ORIGINAL RESEARCH

How Automation in Electronic Medical Records Can Lead to Errors in Dermatology

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ABSTRACT

Introduction: The integration of electronic health records has revolutionized healthcare by facilitating communication among providers, but it has also introduced significant challenges. In dermatology, a particular issue arises with the use of electronic medical record (EMR) systems that employ auto-populated fields on digital pathology requisition forms (RFs) for skin biopsies. These systems allow for the rapid selection of pre-set descriptions and differential diagnoses, which, while timesaving, frequently lead to diagnostic inaccuracies and potentially detrimental impacts on patient care.
Objective: To explore the impact of auto-populated EMR descriptions on the accuracy of dermatopathologic diagnoses.
Methods: A retrospective analysis was conducted on digital pathology RFs submitted with skin biopsy specimens to evaluate the completeness, relevance, and accuracy of clinical information provided in these forms.
Results: Dermatopathologists often receive biopsy specimens with RFs that list multiple provisional diagnoses based on generic, EMR-generated descriptions, which may not accurately represent the patient's condition. This practice hampers the ability of dermatopathologists to perform effective clinicopathologic correlation, crucial for accurate diagnosis.
Conclusion: We highlight that the convenience of EMR systems can discourage clinicians from recording detailed, accurate clinical observations. Consequently, this lack of detailed documentation prevents dermatopathologists from making informed diagnoses by correlating histologic features with clinical appearances. The current practice of using EMRs without consideration for their clinical relevance not only wastes healthcare resources but also poses a significant medico-legal risk. Therefore, refining EMR practices and integrating more comprehensive clinical data will ensure greater accuracy in dermatological diagnoses.

INTRODUCTION

The introduction of electronic health records (EHR) has transformed health care, and now most health care systems and providers employ an EHR in one way or another. While in many cases this has enhanced patient care by improving communication among healthcare providers, it has also introduced

challenges, as many EHR are not "user friendly" or intuitive. Furthermore, it has been demonstrated to contribute to physician burnout.[1,2]

In dermatology, one problem that has become more prevalent results from the use of auto populated phrases, differential diagnoses, and clinical descriptions entered into digital pathology requisition forms (RFs) submitted to dermatopathologists when a provider performs a skin biopsy. In just a few seconds, the individual completing the RF can select from a predetermined list of automated descriptions, differential diagnoses, and clinical impressions. While this feature streamlines the process and saves time for busy practitioners, it also often leads to inaccuracies in diagnosis and consequently adversely impacts patient care.

METHODS

A retrospective analysis was conducted to examine the accuracy of dermatopathologic diagnoses based on RFs submitted with skin biopsy specimens. The analysis focused on the completeness, relevance, and accuracy of clinical information in RFs that utilized auto-populated descriptions. The study also assessed the impact of these auto-populated entries on the dermatopathologist's ability to perform effective clinicopathologic correlation.

RESULTS

Dermatopathologists commonly encounter RFs listing several provisional diagnoses based on generic descriptions from the electronic medical record (EMR), often lacking critical clinical details such as accurate clinical morphology or relevant history. The use of vague terms like "rule out

eczema" without clear clinical context hindered diagnosis. In some cases, inappropriate terms like "check margins" were automatically added for benign conditions, leading to unnecessary resource utilization and diagnostic confusion.

DISCUSSION

Several studies have demonstrated that RFs frequently lack critical information such as specimen type, reasonably detailed clinical morphology, or clinical history.[3-5] Clinical photographs, when available in the EMR, are usually not made available to the dermatopathologist. These deficiencies prevent the dermatopathologist from performing optimal clinicopathologic correlation and hinders diagnostic accuracy, which may impair patient care.

Ambiguous neoplastic lesions or atypical inflammatory disorders warranting a biopsy are commonly described on RFs using automated descriptions that do not accurately or reasonably reflect the clinician's observations. The RF may include a long list of differential diagnoses that are selected in indiscriminate fashion by "checking off" multiple diagnoses without limitation to those that are considered most likely. In some cases, entities with virtually identical histologic appearances are both submitted, such as "allergic contact dermatitis vs nummular dermatitis," presuming that the dermatopathologist will be able to distinguish between them without additional clinical information, which is impossible. In other cases, an imprecise term is submitted such as, "rule out eczema" when it is not clear what the clinician means by the term and the dermatopathologist is left to divine whether the clinician means atopic dermatitis or another condition that may be associated with histologic findings of spongiosis.[6]

In some cases, the "menu" available for clinicians to choose from has been created by EMR developers using classic textbook descriptions of skin disorders. One example of this is psoriasis which often presents ambiguously mimicking conditions such as nummular dermatitis and atopic dermatitis. Clinicians desire a definitive diagnosis because the treatment varies significantly as different biologic agents will be used depending on the diagnosis. The RF description of psoriasis most often encountered is, "psoriasiform plaques with micaceous scale" (**Figure 1A**) or "guttate papules", yet clinicians rarely biopsy psoriasis if it demonstrates classic clinical features such as a psoriasiform plaque with micaceous scale. A more reasonable differential diagnosis would reflect what the clinician is observing rather than a "canned" textbook description of classic psoriasis.
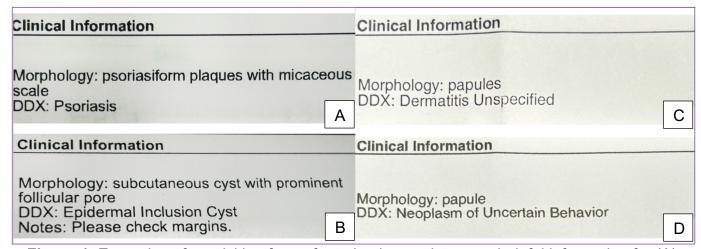

Figure 1. Examples of requisition forms featuring incomplete or unhelpful information for (A) psoriasis, (B) cyst, (C) dermatitis unspecified and (D) neoplasm of uncertain behavior

Another phrase that is incorporated into many RF menu choices is "check margins" which automatically accompanies many diagnoses such as lipomas and cysts (**Figure 1B**). Many, if not most, dermatologists are not overly concerned about the surgical margin of a cyst or lipoma. If a dermatologist truly wants to know whether a benign process such as a cyst or lipoma is involved, he or she should have to make that request intentionally rather than having an EMR automatically request the dermatopathologist to make that determination which is wasteful.

This problem is even more serious when biopsies of atypical pigmented lesions are submitted with "canned" descriptions that cause the dermatopathologist to consider malignancy such as, "irregular brown pigmented lesion. R/O melanoma" without further description as to size, symmetry, circumscription and whether the lesion has been changing, all clinical features used to diagnose melanoma. Such imprecise descriptions result in dermatopathologists ordering expensive special stains to further evaluate such lesions in many cases or to recommend re-excisions unnecessarily creating burdens on the health care system.

Because completing the RF is not "user friendly" and is designed to have those completing it choose from a menu of options, clinicians are discouraged and disincentivized from recording what they truly are observing. Because RFs are somewhat

onerous to complete, dermatologists and advanced practice providers may delegate completing them to non-physicians such as a medical assistant or even a front office clerk. Diagnoses such as "rash unspecified" or "neoplasm of uncertain behavior" are often proffered by such individuals in unsupervised fashion and are essentially worthless when a dermatopathologist is attempting to perform clinical correlation. Unfortunately, such diagnoses are occasionally proffered by dermatologists themselves. They also complete RFs "mechanically" and do things such as selecting an option to "check

margins" on every biopsy, including inflammatory disorders.

Because completing the RF without using the menu option can be onerous requiring typing of information into text boxes, sometimes only allowing limited characters, some clinicians, especially when dealing with a difficult case that requires solid clinical correlation, print out the RF, scratch out the "menu" choice and hand-write their description of the condition and what their actual clinical impression is (**Figure 2**). This is indicia that the EMR is not making such

Figure 2. Clinician preferring to hand-write specific, detailed clinical descriptions to ensure accurate communication due to inadequate predefined EHR system options

clinicians more efficient but instead hindering the practice of high-quality dermatology.

This issue could be ameliorated somewhat if clinical images were provided to the dermatopathologist. However, only a vanishingly small percentage of biopsies of challenging cases are submitted with clinical images.

In our opinion, "neoplasm of uncertain behavior", "rash unspecified", or "dermatitis unspecified" should never be chosen as a menu option and EMR systems should not be permitted to offer them as menu choices at all (**Figure 1C**). All biopsy specimens should be accompanied by accurate clinical descriptions or digital images in difficult cases. Using vague morphological terms such as "macule", "papule", "patch", or "plaque" without a differential diagnosis provides minimal guidance to the

dermatopathologist attempting to perform clinicopathologic correlation. Clinicians should specify which specific neoplasm is being considered with a description followed by a phrase such as "rule out basal cell carcinoma or melanoma" rather than "neoplasm of uncertain behavior" (**Figure 1D**).

Both clinicians and dermatopathologists share a responsibility to their patients to provide the best care possible which includes providing reasonable information to the dermatopathologist. Clinicians should provide pertinent and accurate clinical information such as clinical morphology, relevant history, and reasonable differential diagnoses to the dermatopathologist (**Figure 3**) so that they can render the best diagnosis possible by correlating histologic features with clinical features. Conversely, the dermatopathologist has a responsibility to

Clinical Information

Morphology: 1.1cm asymmetrical irregular smooth tan papule NTTP
DDX: Neoplasm of Uncertain Behavior vs. Lentigo maligna vs pigmented ISK vs Lentigo vs other

Morphology: 2mm X 5mm hyperkeratotic patch
DDX: Neoplasm of Uncertain Behavior vs. Squamous Cell Carcinoma in situ vs. hypertrophic actinic keratosis

Clinical Information

Morphology: 2cm x 1.5cm irregular pigmented macular lesion
DDX: Neoplasm of Uncertain Behavior vs. Melanoma vs. Dysplastic Nevus vs. solar lentigo

Morphology: with atypical pigment pattern on ELM and papule
DDX: Neoplasm of Uncertain Behavior vs. Melanoma vs. pigmented sk
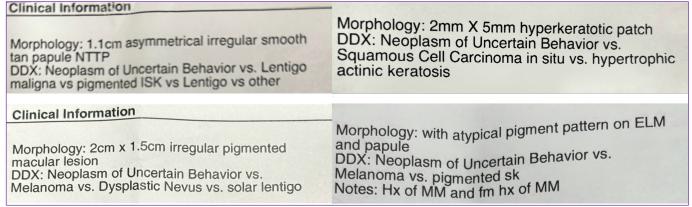Notes: Hx of MM and fm hx of MM

Figure 3. Examples of requisition forms that provide detailed, clinically useful descriptions of lesion morphology, pertinent history, and differential diagnoses

attempt to provide the best diagnosis possible and when given reasonable information, to be able to perform clinical correlation. Using auto populated EMR phrases without considering clinical relevance often leads to non-specific "descriptive" diagnoses or telephone calls to the referring dermatologist's office to garner more information which delays diagnosis and

wastes time for all parties. Because failure to provide accurate information can lead to patient harm, it is a potential source of medico-legal liability for both the dermatologist and the dermatopathologist.

It remains to be seen whether legal liability will be, or has already been, created for EMR companies which encourage clinicians to

provide incomplete and inaccurate information about patients by "dangling" attractive menu choices in front of them to save time, rather than encouraging them to practice in the best interests of their patients. They do not include any disclaimers about using the EMR program in this fashion, and no warnings are issued to users about potential harm that may result by doing so. This could create strict liability for EMR companies, as engaging in this practice could be viewed as a hazardous activity not commonly engaged in by the general community and possibly akin to practicing medicine without licensure. Perhaps this should serve as a warning to such companies to evaluate this issue and take corrective action.

CONCLUSION

To improve diagnostic accuracy and patient care in dermatology, it is essential to refine EMR systems to encourage the inclusion of more detailed and accurate clinical information in requisition forms. Eliminating vague and potentially misleading auto-populated options, integrating clinical images, and fostering better communication between clinicians and dermatopathologists are necessary steps. Both clinicians and EMR developers bear responsibility for ensuring that the use of these systems supports, rather than hinders, high-quality patient care.

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