Impact of Immediate Access to the Electronic Medical Record on Anatomic Pathology Performance

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Abstract

Objectives: To assess the overall impact of access to the electronic medical record (EMR) on anatomic pathology performance.

Methods: We reviewed the results of all use of the EMR by 1 pathologist over an 18-month period.

Results: Of the 10,107 cases (913 cytology and 9,194 surgical pathology) reviewed, the EMR (excluding anatomic pathology records) was accessed in 222 (2.2% of all cases, 6.5% of all cytology cases, and 1.8% of all surgical pathology cases). The EMR was used to evaluate a critical value in 20 (9.0%) cases and make a more specific diagnosis in 77 (34.7%) cases, a less specific diagnosis in 4 (1.8%) cases, and a systemic rather than localized diagnosis in 4 (1.8%) cases. The percentage of cases in which the physician was contacted decreased from 7.3% for the prior 18 months to 6.7%, but this change was not significant (P = .13). Twelve cases were subsequently sent for interinstitutional consultation, and no disagreements were identified.

Conclusions: The EMR was accessed in 2.2% of all surgical pathology and cytology cases and affected the diagnosis in 48% of these cases.

The electronic medical record (EMR) is a powerful tool that can be used to potentially improve the performance of anatomic pathology. Although information about how the EMR may affect medical care outside of pathology is available, information on how this tool may have an impact on the performance of anatomic pathology itself is limited. Previously, we and others have shown that the EMR can be used to aid in handling cases that are potentially critical values to ensure patient safety and in improving tumor staging reporting. Other authors have proposed how it may be useful in the future and for genomics, but data on its actual use are scarce. To date, a systematic review of the impact of the EMR on anatomic pathology performance has not been completed. To address this, we documented the impact of review of the EMR on the performance of 1 pathologist (A.A.R.) over an 18-month period.

Materials and Methods

For 1 author (A.A.R.), all cases in which the EMR was accessed during the 18-month period from July 1, 2011, through December 31, 2012, were prospectively recorded along with the impact that the EMR had on the diagnosis. The EMR, NetAccess (Siemens Medical Solutions, Malvern, PA), was separate from the anatomic pathology information systems (AP LIS) but could easily be accessed directly from the same terminal as the AP LIS. Only cases in which clinical information, including clinical laboratory results, imaging studies, and clinical notes, could be accessed were counted; cases in which only the records of the anatomic pathology department were accessed were not included. The impact was
divided into the following categories: (1) to evaluate a critical value, (2) to make a more specific diagnosis (ie, the origin of a metastatic tumor or parathyroid adenoma in the setting of a normalized serum calcium), (3) to make a less specific diagnosis (ie, include metastatic disease in something that looks like a primary tumor in a patient with a known history), and (4) to make the diagnosis of systemic rather than localized disease (ie, systemic Langerhans cell histiocytosis rather than localized disease). In cases that might be critical values, the EMR was used to determine whether it was necessary to contact the clinician directly, as previously described.5

There were no set criteria for initiating a review of the EMR, which was left to the discretion of the pathologist. Most commonly, the review was initiated because a critical value had to be evaluated, histologic findings did not fit the clinical picture, insufficient clinical information was presented with the case to reach a definitive diagnosis, or the findings on histology were unusual and prompted a further investigation.

Statistical analysis was done using a 2-tailed χ² test. A P value of .05 was considered significant.

### Results

Of the 10,107 cases (913 cytology and 9,194 surgical pathology) reviewed, the EMR was accessed in 222 (2.2% of all cases, 6.5% of all cytology cases, and 1.8% of all surgical pathology cases). The most common tissue types were fluids (36), pulmonary (27), liver (24), parathyroid (14), colon (12), and skin (11). This represents 7% of all fluids, 13% of all pulmonary specimens, 22% of all liver specimens, 24% of all parathyroid specimens, 2% of all colon specimens, and 1% of all skin specimens reviewed by the authors during this period.

The EMR was used to evaluate a critical value in 20 (9.0%) cases and make a more specific diagnosis in 77 (34.7%) cases, a less specific diagnosis in 4 (1.8%) cases, and a systemic rather than localized diagnosis in 4 (1.8%) cases. These cases are summarized in [Table II](#). In 1 case, the EMR suggested a diagnosis of inflammatory bowel disease in the appendix based on the initial clinical history given by the patient. However, different information obtained from the patient after the surgery and relayed to the pathologist by the clinician directly suggested that the clinical information in the EMR was inaccurate and may have been an interval appendicitis.

There was no significant difference in the percentage of cases that the EMR affected in the first half of the study (48%) vs the second (45%; P = .78).

The EMR more commonly had an effect in surgical pathology material (54%) vs cytology material (28%; P = .001), but this occurred because more cytology cases had the EMR accessed: the percentage of all cases that the EMR affected was not significantly different between surgical pathology (1.2%) and cytology (1.1%; P = .91) cases.

The percentage of cases in which the physician was contacted decreased from 7.3% (672/9,229) for the prior 18 months to 6.7% (679/10,107), but this change was not significant (P = .13). Twelve cases were subsequently sent for consultation at an outside institution, and no disagreements were identified.

### Discussion

To our knowledge, this is the first attempt to measure the overall impact of the EMR on the performance of anatomic pathology. Our results suggest that although the overall percentage of cases that may benefit from review of the EMR is relatively low, this information had a significant impact on the diagnosis in nearly half of these cases. Although the exact impact on performance likely will vary with the exact case mix involved, our results in a general pathology setting strongly support the idea that the EMR can significantly improve the performance of anatomic pathology and should be accessed by anatomic pathologists when available. We are fortunate to have a clinical LIS that is easy to access and use, even though it is separate from the AP LIS, and this certainly facilitates its use on a routine basis.

Nevertheless, there are limits to its use. In 1 case, the information provided by the EMR was inaccurate, and an incorrect diagnosis would have been made if the clinician had...
not been contacted as well. The appropriate balance between using the EMR and speaking directly with the physician is not yet known.\textsuperscript{5}

In this study, the use of the EMR led to a decrease in the percentage of cases that required a call to the physician, although this decrease was not statistically significant. Nevertheless, given the close value of the decrease in physician calls (0.7\% of all cases) and the percentage of cases in which the EMR provided significant information (1.1\% of all cases), we hypothesize that over longer periods and more cases, this change may prove to be significant.

Some pathologists may not be comfortable with routine evaluation of the EMR. Indeed, in many anatomic pathology training programs, there may be little experience with evaluating the medical record outside of pathology. The pathologist in this particular study was an anatomic pathology/clinical pathology Board-certified general pathologist with a year of medical internship and, as such, felt comfortable evaluating the EMR. However, the results may vary with the experience and training of the anatomic pathologist who accesses the EMR, as well as the experience and training of the medical staff with which they work. The question of what are the expectations and limitations of pathologists working as medical consultants is larger than accessing the EMR and one that remains a subject of controversy.\textsuperscript{10-15} Further study of this subject appears warranted.

In conclusion, we have shown that the EMR was accessed in 2.2\% of all surgical pathology and cytology cases and affected the diagnosis in several different ways in 48\% of these cases.

\textbf{References}

5. Renshaw A. Using the electronic medical record to better define “no products of conception” as a critical value in anatomic pathology. \textit{Am J Clin Pathol}. 2012;137:121-123.