Nonmelanoma Skin Cancers: Diagnostic Accuracy of Midlevel Providers Versus Dermatologists

It is important to be as clinically accurate as possible, so the appropriate biopsy method and treatment plan can be developed in a timely manner.

Corley Pruneda, MD; Malvika Ramesh, BS; Landon Hope, MD; and Richard Hope, MD

Midlevel providers, nonphysician clinicians such as nurse practitioners (NPs) and physician assistants (PAs), now provide an increasing proportion of dermatologic care. In 2014, 46% of US dermatologists employed midlevel providers.[1] Dermatology is a field with one of the highest employment rates of midlevel providers, and this number is likely to continue to increase.[2] Hiring midlevel providers can be a cost-effective method for practices to meet an increasing demand for patient care.[3] However, dermatologists have a more extensive level of specialized training, completing at least 10,000 hours of specialty-specific clinical training in residency compared with the 500 to 900 hours on average required to graduate from an NP or PA program.[4,5] The number needed to biopsy per malignant neoplasm was double for midlevel providers compared with dermatologists.[6] We sought to evaluate if these differences in clinical training affected the diagnostic accuracy for nonmelanoma skin cancers (NMSCs) in a private practice setting. We also evaluated which subtypes of NMSC were most commonly misdiagnosed clinically relative to the final histopathologic diagnosis.

Method

We reviewed the records from a private practice clinic in Lubbock, TX, which employs 2 physicians, 2 NPs, and 1 PA. Of note, the 2 NPs worked as nurses for the dermatologists in the practice for several years before pursuing their NP degree. Also, each midlevel provider worked underneath and shadowed the physicians for at least a year after graduation from their NP or PA programs. As a result, they were able to observe thousands of biopsies and a wide variety of clinical presentations before seeing patients on their own. A physician was readily available during all encounters; however, the first impression was made by the midlevel provider before the biopsy was performed.

The total number of NMSCs diagnosed were calculated for the physician and midlevel provider groups over 5 years. Misdiagnoses were also calculated, defined as a clinical diagnosis that differed from the final histopathologic diagnosis. For example, if the provider clinically suspected a basal cell carcinoma (BCC) at the time of biopsy and the lesion was subsequently read by the dermatopathogist as a squamous cell carcinoma (SCC), this was considered a misdiagnosis. In this review, we only included cancers when the final diagnosis was an NMSC.

Results

A total of 11959 NMSCs were diagnosed during the 5-year period ranging from January 1, 2017, to December 31, 2021. Overall, there was a clinical misdiagnosis rate of 11.73%, with 1403 of 11959 skin cancers having a different NMSC pathologic diagnosis than the original clinical diagnosis (**Table 1**). The physicians had a misdiagnosis rate of 11.14%, with 1118 skin cancers misdiagnosed out of 10039 total skin cancer diagnoses. The midlevel providers had a misdiagnosis rate of 14.84%, with 285 out of 1920 total skin cancer diagnoses.

Table 1. Clinical Misdiagnosis Rate

Provider	Number of Diagnoses	Number of Misdiagnoses	Rate of Misdiagnosis
Midlevel	1920	285	14.84%
Physician	10039	1118	11.14%
Total	11959	1403	11.73%

Table 2. Common Misdiagnoses

Clinical Diagnosis	Pathologic Diagnosis	Total Number	Number of Misdiagnoses
BCC	SCC	754	53.7%
SCC	BCC	419	29.9%
BCC or SCC most often	Basosquamous cell carcinoma	132	9.41%
Melanocytic lesion	BCC or SCC	44	3.1%
SCC most often	AFX	35	2.5%
BCC most often	MCC	9	0.6%
Various diagnoses	BCC or SCC	10	0.7%

The most common clinical misdiagnosis was BCC in 754 cases when the pathology showed an SCC. This accounted for 53.7% of the misdiagnoses. The second most common misdiagnosis was a clinical SCC when the pathology showed BCC, which comprised 29.9% of the misdiagnoses. The next most common misdiagnosis was a lesion that showed pathologic features of both BCC and SCC, termed basosquamous cell carcinoma, that accounted for 9.41% of the misdiagnoses (**Table 2**). Only 3.1% of the total misdiagnosed lesions were clinically suspected to be melanocytic and then subsequently diagnosed as an NMSC. Other, rarer NMSCs, such as atypical fibroxanthoma (AFX) and Merkel cell carcinoma (MCC), were most commonly misdiagnosed as SCC and BCC, respectively.

Discussion

As can be seen by this review, the clinical diagnosis of BCC and SCC most often corresponded to the pathologic diagnosis. This is likely due to the sheer frequency with which these lesions are encountered in clinical practice because they represent the majority of NMSCs diagnosed. Features that can lead to a misdiagnosis include crusting of the lesion; bleeding; ulceration; trauma; and previous treatment with other modalities, such as liquid nitrogen, which can distort the lesion's architecture. Additionally, variations in vasculature, such as the hairpin vessels seen in invasive SCC and the crisp, arborizing vessels seen in BCC, can be mistaken for each other dermoscopically and lead to a misdiagnosis. Some lesions, such as heavily pigmented BCCs, can be clinically diagnosed as a melanocytic lesion when they are, in fact, an NMSC. The rarer NMSCs, such as AFX and MCC, are seldom diagnosed clinically and can have a wide array of presentations.

Finally, although the midlevel practitioners were quite accurate in diagnosing skin cancers clinically, the training and experience of the physicians translated to modestly more accurate clinical diagnoses overall. The midlevel providers in this practice may be more astute at diagnosing skin cancers than those practicing elsewhere due to their extensive experience assisting with biopsies before seeing patients independently. Midlevel providers have a significant presence in dermatology practices across the country. As such, we recommend that they spend a significant amount of time shadowing or working for a dermatologist before seeing patients on their own to develop the skills needed to correctly identify NMSCs while avoiding unnecessary biopsies of benign lesions. A large part of dermatology is pattern recognition, and it requires seeing thousands of lesions to develop the mental framework needed to accurately diagnose skin cancers on a regular basis. ■

Dr Corley Pruneda is a XX and Malvika Ramesh is a XX at the Texas Tech University Health Sciences Center in Lubbock, TX. Dr Landon Hope is a XX at the University of Arkansas for Medical Sciences in Little Rock, AR. Dr Richard Hope is a XX at the Lubbock (TX) Dermatology and Skin Cancer Center.

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