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An audit of dermatopathology requisitions: hand written vs. electronic medical record data entry accuracy

Background: At our institution, dermatopathology case requisitions are received in hand written form or via electronic medical record (EMR). Categories for requisition data entry include patient demographics, physician name and procedure site/date. Systematic data entry problems potentially cause considerable documentation error, propagate inaccurate patient information and potentially delay billing/revenue collection.

Method: We compared dermatopathology data entry errors on hand written requisitions to data entry errors using the EMR. A total of 11,475 requisitions (8545 hand written and 2930 EMR) were included in the study (the time frame was 4/1/2011-9/30/2011).

Results: For hand written requisitions, there were 258 data entry errors on 8545 specimens (3.0%). For requisitions entered via EMR, there were 113 errors on 2930 specimens (3.9%). Container labeling, which is a hand written process with both requisition methods, was the most common source of error.

Conclusions: Currently, even with an EMR, containers are at least partially hand labeled and 96% of EMR errors occurred during this process. Other EMR data entry errors are extremely uncommon (4/2930 cases). This suggests introduction of a labeling process entirely linked to EMR data entry could nearly eliminate data entry errors. Although this study focused solely on dermatopathology cases, the findings can be extrapolated to all types of specimens.

Keywords: data entry, dermatopathology, medical error

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Electronic medical records (EMR) have received significant attention over recent years as government and other organizations advocate for widespread usage by hospitals and physicians as a means of reducing costs, improving patient care and reducing medical errors.[1–4] Despite such advocation, only approximately 8% of hospitals have implemented EMR's and these hospitals have tended to be larger not-for-profit and teaching hospitals.[5] Thus, literature evaluating EMR implementation has largely focused on inpatient hospital care as well as medication order entry.

NorthShore University HealthSystem encompasses four hospitals and various outpatient clinics serving the Northern Chicago suburbs. Additionally, there is an outreach system that processes small

biopsy specimens, including dermatopathology specimens, from multiple independent outpatient clinics. NorthShore implemented a complete EMR (EPIC, Verona, WI) approximately 7 years ago for inpatient care and a portion of outpatient services.

The dermatopathology service receives specimens primarily from outpatient clinics. The majority of these are accompanied by hand written requisitions but there are a notable number of requisitions entered through the EMR. With a high case volume, systematic data entry problems potentially cause considerable documentation error, propagate inaccurate patient information and potentially delay billing/revenue collection. This study compares data entry accuracy for hand written dermatopathology requisitions to ones entered via the EMR.

Materials and methods

Study approval was obtained by the NorthShore University HealthSystem Institutional Review Board. A total of 11,475 dermatopathology requisitions were received from April 1, 2011 through September 30, 2011 (8545 hand written and 2930 EMR). Data entry errors were documented and categorized in the laboratory information system as cases were accessioned and reviewed.

Results

For the hand written requisition process, there were 258 data entry errors associated with 8545 requisitions (3.0%). When requisitions were entered into the EMR, there were 113 data entry errors associated with 2930 requisitions (3.9%). For the hand written process, 207/258 errors (80%) were related to container labeling and for the EMR process, 109/113 errors (96%) were related to container labeling. More specifically, the most frequent container labeling error was absence of procedure site on the container or a discrepancy between the site indicated on the container and on the requisition. Currently, the EMR generates labels with patient demographic information with a line for procedure site. The actual procedure site is not printed, however, and must be hand written on the EMR label. Additionally, these labels are often not utilized and the container label is frequently entirely hand written.

Additional non-container labeling errors were as follows. For hand written requisitions, there were 37 errors that occurred due to a mismatch between existing computer demographics and what was written on the requisition form. This type of error could not occur with the EMR. Other errors exclusive to the hand written requisition process included incorrect patients accessioned into the laboratory information system (LIS) (four errors), illegible requisitions (three errors), requisitions with incomplete/absent demographics (three errors) and requisitions with no physician indicated (one error). These errors also could not occur with the EMR as these are required data fields necessary before the EMR will accept the order. (Table 1, Fig. 1)

Table 1. Summary of findings

Category of error	Number of hand written requisition errors	Number of EMR requisition errors	Total number of errors
Mismatch between existing computer demographics/hand requisition	37	0	37
Requisition with incomplete/absent demographics	3	0	3
Requisition with no physician indicated	1	0	1
Requisition with wrong collection date	1	2	3
Specimen container not labeled	2	1	3
Specimen container with no patient name	10	0	10
Mismatch between patient name on requisition form/container	8	0	8
Specimen container with no procedure site	152	95	247
Mismatch between procedure site on requisition form/container	35	13	48
Wrong patient accessioned	4	0	4
Illegible requisition/container label	3	0	3
Wrong test ordered on specimen (ordered for microbiology culture)	0	1	1
Order not entered into EMR	0	1	1
Wrong demographic information on requisition	1	0	1
Wrong site written on requisition	1	0	1
Total errors	258	113	371
Total requisitions	8545	2930	11475
Overall error rate	3.0%	3.9%	3.2%

EMR, electronic medical record.

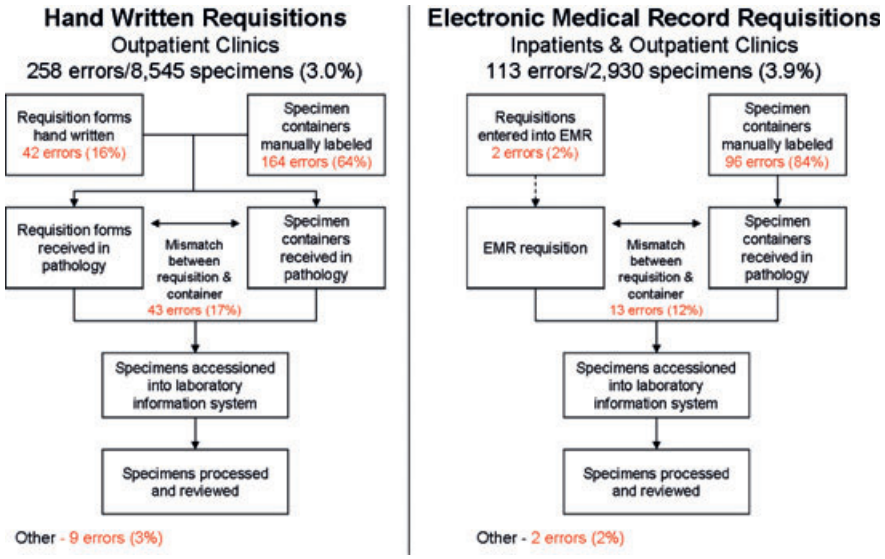

Fig. 1. Hand written vs. Electronic medical record error rate.

Discussion

Although overall data entry error rates on dermatopathology requisitions are comparable regardless of whether the process is entirely hand written (3.0%) or partially linked to the EMR (3.9%), closer inspection of the data reveals that the vast majority of errors in both processes (80% of hand written errors and 96% of EMR errors) occur with container labeling. Specimen container labeling is an integral component of the requisition process and in both requisition methods, there is a hand written component to container labeling. The EMR does generate patient labels with demographic information but these labels do not list the procedure site. This must be written by hand. Most commonly, the specimen container did not have the procedure site designated or there was a mismatch between the site indicated on the container and the site indicated on the requisition. Additionally, the EMR-generated labels are unfortunately frequently not utilized by physician offices, and instead the label is entirely hand written. Thus, process changes/improvements are important components to EMR implementation.

With the EMR process, the only errors not related to container labeling included requisitions with the wrong collection date,[2] a requisition requesting processing by microbiology instead of histology[1] and a container that was sent without an order being previously entered into the EMR.[1] For hand written requisitions, additional non-container-related errors included a mismatch between existing computer demographics and demographics written on the requisition form (37), incorrect patients accessioned into the LIS,[4] illegible requisitions,[3] requisitions with incomplete demographics,[3] a requisition with incorrect demographics,[1] a requisition with no physician indicated,[1] a requisition with the wrong collection date[1] and a requisition with the wrong site written on the requisition.[1]

This data indicates that the primary source of requisition error when submitting dermatopathology specimens is with manual labeling of containers, most specifically as it pertains to procedure site. Although less common, non-container labeling errors such as a mismatch between data on the requisition form/container, incomplete data or illegible data, are nearly eliminated with the EMR. This data suggests that introduction of a labeling process entirely linked to EMR data entry, in conjunction with appropriate process improvements to ensure proper label usage, could nearly eliminate data entry errors.

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