








ORIGINAL ARTICLE

Diagnostic concordance challenges in dermatology: an internal analysis

HIGHLIGHTS

1. Primary care doctors have diagnostic difficulties in dermatology.
2. The teaching of dermatology is insufficient in medical schools.
3. There is a need for permanent health education in dermatology.

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ABSTRACT

Objective: Evaluate the degree of diagnostic agreement in dermatology among primary and intermediate care doctors compared to tertiary care dermatologists. **Method:** A prospective and descriptive study that analyzed secondary data from patients on first outpatient consultation in the dermatology service of a hospital in Catanduva (SP) – Brazil, between September 2023 and February 2024. The data collection of patients' medical records was referred from primary to intermediate care. The diagnostic sensitivity, positive predictive value, and the Kappa accuracy index were calculated. **Results:** The most prevalent diseases were malignant neoplasms (23.89%) and psoriasis (11.50%). Diagnostic agreement among doctors of different levels was low, with Kappa coefficients ranging from 0.0204 to 0.776. **Conclusion:** The findings indicate that although some diagnoses are carried out with accuracy, there is a need for improvement in dermatology training for primary care doctors, especially in relation to neoplastic conditions.

KEYWORDS: Clinical Diagnosis; Skin Diseases; Skin Neoplasms; Health Care Levels; Primary Health Care.

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INTRODUCTION

Dermatology is the medical specialty dedicated to diagnosing and treating diseases of the skin, skin appendages, and mucous membranes. In recent decades, Dermatology has experienced remarkable growth in quantity and quality, evolving from a predominantly clinical specialty to a medical-surgical approach¹. Given this advancement of expertise, primary care doctors (APS) often encounter many skin-related complaints in their daily clinical practice².

Diseases that affect the skin have some characteristics that are different from other conditions. In addition to the high prevalence and incidence of certain ailments, various skin disorders are commonly associated with other organic systems³. In some cases, the skin lesions are quite visible, generating a significant impact on people's routine and causing difficulties in the performance of work and social activities⁴.

In the United States, approximately 6% to 7% of all outpatient visits are related to skin complaints, and of these patients, about 60% are treated by professionals who are not dermatologists⁵⁻⁶. In Brazil, a study conducted in Rio de Janeiro revealed that for every 20,000 consultations attended by doctors who provide care for APS, approximately 680 are referred to dermatologists³.

The health care network (RAS) is a polyarchival structure composed of a series of interconnected health services that provide continuous, comprehensive, and empathic care to a given population. This network is coordinated by APS and works in conjunction with intermediate and tertiary care⁷.

Tertiary care services are characterized by a higher technological density compared to intermediary care services. Consequently, patients are directed in the network according to their needs and the complexity of the required care. Despite their technological disparities, there is no subordination relationship between intermediate and tertiary care services. Each level of attention is equally crucial to achieving the objectives set out in RAS⁷.

Due to the need for careful history and special attention to the inspection of the various characteristics of the observed lesions, Dermatology is a specialty that requires specific training⁸. When performed effectively, the dermatological evaluation can identify changes in the coloration and texture of the skin, as well as lesions with various distribution and morphologies⁹. To perform skin evaluations, dermatologists generally demonstrate superior diagnostic accuracy in assessing potentially malignant and less common diseases, and tend to perform more comprehensive differential diagnoses than non-dermatologists¹⁰.

Doctors who provide primary care have limited training in dermatology, making them less proficient in diagnosing skin diseases than dermatologists¹¹⁻¹². This raises concerns about incorrect diagnoses, inadequate disease management, and late referrals and can negatively impact the cost-effectiveness ratio and the overall quality of medical care¹³⁻¹⁴.

The limited theoretical and practical knowledge of many generalists can lead to the underestimation or confusion of certain dermatological conditions, regardless of whether they are benign or not, due to their harmless appearance, chronic progression, or even absence of symptoms. Additionally, due to the lack of valuation and resources to deal with dermatological issues at the family and community level, general practitioners have a tendency to overdiagnose some conditions, such as eczema, warts, and infectious diseases, neglecting other possible diagnoses, including neoplasms, resulting in delayed start of treatment and unfavorable prognosis^{3,15}.

In this context, general practitioners must demonstrate appropriate competencies for diagnosing and treating the most common skin diseases in the APS, which serves as an entry point to the other levels of health care^{3,16}. Thus, this professional should be able to identify signs suggesting malignancy in skin lesions and symptoms of common systemic diseases that affect the skin. In addition, he must be competent in diagnosing and managing frequent skin conditions such as acne, fungal and bacterial infections, and eczema to guide the patient through the health care network correctly^{3,17}.

After establishing the diagnosis, a non-specialist may follow cases of low complexity. However, discontinuity in the treatment of APS is common, which leads to additional referrals, repeating the evaluation with specialists, prescribing multiple medications for the same purpose, prolonging the waiting time for problem resolution, increased anxiety, and an inadequate understanding of the patient's health status^{3,18-19}.

Therefore, considering the scarcity of studies investigating the diagnostic agreement between the different levels of health care in conditions affecting the mucous membranes, skin, and its annexes, this study aimed to evaluate the degree of diagnostic agreement in dermatology among primary and intermediate care doctors compared with tertiary care dermatologists.

METHOD

This prospective, cross-sectional, and descriptive study uses documentary sources, i.e., secondary data from patients at the first consultation. The data were obtained through the patient records referred to the dermatology service of the Emílio Carlos Hospital (HEC), in Catanduva (SP) – Brazil, from the municipal APS and intermediate care (AME-SP), using the reference guide by the CROSS system (Central for Regulation of Health Services Offers). A total of 113 consultations were analyzed.

The first ambulatory consultation included patients aged 18 years or older referred to the HEC dermatology service. Patients incorrectly entered into the specialty "Dermatology" in the CROSS system were excluded for reasons related to the digitization of the Physical Reference Guide: error in selecting the specialty or difficulty understanding the medical professional's graph by the official responsible for typing. In addition, patients in return and interconsultations were also removed from the study.

The data from the electronic patient records at HEC were collected using data collection tables in Excel®, covering the period from September 2023 to February 2024. The table used contained fields for data collection, including the following information: date of entry; total number of visits; number of returns; number of first visits; CID of referral; CID final; origin and referral of which health care (primary/intermediate).

The statistical analysis of the data began with the final diagnosis of the tertiary service dermatologist, considered the "golden standard", being used to evaluate the prevalence of each disease or group of dermatological diseases in the sample. Subsequently, a concordance study was conducted between the diagnoses provided by doctors at the primary and intermediate levels and the final diagnosis of the tertiary level dermatologist. For the diagnoses issued by the doctors of APS and intermediate care, the subsequent diagnoses given by the tertiary care dermatologist were analyzed.

This study investigated the following parameters: diagnostic sensitivity (percentage of cases with a particular disease who had previous suspicion of the disease), positive

predictive value (percentage of cases with a particular suspected diagnosis that was subsequently confirmed), and the Kappa agreement index²⁰.

The statistical program Statistical Package for Social Sciences (SPSS) version 27.0 was used for data analysis. After the descriptive analysis, the Kappa statistical test verified the agreement between the diagnoses of primary/intermediate care physicians and tertiary care dermatologists. To calculate concordance using the SPSS program, two nominal categorical variables were created (primary/intermediate care physicians and tertiary care dermatologists), assigning numerical values to each group of diseases.

To conduct an analysis of diagnostic agreement by the Kappa coefficient, the diseases were grouped according to the subdivisions of ICD-10: skin attachments; skin changes due to chronic exposure to non-ionizing radiation; dermatitis and Eczema; infectious and parasitic diseases; benign neoplasms; malignant neoplasms; other skin and subcutaneous tissue conditions; and psoriasis.

Immediately after the organization of the tables, the two variables were compared, and their agreement was calculated from the simple Kappa test, employing the capabilities of the selected statistical software for the analysis. The interpretation of the Kappa coefficient was carried out from the criteria proposed by Landis and Koch²¹, which follows the following scale: no agreement (<0); poor agreement (0 to 0.19); reasonable agreement (0.20 to 0.39); moderate agreement (0.40 to 0.59); substantial agreement (0.60 to 0.79), and excellent agreement (0.80 to 1.00).

This research was approved by the Research Ethics Committee of the University Centre Padre Albino (UNIFIPA), under no opinion. 6.831.642.

RESULTS

Between 1 September 2023 and 29 February 2024, 113 new Reference Guides were forwarded to the HEC dermatology service through the CROSS system. Of these, 19 (16.81%) corresponded to patients previously evaluated by the intermediate care dermatology service, already referenced for follow-up at the tertiary level. The other 94 guides (83.19%) were from APS, as illustrated in Figure 1.

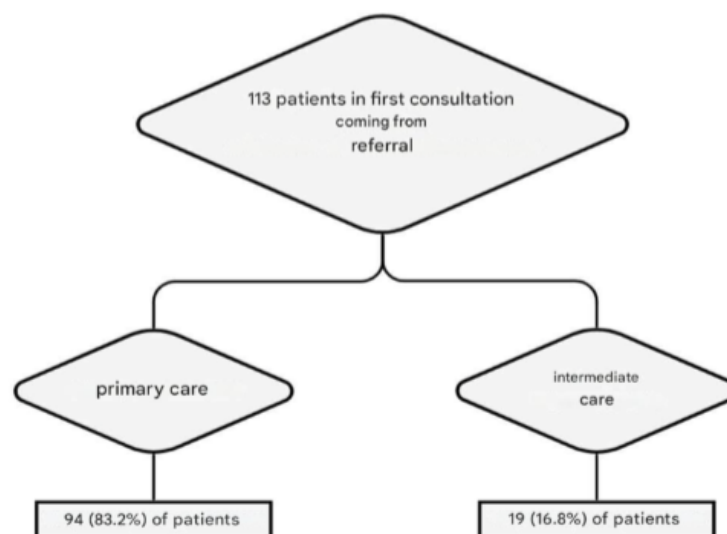


Figure 1. Origin of patients referred to Tertiary Care. Catanduva, SP, Brazil, 2024

Source: The Authors (2024).

Table 1 presents the prevalence of dermatological diseases diagnosed by tertiary care dermatologists, which is considered the gold standard for this study. During the analysis period, malignant neoplasms, psoriasis, dermatitis, and eczema were most frequently diagnosed in the outpatients. On the other hand, the less common diseases, with only one diagnosis each, included cheloidal scar, chloasma, lower lumbar pain, scabies, Hansen's disease, melanoma, melanocytic nevus not specified, other follicular disorders, other specific congenital malformations of the skin, and other pigmentation disorders.

Among these, the "malignant neoplasms" diagnosis stands out, with an absolute frequency of 27 cases in 113, representing 23.89% of the diagnoses issued by tertiary care dermatologists. In addition, the diagnosis of "Unknown and unspecified causes of morbidity" is also relevant in the sample, as it presents seven cases, corresponding to 6.19% of the diagnoses.

Table 1. Frequency of skin diseases found in the sample. Catanduva, SP, Brazil, 2024.

Diseases	Frequency	%
Cutaneous abscess	2	1.77
Acne	3	2.65
Alopecia	5	4.42
Skin changes due to chronic exposure to non-ionizing radiation	5	4.42
Callus and callosities	2	1.77
Unknown and unspecified causes of morbidity	7	6.19
Seborrheic keratosis	2	1.77
Cheloid scar	1	0.88
Epidermal cyst	4	3.54
Chloasma	1	0.88
Dermatitis and eczema	12	10.62
Metabolic disorders	2	1.77
Low Lumbar Pain	1	0.88
Scabies	1	0.88
Hansen's disease	1	0.88
Suppurative Hydradenite	3	2.65
Melanoma	1	0.88
Molluscum contagiosum	2	1.77
Malignant neoplasms	27	23.89
Benign Neoplasia	7	6.19
Melanocytic nevi, not specified	1	0.88
Other follicular disorders	1	0.88
Other localized diseases of connective tissue	2	1.77
Other specified congenital skin malformations	1	0.88
Other pigmentation disorders	1	0.88
Psoriasis	13	11.50
Urticaria	2	1.77
Vitiligo	3	2.65

Source: The authors (2024).

In this study, the most frequent diagnoses obtained by tertiary care doctors were malignant neoplasms (23.89%), psoriasis (11.50%), and dermatitis and eczema (10.62%). When evaluating the diagnoses of APS and intermediate physicians compared with tertiary care dermatologists, we found the sensitivity, positive predictive value, and Kappa values described in Table 2.

Table 2. Sensitivity, positive predictive value, and Kappa coefficient of primary and intermediate care physicians compared to tertiary care dermatologists. Catanduva, SP, Brazil, 2024.

Diagnosis	Sensitivity (%)	Positive Predictive Value (%)	Kappa
Effects of the attachments of the skin	50	80	0.398
Skin changes due to chronic exposure to non-ionizing radiation	40	22.2	0.0204
Dermatitis and eczema	41.6	62.5	0.302
Infectious and parasitic diseases	28.5	50	0.182
Benign Neoplasms	25	25	0.0769
Malignant Neoplasms	32.1	81.8	0.0611
Other conditions of the skin and subcutaneous tissue	66.6	22.2	0.185
Psoriasis	92.3	85.7	0.776

Source: The authors (2024).

The sensitivity, which indicates the ability of a test to detect people with the disease correctly, ranged from 25% to 92.3%, presenting its highest value in the identification of psoriasis. The positive predictive value (VPP), which represents the probability that a positive outcome in a diagnosis is true, presented the highest rates in psoriasis (85.70%), malignant neoplasms (81.80%) and skin annexes (80%). Kappa values ranged from 0.0204 to 0.776, with the three worst performances observed in skin-related diseases due to chronic exposure to non-ionizing radiation (K= 0.0204), malignant neoplasms (K= 0.0611), and benign neoplasms (K= 0.0769), having higher values in psoriasis (K= 0.776).

DISCUSSION

The main objective of this study was to evaluate the accuracy of the diagnosis of dermatological diseases in primary and intermediate care by referring patients to tertiary care, through the agreement between the diagnoses obtained. The study results revealed a low level of diagnostic agreement between primary and intermediate care doctors and tertiary care dermatologists, who were considered the gold standard in this analysis, for most of the diagnostic groups analyzed. Of the 113 first consultations, 19 (16.81%) were from intermediate care and 94 (83.19%) from APS. These data confirm that referrals to tertiary care are more frequent from the APS.

Notably, Kappa values are significantly low for the groups of skin diseases related to neoplastic or potentially neoplastic changes. These diseases present lesions that range from high to low complexity of identification, and are part of the daily life of the general practitioner. The low consensus in the diagnoses of malignant and benign

neoplasms ($Kappa < 0.1$) indicates a failure in the early identification of potentially serious conditions, reflecting challenges in training these dermatology professionals.

Although they cannot remain in follow-up in the APS, the suspect or initial diagnosis of various carcinogenic or precancerous lesions can be easily carried out by the APS doctors. For intermediate care specialists, the implementation of curative procedures may be limited due to the available technological complexity. However, it is possible to follow patients to identify new lesions or even relapses of the initially treated disease. The findings are in line with the literature, which suggests that APS doctors often face difficulties in diagnosing dermatological diseases.

The group with the highest diagnostic accuracy consisted of patients diagnosed with psoriasis, corroborating previous findings in the literature²². Most referrals to this group of diseases originated from APS doctors, which could suggest consistent technical training, especially among generalists and with clinical expertise, for this disease. The sensitivity presented the best indices in psoriasis, which can be justified because the disease facilitates visual diagnosis and is a well-established skin condition. Its clinical presentation is often characteristic, especially in cases where the lesion is well defined.

The Unified Health System (SUS) is structured so that patients on ambulatory follow-up by specialists at the intermediate and tertiary levels should be progressively referred through the health network, ideally starting at the APS level. In this scenario, we observed a bias in our sample, in which APS doctors made most referrals to tertiary care. This result suggests that while some diagnoses can be carried out accurately, some diseases still need more attention and specific training. The fact that less than half of the cases do not present an alteration of CID reinforces the need for a more effective screening and a deeper understanding of dermatological conditions by APS doctors.

Such results are consistent with the findings of previous studies, indicating that APS doctors face challenges in diagnosing dermatological diseases²²⁻²³. The study revealed no change in the CID in less than half of the cases referred to a tertiary service. This data suggests a low diagnostic agreement among medical professionals of different levels of health care, since more than half of the diagnoses of skin conditions carried out by the primary and intermediate services underwent a diagnosis alteration. This may be due to differences in the criteria used for diagnosis, lack of expertise in certain cases, or lack of access to supplementary examinations, which can lead to a more inaccurate or divergent assessment. A study conducted in the United States with dermatological patients revealed that a quarter of patients whose main complaint was a skin problem were referred to a specialist service, and the dermatologist agreed in just over half of the cases with the referral diagnosis².

Regarding the degree of agreement, Kappa, this was considered reasonable only in the diagnoses of conditions of the attachments of the skin, dermatitis, and eczema. Psoriasis was the only diagnosis that reached a substantial level of agreement. However, the other groups of diagnosed diseases presented poor diagnostic agreement, indicating that dermatologists' diagnoses differed from those of other doctors in most skin conditions.

In the study, the most frequent diagnoses obtained by tertiary care doctors were malignant neoplasms, psoriasis, dermatitis, and eczema. These findings are consistent with the literature since, in another study, 984 consultations were analyzed, revealing that the most common dermatological conditions were, in decreasing order of prevalence: eczema (11,3%), benign tumors (9%), pigment disorders (8,7%) and oncopathies

(7,02%)²⁴. The present study identified only one melanoma case, which aligns with research that points to this neoplasm as the least common among skin tumors²⁵.

Most skin-affecting diseases, such as dermatitis and eczema, which comprise 10.61% of the sample and have a Kappa agreement index of 0.302, should be evaluated and treated at the APS level. However, higher education in this area is often inadequate in most medical schools, both in terms of basic science and training and clinical practice. A study conducted in southern Brazil showed that 37.1% of the referred patients could have been treated in APS²².

Dermatology is often treated as an isolated discipline throughout the course, and it has difficulties integrating vertically and horizontally in the programmatic axes. Content related to the discipline receives little hourly charge during graduation, even in more updated curricula²⁶⁻²⁷.

According to Kappa²¹, when analyzing the diagnostic agreement in malignant neoplasms, we observe a poor agreement. For the diagnosis of these oncological skin diseases, it is essential to have skills in characterizing precursor and suspected lesions. This finding corroborates the findings of other studies in which the diagnostic accuracy of malignant neoplasms was also low^{23,28}. The forwarding in these cases should be agile, as the technological capability of APS may limit the diagnosis.

In this sense, it is crucial that APS doctors recognize these types of lesions, as the waiting time for evaluation by a dermatologist can significantly impact the prognosis of these diseases. Early diagnosis of skin melanoma, for example, can result in a reduction in mortality since survival is inversely related to the tumor thickness²⁵. This lack of skill impedes the timely diagnosis of these diseases, making it difficult to implement appropriate treatments and worsening the patient's prognosis.

Psoriasis, malignant neoplasms and skin attachment conditions have demonstrated the highest values of positive predictive value (VPP), suggesting that these conditions, when diagnosed positively, are highly likely to be truly positive. Psoriasis, in particular, also stood out in terms of diagnostic sensitivity, indicating that doctors effectively identified it at all levels of health care. These results are consistent with other studies, which demonstrated rates of 98.6% and 88.8% for VPP and sensitivity, respectively, to the disease²³. Given our study, it became apparent that the level of diagnostic agreement is poor, for most diagnostic groups analyzed, among primary and intermediate care doctors and tertiary care dermatologists.

The results of this study highlight the importance of the APS doctor in properly screening patients with skin conditions that require referral to the dermatologist, in addition to recognizing signs of more serious diseases and referring these patients with agility. A potential solution to reduce the excess of unnecessary referrals would be to improve the technology available in intermediate care, helping doctors at that level to optimize their diagnoses. It is also crucial to approach the training of new doctors, as there are gaps in dermatology education during graduation. Educational institutions should endeavour to ensure a solid foundation in dermatology for professionals who will act in the APS, including possible changes and adjustments in the medical course curriculum as necessary^{24,29}.

The present study presented some limitations, including the absence of certain sociodemographic data due to the lack of availability in the records. In addition, because it was conducted in only one hospital unit, the results cannot be generalized to the entire population. Despite these limitations, this study can significantly contribute

to a better understanding the diagnostic agreement among doctors of the APS and intermediate care with tertiary care dermatologists.

CONCLUSION

This study revealed a marked discrepancy between the referral diagnoses made by APS doctors and the intermediate care compared to those identified by tertiary care dermatologists. In 53.10% of referrals, there was a change in the ICD by tertiary care dermatologists. Kappa's degree of agreement was considered poor in most disease groups, indicating a diagnostic variability between tertiary care dermatologists and doctors in other health areas. Highlighting the high frequency of diagnoses of malignant neoplasms, representing about 23.89% of the sample, highlights the importance of a more in-depth preparation among APS professionals for the early identification of these neoplasms.

These results suggest the need for specific strategies to strengthen the development of APS professionals in relation to skin diseases. This could result in a more resolute service, avoid unnecessary referrals, improve the access of patients with real needs to specialist dermatology services, and enable more equitable health care. In addition, it would be important to improve the available technological resources for intermediate care, which would increase the diagnostic and treatment capacity of dermatologists in this area.

In our context, we believe that it is necessary to encourage the training of primary care doctors in the correct recognition of dermatological lesions. In addition, a review of the curriculum grades of medical courses would be fundamental to providing greater practical and theoretical knowledge to doctors in training. A greater awareness of this imbalance between educational needs and priorities is the first step to promoting changes in medical education.

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