IN-DEPTH REVIEWS

Clinician-Dermatopathologist Communication via the Requisition Form in the Era of Electronic Medical Records: A Review of the Literature

Haley D. Heibel, MD,[1] Clay J. Cockerell, MD, MBA[2]

[1]SUNY Downstate Health Sciences University, Brooklyn, NY, USA
[2]Cockerell Dermatopathology, Dallas, TX, USA

ABSTRACT

Background: There are shortcomings in the quality and accuracy of clinical information on skin biopsy requisition forms (SBRFs). Most SBRFs are completed via the electronic medical record (EMR). This impacts workflow and the quality of submitted clinical information. An evaluation of clinician-dermatopathologist communication identified targets for improvement in this system.

Objective: To determine the impact of EMRs on the handling of SBRFs by clinicians, identify barriers to effective clinician-dermatopathologist communication, and provide suggestions for improvement in this system.

Methods: A literature search was conducted on Medline, Cinahl, and Scopus including the keywords of dermatology*, dermapatholog*, dermatopathology*, and requisition*. 20 articles were retrieved. 17 articles were included from this search and from cross-referencing articles.

Results: This review reaffirmed the inadequacy of clinical information provided to dermatopathologists. Standardization of and formal education in completing SBRFs, along with dermatopathologist access to information and images via shared EMR may improve histopathologic interpretation of specimens and allow for cost-effective patient care.

Limitations: This review was restricted to the English language. Previous study designs have primarily been retrospective and surveys.

Conclusion: The development of user-friendly standardized SBRFs with validated criteria are necessary. Clinicians must learn to convey information on the SBRF using appropriate terminology in ways that enhance the workflow of both clinicians and dermatopathologists and improves patient outcomes.

INTRODUCTION

In dermatology, the skin biopsy is an important part of the clinical evaluation, and the skin biopsy requisition form (SBRF) is the primary and critical method of communication between the clinician and the pathologist.[1,2] The quality, completeness, and accuracy of the clinical information on the SBRF influences the dermatopathologist's ability to make an accurate and timely histopathologic diagnosis, clinically meaningful histologic interpretation, and appropriate treatment recommendations for the clinician.[2-4]

Previous research regarding clinic-pathological consistency has suggested the clinical diagnostic accuracy rates of dermatologists were significantly higher than physicians of other disciplines.[3,5] Despite the comparative higher accuracy of clinical diagnoses on SBRFs by dermatologists, data has demonstrated that the ideal amount and quality of information on SBRFs for histopathological interpretation is often incomplete or absent and impedes the ability of dermatopathologists to make an accurate and efficient diagnostic decision.[1,6,7]

An increasing number of SBRFs are completed electronically because many practices have adopted electronic medical records (EMR). Requisition form completion through EMR portals has led to improvements in labeling and processing of skin biopsy specimens and virtually eliminated lost SBRFs.[4] However, since the advent of EMR, dermatopathologists have anecdotally reported an unfavorable impact on the quality of clinical information obtained from the SBRF. The purpose of this study is to document deficiencies in the handling of SBRFs by dermatologists in the context of the EMR and suggest opportunities for improvement.

DISCUSSION

Barriers to Effective Clinician-Dermatopathologist Communication

Clinicians' workflow and beliefs. Current barriers to the provision of necessary and pertinent clinical information on the SBRF by clinicians include: high patient volumes, time constraints of clinic visits, lack of knowledge of the important role that clinical information has for an accurate histopathologic interpretation, the level of dermatologic experience of the submitting physician, the quality of skin biopsy specimens, lack of consensus of what clinical information should be included on the SBRF, and completion of the SBRF by health care staff other than the physician with varying levels of dermatologic experience.[4,6,8-10] Another contributing factor to the dearth of clinical information on SBRFs may be the open-ended structure of many SBRFs that does not encourage clinicians to state specific clinical information (Fig. 1).[9]

Specific challenges related to EMR requisitions. In an audit of SBRFs, Kinonen et al[11] found that there were more data entry errors on requisitions completed via EMR (3.9% of SBRFs) than handwritten requisitions (3.0% of SBRFs). The most common source of error for both handwritten and electronically generated SBRFs was container labeling. The most frequent container labeling errors were an absence of the procedure site or a discrepancy between the procedure site written on the SBRF and the container. An interesting finding was that there was a larger proportion of errors related to container labeling from the EMR, with 109/113 errors (96%) being related to container labeling, than those generated by handwritten process (207/258, 80%). The prominence of container labeling errors from labels generated by EMR in this study may

be accounted for by the requirement for the procedure site to be handwritten on the container label containing printed patient information.

Some electronic SBRFs automatically generate textbook descriptions of clinical morphology based on the clinical diagnosis provided. For example, a clinician may take a biopsy of a psoriatic lesion, and the EMR automatically enters a description that states, "psoriasiform plaques with micaceous scale" (Fig. 2). However, this clinical information is not helpful because a biopsy of a characteristic lesion of psoriasis would not be necessary, and it may not accurately describe the patient's presentation. We have also received a SBRF that did not match the

Figure 1. This SBRF does not indicate clinical history or impression.

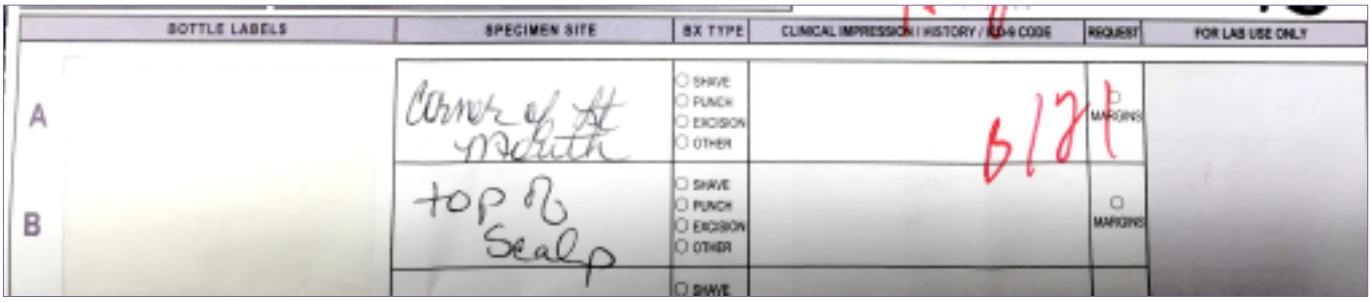


Figure 2. An automatically generated clinical description of a classical lesion of psoriasis. A lesion with this morphology would not require biopsy.

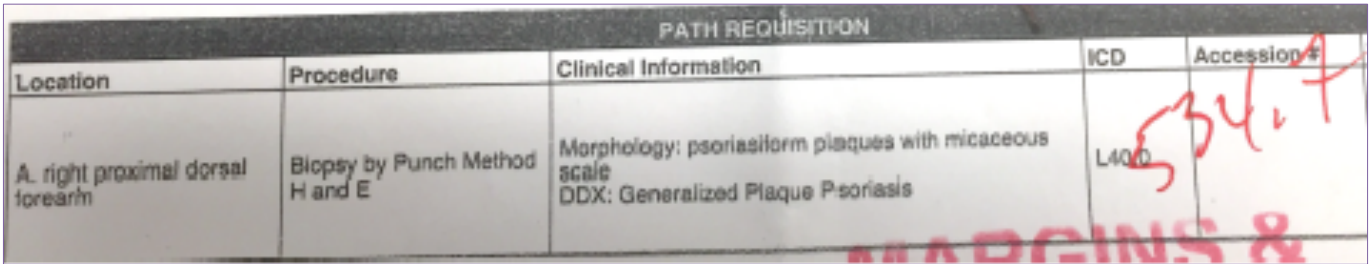
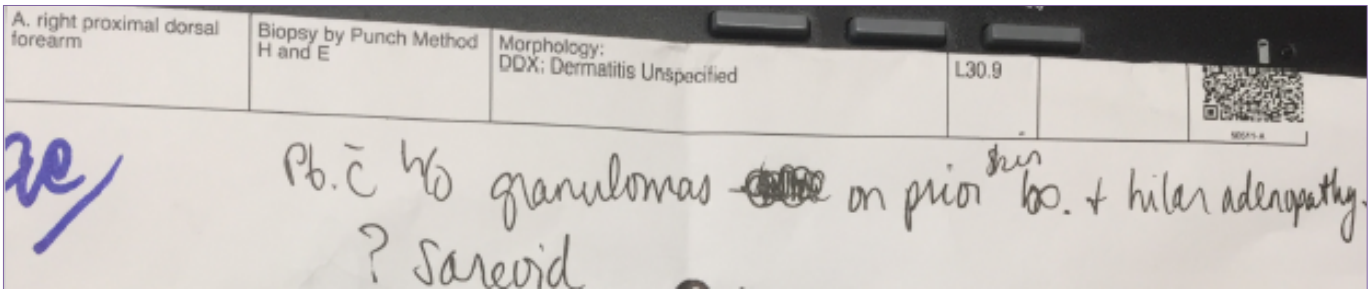


Figure 3. This clinician manually provided clinical history on this electronic SBRF of an inflammatory lesion.



specimen because the electronic SBRF was a re-populated description of a previous biopsy. These features that seem to make the EMR more user-friendly may mislead dermatopathologists to an erroneous diagnosis. Many inflammatory skin diseases have clinical presentations that are more complex than any automatically generated description would provide, and it is cumbersome and difficult for clinicians to enter information into specific fields in the EMR template (Fig. 3).

Additionally, some phrases are automatically accompanied with certain biopsies, which may not be relevant to clinicians' concerns. For example, many cyst biopsies automatically generate the phrase "please check margins," which may lead to increased costs, technician time, and resources if the dermatologist does not eliminate the phrase.

Effects on dermatopathologists.
Dermatopathologists have reported that a common problem in their practice is insufficient clinical information regarding skin biopsy specimens.[10] Other barriers for dermatopathologists in achieving effective communication with clinicians include situations with limited access to a shared EMR to review pertinent clinical information and limitations in giving feedback to clinicians to encourage better communication via the SBRF due to concern of losing business in the private setting.[10] When dermato-pathologists have provided feedback to clinicians directly or via the pathology report to address specimen inadequacies, clinicians who obtain small biopsy specimens were generally not responsive.[2]

Comfere et al[6] found in a systematic review that clinical information and a differential diagnosis were provided in only 36% (18 of 50 dermatologists) of SBRFs with considerable variation in the content of SBRFs. Use of nonspecific terminology on the SBRF, such as "rule out", may be associated with diagnostic delays and the use of unnecessary pathology services including higher rates of stain utilization and more sections in a non-integrated (external cases) practice but not in an integrated (internal cases) practice of a single dermatopathology group.[12]

However, dermatopathologists reported in a survey significant dissatisfaction with time spent gathering information necessary for an accurate and timely diagnosis with 44.7% (261/584) reporting an average of 30 minutes or more daily searching for clinical information to facilitate in histopathologic examination.[2,7] They noted that there were advantages to access of clinical information via EMR, but there were associated obstacles of increased time and effort to identify pertinent clinical information.[2] With increasing use of template notes consisting of pre-filled phrases and check boxes, the clinical narratives containing useful descriptions for histopathologic interpretation are less common.[2,8]

In a retrospective review of SBRFs and associated encounter visit notes (EVNs), Olson et al[4] found that missing critical information on the SBRF was often present in the EVN, but that some important clinical information was absent from both sources. The lack of standardization of the format and clinical content of EVNs may account for inconsistent placement of information in various sections and the omission of important clinical information within EVNs.[8] Therefore, dermatopathologists may invest extensive time in the review of patient records without finding the necessary information for histopathologic interpretation.

Recommendations for improvement

Education. Communication and sharing of perspectives regarding the meaning of nonspecific terms on the SBRF may increase awareness of the implications that nonspecific terms such as "rule out" have on the workflow and utilization of resources by the pathologist and may represent another approach to enhance histologic interpretation of skin biopsies.[12] Dermatopathologists have proposed educating dermatology and non-dermatology trainees and clinicians about the importance of complete and accurate clinical information on the SBRF through periodic in-office tutorials, case-based feedback on the dermatopathology report, and structured curriculums in residency regarding the role that clinical information has on accurate histopathologic interpretation and appropriate specimen and clinical photography obtainment.[10]

Changes in work environment. With increased physician extenders and non-dermatologists providing dermatologic care, efforts may be focused on optimizing the work environment for dermatologists to complete all SBRFs and on educating physician extenders and non-dermatologists how to provide complete, relevant, and accurate clinical information and specimens for histopathologic examination.[10] Ideally, the SBRF should be completed by the dermatologist who obtains and submits the specimen.[5]

Requisitions generated by EMR overcome some of the limitations of handwritten SBRFs including discrepancies between demographics on the patient chart and the SBRF, incomplete patient demographics, the lack of indication of the requesting physician, and illegible SBRFs.[11] Requisition forms generated by EMR may be improved by entirely linking the EMR data entry to the SBRF to include patient demographics, date, and procedure site and processes to promote proper label usage.[11] Direct transfer of relevant clinical data from the EVN to the SBRF may overcome the error prone and inefficient requirement for duplicated data entry for both the EVN and the SBRF in some current EMRs that may account for frequent discrepancies between the EVN and SBRF.[8] However, the SBRF may evolve into a duplicate of the EVN and be undervalued in the setting of an integrated EMR and access to clinical images.[8] Standardization of the organization of the EVN regarding important clinical information may enhance dermatopathologists' efficiency in finding pertinent information and the accuracy of histopathologic interpretation.[4]

Standardization of the SBRF. Communication between clinicians and dermatopathologists may be improved through institution of standards for SBRFs by professional groups, required clinical elements on the SBRF, and the development of a consistent and efficient system to collect, deliver, and communicate clinical information to dermatopathologists.[10] Electronic SBRFs may be improved by the inclusion of checklists with required fields and clear descriptions to allow for greater ease in extracting information by the dermatopathologist.[10] After the implementation of templated electronic SBRFs, Maley et al[13] found an increased amount of pertinent clinical information on the SBRF for specimens with a final diagnosis of melanoma and that electronic SBRFs were significantly more likely than handwritten SBRFs to include the type of biopsy specimen, a larger number of differential diagnoses, a recorded diameter of the lesion, and a greater proportion of the lesion removed in the biopsy specimen.

Although standardized definitions and the diagnostic utility of critical clinical entities on the SBRF have not been extensively studied, dermatopathologist respondents of a survey have reported the clinical diagnosis provided by the dermatologist to be the most important component on the SBRF.[6,10] This is confirmed by a retrospective study of 3,949 pathological reports by Aslan et al[3] who found that sufficient clinical descriptive knowledge increases the probability of an accurate diagnosis. Description of clinical morphology is beneficial for the dermatopathologist when clinical diagnosis on the SBRF does not correlate with histopathologic interpretation.[10]

Use of specific terminology on the SBRF. Sellheyer and Bergfeld[5] recommended a specific clinical diagnosis and a differential diagnosis to be included on the SBRF and discouraged the use of obscure abbreviations, "rule out," and vague terminology such as "lesion," "skin rash," "recent changes," and "skin anomaly." Dai et al[14] found in a retrospective study of SBRFs of inflammatory skin diseases that, when a single diagnosis was listed, the term rule out often accompanied the diagnosis. The physician's intent was to confirm the diagnosis, making the use of the term "rule out" misleading.[14] They recommend using the word "likely" or "suggest" instead. Other vague terminology is not helpful for clinicopathological correlation without additional clarification, may prompt orders for deeper sections and special stains, and may delay the final report.[5]

For inflammatory skin diseases, inclusion of only a clinical diagnosis may not be sufficient and may influence the dermatopathologist to focus on histopathologic features consistent with the clinical diagnosis when the specimen represents another diagnosis.[5,8] However, the presence and accuracy of the clinical impression of inflammatory lesions is the most critical of all clinical entities on the SBRF.[8]

Supplemental clinical images. Dermatopathologists have reported that clinical photographs are valuable and may be sufficient clinical information when a clinical description is lacking.[2] When information on the SBRF is ambiguous or absent, the inclusion of clinical and dermoscopic images on the SBRF may establish a more complete understanding of the clinical presentation for the pathologist.[15] In busy dermatology practices, applications that allow for easy and direct upload of clinical images into EMR have enhanced efficiency.[2] The inclusion of images with the SBRF may enhance histopathologic interpretation, but should only be considered as a supplement and not a replacement for clinical information.[5]

Dermoscopic findings may serve as an ideal communication bridge between clinicians and dermatopathologists because many dermoscopic features have direct histopathologic correlates and dermoscopy can be used in vivo and on excised tissue after formalin fixation.[15,16] Dermoscopy provides an innovative approach for clinicians to make clinical decisions and to share their thought processes regarding diagnosis and patient management.[16] This may enhance clinician-dermatopathologist communication through improvements in clinicians' diagnostic accuracy and in appropriateness of skin biopsy specimens and will result in optimized histopathologic interpretation by dermatopathologists.[16]

Features of the clinician-dermatopathologist communication loop. Clinical and pathology practices that are in close proximity may allow for ease and efficiency of face-to-face communication and shared decision making between clinicians

and dermatopathologists.[2] This allows for joint clinician-dermatopathologist examination to acquire relevant clinical information, to examine the "gross" pathology, and to encourage case discussion.[2,4] In addition, dermato-pathologists who rely on face-to-face communication spend less time on average (< 30 minutes) daily searching for clinical information than those who rely on telephone or SBRFs.[2]

CONCLUSION

This review has explored how knowledge gaps of clinicians regarding the importance of pertinent clinical information for accurate histopathologic interpretation and characteristics of the work environment and format of electronic SBRFs may affect the completion of SBRFs in the context of EMR. For improvements in computerized data entry, standardization of the SBRF and associated EVN is necessary and should be user-friendly and easily integrated into the current workflow of practices.[4] EMR programming companies should additionally provide resources and formal training in using the program. An electronic system would be valuable that allows the clinician to efficiently search for relevant clinical note fields, enter data, and present information that is well organized for the dermatopathologist.[4,10]

The use of criteria to assess for completeness and accuracy of SBRFs has not been validated.[17] A consensus of standardized definitions of critical clinical elements on the SBRF and their diagnostic utility is necessary.[6] Efforts designed to categorize and develop a tier-based system of useful clinical information and indications for clinical photographs based on the clinical diagnosis and presentation would benefit both clinicians and dermatopathologists.

Efforts to identify and close a knowledge gap of the medicolegal importance of the SBRF may prompt a change in practices of the completion of SBRFs. Data from a survey study indicated that most dermatologists are aware that the SBRF is part of the permanent medical record, but over 50% of the time these forms are not personally completed or checked for accuracy.[18] Our goal is to raise awareness of the changes introduced in clinician-dermatopathologist communication in the era of EMR to encourage behavior change in dermatologists' practices in completing SBRFs.

Abbreviations Used: SBRF (skin biopsy requisition form), EMR (electronic medical record), EVN (encounter visit note)

Key words: Dermatopathology; skin biopsy; requisition form; electronic medical records; communication; review
Conflict of Interest Disclosures: None

Funding: None

Corresponding Author:
Haley D. Heibel
461 Dean Street
Unit 30A
Brooklyn, NY 11217
Phone number: (402)-525-0134
Email: haley.heibel@downstate.edu

References:
1. Chismar LA, Umanoff N, Murphy B, Viola KV, Amin B. The dermatopathology requisition form: Attitudes and practices of dermatologists. *J Am Acad Dermatol*. 2015;72(2):353-355.
2. Comfere NI, Peters MS, Jenkins S, Lackore K, Yost K, Tilburt J. Dermatopathologists' concerns and challenges with clinical information in the skin biopsy requisition form: A mixed-methods study. *J Cutan Pathol*. 2015;42(5):333-345.

3. Aslan C, Göktay F, Mansur AT, Aydingöz IE, Günes P, Ekmekçi TR. Clinicopathological consistency in skin disorders: A retrospective study of 3949 pathological reports. *J Am Acad Dermatol*. 2012;66(3):393-400.
4. Olson MA, Lohse CM, Comfere NI. Rates of provision of clinical information in the skin biopsy requisition form and corresponding encounter visit note. *J Pathol Inform*. 2016;7:40-40.
5. Sellheyer K, Bergfeld WF. "Lesion," "rule out...," and other vagaries of filling out pathology requisition forms. *J Am Acad Dermatol*. 2005;52(5):914-915.
6. Comfere NI, Sokumbi O, Montori VM, et al. Provider-to-provider communication in dermatology and implications of missing clinical information in skin biopsy requisition forms: A systematic review. *Int J Dermatol*. 2014;53(5):549-557.
7. Trotter MJ, Au S, Naert KA. Practical strategies to improve the clinical utility of the dermatopathology report. *Arch Pathol Lab Med*. 2016;140(8):759-765.
8. Romano RC, Novotny PJ, Sloan JA, Comfere NI. Measures of completeness and accuracy of clinical information in skin biopsy requisition forms: An analysis of 249 cases. *Am J Clin Pathol*. 2016;146(6):727-735.
9. Waller JM, Zedek DC. How informative are dermatopathology requisition forms completed by dermatologists? A review of the clinical information provided for 100 consecutive melanocytic lesions. *J Am Acad Dermatol*. 2010;62(2):257-261.
10. Wong C, Peters M, Tilburt J, Comfere N. Dermatopathologists' opinions about the quality of clinical information in the skin biopsy requisition form and the skin biopsy care process: A semiqualitative assessment. *Am J Clin Pathol*. 2015;143(4):593-597.
11. Kinonen CL, Watkin WG, Gleason BC, Johnson CEJ, Thomas AB, Cibull TL. An audit of dermatopathology requisitions: Hand written vs. electronic medical record data entry accuracy. *J Cutan Pathol*. 2012;39(9):850-852.
12. Abdou Y, Lohse C, Comfere NI. Use of the term "rule out" in requisition forms may cause diagnostic delays in dermatopathology practice. *Int J Dermatol*. 2017;56(1):86-91.
13. Maley A, Swerlick R, Stoff B. Comparison of electronic and handwritten pathology requisition forms for cutaneous melanoma. *J Am Acad Dermatol*. 2015;72(5):916-917.
14. Dai H, Machan M, Fraga GR. How accurate are the suggested diagnoses on biopsy requisitions for inflammatory skin disease? A retrospective study of 348 cases. *Am J Dermatopathol*. 2014;36(4):298-302.
15. Yelamos O, Braun RP, Liopyris K, et al. Usefulness of dermoscopy to improve the clinical and histopathologic diagnosis of skin cancers. *J Am Acad Dermatol*. 2019;80(2):365-377.
16. Yélamos O, Braun RP, Liopyris K, et al. Dermoscopy and dermatopathology correlates of cutaneous neoplasms. *J Am Acad Dermatol*. 2019;80(2):341-363.
17. Zohar Y, Shreberk-Hassidim R, Elia J, et al. Clinical description of skin lesions in pathology requisition forms completed by plastic surgeons is lacking: A retrospective study of 499 lesions. *Eur J Plast Surg*. 2018;41(2):249-252.
18. Heibel, HD, Brown, ME, Davis, TL. A survey of dermatologists' practices in completing the skin biopsy requisition form in the era of electronic medical records. Poster presented at: Texas Dermatological Society Annual Spring Meeting; May 17-18, 2019; Houston, TX.