Pediatric Inpatient and Emergency Dermatology Consultations: A 5-Year Retrospective Analysis

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Objective: To characterize and analyze the inpatient and emergency pediatric dermatology consults in our academic hospital center.

Methods: We reviewed 485 consultations that were done by the University of Puerto Rico Department of Dermatology from July 2007 to June 2012. The date, patient age and gender, consulting service, presumptive diagnosis, final diagnosis, and diagnostic procedures performed were documented for each consult.

Results: The patients' ages ranged from newborn to 18 years; the 13 to 18 years age group was the most common (29%). Dermatology consults were requested by the general pediatrics ward, primarily (32%), followed by the emergency room (25%). In 236 cases (48.6%), a vague diagnostic impression was provided by the consulting service, whereas in 249 (51.4%) cases, a specific or differential diagnosis was provided. The dermatology service changed the diagnosis in 12% (58/249) of the evaluated cases. The most common misdiagnoses were allergic contact dermatitis, drug eruption, papular urticaria, nutritional deficiency, atopic dermatitis, seborrheic dermatitis, cellulitis, and herpes infection. The most common diagnoses encountered were inflammatory skin conditions, infectious diseases, and drug eruptions. Skin biopsy was the most common procedure performed. In 30% of the cases, more than 1 procedure was performed as part of the evaluation work-up.

Conclusion: Our study demonstrates the important role of the dermatologist in the diagnosis and management of pediatric patients with dermatological diseases. The information contained within this manuscript should contribute to raising the awareness of pediatricians regarding the most common dermatological diagnoses in this patient population. [*P R Health Sci J 2018;37:105-109*]

Key words: Atopic dermatitis, Pediatric, Consults, Inpatient

Although dermatological services are most commonly provided in an outpatient setting, the importance of inpatient dermatology consultation has increased over the last several years (1, 2). Inpatient consultations represent a vital aspect of dermatologic care and resident training in academic centers (3, 4). Even though, there have been decreases in the hospital admissions initiated by dermatologists, their consultative role has remained important in the management of inpatients and of patients evaluated in the emergency room. The dermatologist can improve the accuracy of the clinical diagnosis and, in many instances, carry out skin procedures necessary to confirm that diagnosis and, thus, establish the early and adequate treatment of patients admitted to the hospital and emergency room (ER) (1).

Inpatient and ER consults are an integral part of our academic program. No previous study has been done in PR to evaluate the important role of the dermatologist in the management of pediatric patients admitted with skin diseases. For this reason, we conducted a study on the care provided by our consulting service to pediatric inpatients and emergency pediatric patients over a 5-year period. Enhancing our knowledge and understanding of pediatric dermatology consultations in this population will lead to improvements in the care delivered to these patients by the consulting service.

Methods

In this retrospective study, we analyzed all the consultation reports (covering from July 2007 to June 2012) from the University of Puerto Rico's Department of Dermatology at the

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The author/s has/have no conflict/s of interest to disclose.

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Pediatric University Hospital. The Department of Dermatology keeps a logbook containing all the consultation reports. A fourth-year dermatology resident and an attending physician were responsible for evaluating all the consults. The pediatric consulting services included the general pediatrics ward, pediatric emergency room, pediatric hematology-oncology ward, neonatal intensive care unit, pediatric intensive care unit (PICU), and pediatric infectious and nephrology services, among others.

The data collected from the consult reports included the date of each consultation, patient age and gender, medical record number, consulting service, presumptive diagnosis, final diagnosis, and diagnostic procedures performed, if any. The presumptive diagnosis provided by the consulting service was obtained from the consult requisition. The patients' ages ranged from newborn to 18 years old.

Our primary focus was to assess and characterize patient demographics, the hospital setting in which a given consult was requested, the most common diagnoses encountered, diagnostic discrepancies, and the procedures performed. Diagnostic discrepancies written by the pediatric consulting service can be described as misdiagnoses or when nonspecific descriptions, such as the term "rash," were used. The data were analyzed using descriptive statistics. The University of Puerto Rico Medical Sciences Campus Institutional Review Board granted approval.

Results

A total of 1,427 inpatient and emergency consults (performed from July 2007 to June 2012) coming from all the consulting services were evaluated. Of these, 485 consults corresponded to the pediatric population (34%). For our department, the annual mean number of pediatric consultations was 97 (41% of all requested consults). From 2007 to 2012, the number of yearly pediatric consults remained stable, as can be seen in Table 1.Regarding gender distribution, 250 of the patients evaluated (51.5%) were males and 235 (48.4%) were females. The 13 to 18 years age group was the most common age group evaluated (29%), followed by the 7 to 12 years group (21%) and the 1 to 11 months group (18%). The general pediatrics service (32%) had the highest number of requests for dermatology evaluations, followed by the emergency room, as can be observed in Table 2.

Table 1. Yearly proportion of total and pediatric consults

Year	Total Consults	Pediatric Consults	Percentage of Total
July 2007–June 2008	246	96	39%
July 2008–June 2009	217	74	34%
July 2009–June 2010	278	99	36%
July 2010–June 2011	304	90	30%
July 2011–June 2012	382	126	33%
Total	1427	485	34%

Table 2. Pediatric services requesting dermatology consultations

Service	Number of Consults (N = 485)	Percent
General pediatrics	155	32%
Emergency room	120	25%
Hematology/Oncology	75	15%
Neonatal Intensive Care Unit (NICU)	44	9%
Pediatric Intensive Care Unit (PICU)	25	5%
Infectious diseases	22	5%
Nephrology	19	4%
Other service(s)	25	5%

In 236 cases (48.6%), the consulting service did not provide a clear diagnostic impression. For example, the word "rash" was used as a diagnosis in 89 consults; of those, the most prevalent final diagnosis made by the dermatology service was a drug reaction (18%), including Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS), Stevens Johnson Syndrome (SJS), and morbilliform drug eruption. Drug eruptions were followed in frequency by atopic dermatitis, irritant or allergic contact dermatitis, and miliaria as being the most common final diagnoses. Other ailments receiving an initial diagnosis of rash include scabies, viral exanthems, diaper rash, and nutritional deficiency. For the remaining cases, a specific or differential diagnosis was provided by the consulting service.

Twenty-three percent (58/249) of the diagnoses and specific assessments that were provided at the initial consult were changed after the dermatology service evaluated the patients. . For example, for 8 cases in which herpes infection was reported as a presumptive diagnosis by the service requesting the dermatology consult, the consultants changed the diagnoses to irritant contact dermatitis, allergic contact dermatitis, and candidiasis, depending on the case. Furthermore, each of 6 cases misdiagnosed as cellulitis proved to be dyshidrosis or arthropod bites. In addition, the most common misdiagnoses were allergic contact dermatitis, drug eruption, papular urticaria, nutritional deficiency, atopic dermatitis, seborrheic dermatitis, cellulitis, and herpes infection.

Table 3 shows the procedures performed by the dermatology consult service, with a skin biopsy being the most common (59.7%; 98 skin biopsies). In 30% of the consults, more than 1 procedure was performed as part of the evaluation work-up.

Table 3. Procedures performed on pediatric consult patients

Procedure	Number
Biopsy	98
Culture	37
Tzanck smear	15
Potassium Hydroxide Preparation (KOH)	12
Intralesional steroid injection	1
Incision and drainage	1
TOTAL PROCEDURES	164

Table 4 shows the distribution of diagnostic categories observed in the pediatric population. Inflammatory skin conditions represented the most prevalent final diagnostic category (40.1%). Within this category, the most common diagnoses were atopic dermatitis, allergic contact dermatitis, nutritional deficiency, seborrheic dermatitis, papular urticaria, irritant contact dermatitis, and acne vulgaris. Atopic dermatitis was the most common diagnosis overall (21%). It was most prevalent among the patients in the 1 to 3 years age group (17 cases), followed by those in the 1 to 11 months age group (11 cases) and 7 to 12 years age group (9 cases). Other, less frequent, inflammatory skin conditions evaluated included alopecia areata, miliaria, balanitis, lichen planus, urticaria, and post-inflammatory hyperpigmentation, among others.

Table 4. Diagnoses of hospitalized and emergency patients

Disease classification	Number (%) n=485
Inflammatory skin condition (e.g., seborrheic dermatitis, atopic dermatitis, allergic contact dermatitis)	194 (40.1%)
Infectious disease (viral, fungal, parasitic)	99 (20.3%)
Drug eruption	56 (11.5%)
Infectious disease (bacterial)	39 (8.0%)
Vasculitis or another connective tissue disease	33 (6.9%)
Neoplasm, benign	29 (6.0%)
Genetic skin disorder	17 (3.5%)
Skin disorder due to physical agents	15 (3.0%)
Neoplasm, malignant	3 (0.7%)

Infectious diseases (20.3%) composed the second most common diagnostic category encountered. Viral exanthem and herpes simplex infection predominated within the viral infection group (24%), while scabies and tinea capitis prevailed within the parasitic and fungal groups, respectively. Staphylococcal scalded skin syndrome, abscess, and cellulitis were the most common bacterial infectious diseases. Other, less frequent, infectious diagnoses included acute paronychia, impetigo, gangrene, meningococcemia, Toxoplasmosis Other Rubella Cytomegalovirus and Herpes infection (TORCH), eczema herpeticum, molluscum contagiosum, varicella zoster, verruca vulgaris, condyloma acuminatum, cutaneous larva migrans, candidiasis, tinea versicolor, intertrigo, and tinea corporis.

Drug eruptions constituted the third most common diagnostic category, with morbilliform drug eruptions being the most frequent. Other adverse drug reactions were acneiform drug eruptions, DRESS, drug-induced hyperpigmentation, drug-induced onycholysis, and SJS. Among the 27 cases of morbilliform drug eruptions, 4 (15%) had been initially misdiagnosed as SJS. In contrast, of the 9 cases of SJS diagnosed by the dermatology team, 8 had been initially diagnosed correctly by the pediatric service.

Vasculitis was the most predominant connective tissue disorder observed (37%, 11/30). Others included dermatomyositis, graft versus host disease, hemophagocytic syndrome, Henoch–Schonlein purpura, lupus, and purpura fulminans.

The benign neoplasms (6%) most commonly requiring consultation were hemangiomas, followed by capillary malformations, keloids, pyogenic granulomas, and nevi. Among the malignant neoplasms (0.7%), cutaneous metastasis and leukemia cutis were the most frequent.

Genodermatoses were seen in 3% of the cases and included autoimmune polyendocrinopathy–candidiasis–ectodermal dystrophy syndrome, aplasia cutis congenita, hypomelanosis of Ito, osteogenesis imperfecta, and incontinentia pigmenti, among others. Other miscellaneous diagnoses were burns, hematomas, edema, extravasation of chemotherapy, and terra firma-forme.

Discussion

Although dermatological services are most commonly provided in an outpatient setting, the importance of inpatient dermatology consultation has increased over the last several years (1). In our study, pediatric consults represented an average of 41% of all the consultations performed by our dermatology service each year. Although no increase in the number of yearly pediatric consults was observed, these findings highlight the key and continuous role that dermatology consultations play in inpatient and ER pediatric care.

In 2015 McMahon et al. and in 2017 Afsar found that the general pediatric ward was the most common pediatric service requesting dermatology evaluation, representing 44% of the total number of consult requests in their study (2, 4). Our results were very similar; 32% of our consults came from the general pediatric ward. However, for McMahon et al and Afsar., the bone marrow transplant service was the second most common requesting service, whereas the emergency room service was second in our study (2, 4). Our hospital does not have a bone marrow transplant unit.

Nearly half of the initial diagnoses that were made by the services requesting a dermatology consult had discrepancies, in that they generally lacked a specific differential diagnosis or commonly employed vague descriptors such as "rash." Our consult service assisted in establishing a diagnosis or confirmed an initial diagnosis in more than 65% (340/485) of the cases reviewed. Moreover, in 12% of the consults in which a differential diagnosis or specific assessment had initially been provided, a change in diagnosis was made after our evaluation. On most occasions, the dermatologic service used as diagnostic criteria for the final diagnosis the clinical features of the skin-related symptoms that prompted the requested consult. In some cases additional diagnostic procedures, such as a biopsy, skin cultures, or Potassium Hydroxide (KOH), among others, were required in order to make a definitive diagnosis. These findings further support the importance of an early dermatology evaluation in the providing of an accurate diagnosis and the improving of patient management and outcomes.

In 2009, Peñate et al. reported on a retrospective study in Spain that analyzed 387 pediatric dermatology consultations that had taken place from 2000 to 2009 in patients 14 years old and younger (5). Inflammatory conditions, including atopic dermatitis and seborrheic dermatitis, were among the most common complaints, as was also observed in our study. In Peñate et al., viral diseases (chickenpox, herpes zoster, and herpes simplex virus, followed by viral exanthem) were the most common infections for which consultations were sought, followed by fungal and parasitic diseases (5). In our study, the second most common diagnostic category encountered was also that of infectious diseases, of which herpes simplex was the most frequent, as was also seen in Peñate et al (5). Viral exanthem was the fourth most common infectious viral diagnosis in Peñate et al. but was the second most common in our study (5).

Furthermore, Afsar reported on a retrospective study in Turkey, a descriptive analysis of 539 pediatric dermatology consultations from 2004 to 2010 in patients ranging in age from 0 to 18 years old (2). Allergic skin diseases were the leading group of dermatoses diagnosed followed by infectious skin diseases as we observed in our study (2). Among the inflammatory dermatoses, atopic dermatitis was the most common one seen in both studies.

We observed a wide range of drug-related skin manifestations ranging from benign morbilliform drug eruptions to life-threatening conditions, such as SJS and toxic epidermal necrolysis. Drug eruptions were seen in 11.5% of our cases, while in McMahon et al., only 7.37% of the studied patients reported skin symptoms that were linked to medications. Furthermore, the uncomplicated morbilliform eruption was the most common drug reaction seen in both studies. In our study, morbilliform drug eruption was most common in the oncology department and the PICU, while SJS and DRESS were most frequently observed in the pediatric emergency room.

In 33% of our consults, a procedure was performed as part of the evaluation work-up. Similar to what was found in our analysis, Falanga et al. observed that biopsy was the most common procedure performed in dermatologic consults. (1). Notably, the Falanga et al. study was not limited to a pediatric population; however, the study highlighted the importance of skin biopsies as a tool for correct assessment in many cases (1). Tzanck smears and KOH preparations were other common procedures performed by our service and were particularly useful because of the rapidity of attaining results. These procedures not only help in confirming correct diagnoses but also narrow down a differential diagnosis by excluding other possibilities.

Limitations of this study include its retrospective design and the fact that it was conducted in a tertiary hospital setting, which may not be representative of other inpatient settings. Follow-up information was limited, and the outcomes of the interventions were not addressed in this study. The reason for admission was frequently missing from the consultation forms; thus, we were unable to determine whether dermatologic symptoms were the sole reason for a given patient's visit or admission. Additionally, it is important to note that the information regarding the presumptive diagnosis of each patient was collected from the consult requisition for said patient. Nevertheless, the inability to make such a determination is more likely an indication of suboptimal documentation skills than it is a demonstration that medical knowledge regarding the differential diagnosis of skin diseases was lacking. In addition, the diagnostic criterion established by the primary team could not be identified.

Only a few published reports have described the frequency and nature of pediatric consultations requested from dermatology services in the US. To our knowledge, this is the first study in Puerto Rico to do so. This study demonstrates the important role played by the dermatologist in the diagnosis and management of dermatologic conditions presenting in pediatric patients in both the hospital and the ER, when present. This study also highlights the significance of the dermatology consultant in reaching a correct diagnosis and thus improving care in these patients. Better understanding and more precisely characterizing the most common and significant diagnoses observed in the pediatric inpatient population, will enhance our knowledge and improve the quality of care provided to these individuals. Patient outcomes, follow-up, the diagnostic value of the procedures performed, and the reasons for dermatological admissions in the pediatric population should be evaluated in future studies.

These results merit attention and may indicate a need for the revision of the dermatology curricula offered in medical schools and pediatric residencies. Such changes as might result from this kind of revision would—it is hoped—lead to improvements in the educations and preparation of physicians engaged in diagnosing and managing both hospitalized and ER patients suffering from these frequently observed dermatologic conditions.

Resumen

Objetivo: Caracterizar y analizar las consultas dermatológicas pediátricas de nuestro centro hospitalario académico. Métodos: Evaluamos 485 consultas presentadas al Departamento de Dermatología de la Universidad de Puerto Rico desde julio 2007 a junio 2012. La información que se documentó de cada consulta evaluada fue la siguiente: las fechas de la consultas la edad y género del paciente, el servicio que consulta, el diagnóstico presuntivo y final y los procedimientos realizados. Resultados: El rango de edad de los pacientes fue desde recién nacido hasta los 18 años. El rango de edad entre 13 y 18 años fue el más prevalente (29%). Las consultas dermatológicas fueron solicitadas mayormente por el servicio de piso de pediatría general (32%) seguido por el servicio de sala de emergencias (25%). En 236 casos (48.6%) el servicio consultante no proveyó una impresión diagnóstica certera, mientras que en 249 (51.4%) casos un diagnóstico diferencial o un diagnóstico

específico fue provisto. El servicio de dermatología cambió el diagnóstico en 12% (58/249) de los casos evaluados. Dermatitis alérgica de contacto, erupción por medicamentos, urticaria papular, deficiencia nutricional, dermatitis atópica, dermatitis seborreica, celulitis e infección por herpes fueron los diagnósticos comunes fallados por el servicio consultante. El procedimiento más común realizado fue una biopsia de piel. En 30% de los casos, más de un procedimiento se llevó a cabo. Conclusión: Nuestro estudio demuestra el rol vital que el dermatólogo realiza en el diagnóstico y manejo de los pacientes pediátricos con enfermedades dermatológicas. Además, informa a los pediatras acerca de los diagnósticos dermatológicos más comunes en esta población.

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