEA) and process improvements can be implemented to improve patient safety.[6]

Severity scoring systems for ILS have been developed in radiation oncology and other fields. Scoring allows prioritization of patient safety events and subsequent process improvements.[3,7,8] Published scoring systems, including the Agency for Healthcare Research and Quality (AHRQ) Harm Score and French Nuclear Safety Authority Scale, measure severity of events from near-miss/no direct patient harm up to direct patient harm and/or death. As attention toward quality and safety increases, the collection and analysis of near-miss events has increased in importance.[7] However, until recently, there have been limited tools to specifically assess the severity and/or risk of near-miss events. There is a wide spectrum of near-miss reports, from a wrong location almost treated to a minor issue of miscommunication. Having a reliable system to prioritize near-miss events is essential for extracting the most value from ILS programs. Recently, our group reported its experience with an ILS and proposed a Near-Miss Risk Index (NMRI) for the rating of near-miss events. A need was recognized to evaluate interobserver variability of the NMRI and is the basis of this study.[9]

Methods

ILS and NMRI design

The ILS at our institution has been previously described.[10] In the course of implementing our institutional ILS, a 5-tier severity system was devised to rate near-miss events.[9] Note that the "near-miss events" included here also encompass the concepts of "unsafe condition" or "process improvement" as described by AHRQ taxonomies.[6] Initially, the process was driven by group consensus and there were no formal guidelines.

Table 1 NMRI guidelines [a]

NMRI	Criteria
0 - No potential harm	Event does not pose downstream risk in workflow. or Event is not related to patient safety or quality of treatment.
1 - Mild potential harm	Event may enhance the risk of other downstream errors. or Event may cause emotional distress or inconvenience to patient with no clinical impact.
2 - Moderate potential harm	Event enhances the risk of other critical downstream errors. or Temporary pain or discomfort for patient. or Deviations from best practices, but with no obvious clinical impact.
3 - Severe potential harm	Limited barriers to prevention of problem or Event with potential clinical impact that is noncritical.
4 - Critical potential harm	Extremely limited barriers to prevention of problem. or Event with potentially critical clinical impact.

NMRI, near-miss risk index.
[a] See Ref. 9 for additional description and case examples.

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