ORIGINAL ARTICLE

Large-Scale Implementation of Structured Reporting of Adnexal Masses on Ultrasound

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Abstract

Purpose: The aim of this article is to describe the development and implementation of structured reporting of adnexal mass findings on pelvic ultrasound in a large integrated health care delivery system.

Methods: A structured reporting system that includes standardized terminology for describing adnexal masses on ultrasound was developed by a multidisciplinary team of radiologists, gynecologists, and gynecologic oncologists on the basis of literature review and internal data. The system uses a reporting template that requires radiologists to assign abnormal adnexal masses to one of five possible categories on the basis of standardized criteria: category 0, 1, 2, or 3 for masses <10 cm, to reflect increasing concern for malignancy, and category X for masses >10 cm. Unique predefined hashtags were linked to each category to enable electronic data extraction, and a hard stop feature was installed that prevents reports from being finalized without a category designation. In 2014, after a 3-month pilot study, large-scale implementation was supported by an educational campaign consisting of web-based conferences, e-mail announcements, and local presentations. Clinical management recommendations on the basis of category and other clinical factors were provided in a separate practice resource for clinicians.

Results: Analysis of adherence revealed that 93% of the approximately 12,000 reports describing abnormal adnexal masses in 2016 included category designations. Feedback from referring providers via an anonymous survey indicated high levels of satisfaction with reports.

Conclusions: Multidisciplinary collaboration and leveraging of technology enabled large-scale implementation of structured reporting with high levels of adherence among radiologists and improved satisfaction among referring providers.

Key Words: Structured reporting, ultrasound, adnexal, mass

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BACKGROUND

Structured reporting of radiologic findings reduces ambiguity, improves the accuracy and clinical utility of imaging reports [1-3], and has facilitated appropriate care and follow-up of equivocal findings, most notably breast lesions seen on mammography [4-6]. Such standardization, however, has not been established for pelvic ultrasound. The absence of structured reporting of adnexal masses hinders the ability to align management with risk and engage in a data-driven process that improves clinical care over time [7]. To address this problem, we developed and implemented a structured reporting system aimed at increasing the reliability and clinical utility of ultrasound reporting of

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adnexal masses. We describe the goals of standardization, the use of technology, the process of implementation, and the resulting level of adherence among radiologists and satisfaction among gynecology clinicians.

METHODS

The system was implemented in an integrated health care delivery system that provides care for more than 4.1 million members and performs approximately 60,000 nonobstetric pelvic ultrasound examinations annually. Within the system, ultrasound examinations are read by approximately 300 diagnostic radiologists.

Goals of Standardization

The project was undertaken in response to quality monitoring that revealed variability in the management of women with adnexal masses and dissatisfaction among women's health providers regarding ambiguity in the ultrasound description of masses and subsequent uncertainty regarding management. To address this problem, a multidisciplinary group of physicians representing gynecology, gynecologic oncology, and radiology, including senior ultrasound fellowship-trained radiologists, was formed to provide input from their respective stakeholder groups and develop consensus on the details of a structured reporting system. The work was sponsored by executive leadership with the objective of creating a system that better served clinicians by providing clear, complete, and actionable descriptions of adnexal masses, although also being acceptable and adoptable by the organization's large and diverse group of more than 300 radiologists, without the need for additional training. The discussion yielded development of an initial set of standardized descriptions of mass types that incorporate both objective and subjective assessments. Each of these descriptions was then assigned a "category score" of 0, 1, 2, or 3, to reflect the strength of association with malignancy, on the basis of literature review [8-15], consensus opinion and internal quality data. In general terms, masses considered benign are category 0, whereas those with characteristics considered probably benign are designated category 1. Masses with features considered indeterminate are designated category 2, which is further subdivided into categories 2a to 2e to enable the significance of specific features to be later analyzed. Category 3 represents cystic and solid masses with solid vascular components, as this was felt to be the description most specific to malignancy. In the initial system, masses $\geq$10 cm were defined as category X regardless of other characteristics. The rationale for this category is the correlation of size with significant pathology, unlikely transient nature, potential for symptoms, and the inherent limitation of ultrasound to thoroughly evaluate very large masses [16].

Use of Technology

To support adoption, a reporting template was built to reflect the agreed-upon structure and content of reports and loaded onto an internally developed software program that functions as a user interface for radiologists to create and submit imaging reports. The program links with multiple information systems, including the electronic medical record. The template provides prefilled fields and dropdown menus that facilitate comprehensive descriptions of abnormal masses and the selection of one of the standardized mass types or, if no mass is seen, the option of selecting the phrase "NA" or "no adnexal mass." Specific hashtags representing the category score are automatically populated when a category is selected to facilitate data extraction. Radiologists are not required to use the templates or dropdown menu of phrases, but on signing the report, the dictation software system notifies the radiologist of the need to state a normal phrase (eg, "no adnexal mass") or select a category if neither of these elements is detected.

Implementation

A pilot study was conducted in which the template was installed on the radiology software program at 2 of the health plan's 22 medical centers over a 3-month period. Education was provided to the radiologists and women's health care providers at these facilities in the form of e-mail communications, web-based teleconferences, and presentations at department meetings by local physician champions. Specific lines of communication were made available for radiologists or clinicians to contact the champions with feedback or questions during the pilot period. Full implementation of the templates at all medical centers was preceded by similar informational outreach throughout the entire organization.

Clinical Recommendations

It was agreed that explicit recommendations regarding follow-up imaging would not be included in radiology reports but instead reside in a practice resource for clinicians that was developed and rolled out in conjunction with the reporting system. The resource provides recommendations for management and referral of women with adnexal masses to gynecologic oncology on the basis