

# Presentation of Rash in a Community-Based Health System

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## ABSTRACT

**Introduction:** Coordination of care between primary care providers and dermatologists is important to ensure high quality and cost efficiency. In our integrated care setting, we used a retrospective cohort study to assess which patients self-refer to dermatology and which returned for a follow-up visit in dermatology.

**Methods:** We identified 107,832 patients with a new rash diagnosis who presented to primary care or dermatology between January and March 2017. We compared patients who self-referred to dermatology with those who used primary care, using multi-level generalized estimating equations with adjustment for patient-level covariables and medical center. We also characterized patients who returned for a follow-up visit in dermatology.

**Results:** Among patients with a new rash diagnosis, 99% were originally seen in primary care. Patients with a history of a dermatological condition were more likely to present to dermatology. Patients with a history of a dermatological condition or with psoriasis, pigment, hair, bullous, or multiple conditions were more likely to have a follow-up visit with a dermatologist. For each outcome, initial location of care and return for a follow-up visit, we found minimal clustering by medical center or provider.

**Conclusion:** One percent of patients with a new rash diagnosis self-refer to dermatology in this setting. Patients with a history of a dermatological condition were more likely to self-refer to dermatology and to have a follow-up visit with a dermatologist. Individual dermatologists and primary care providers had little impact on a patient's odds of returning for a follow-up visit.

## Introduction

Dermatologists should be used for their highest scope of practice because their workforce is limited and specialty care is costly.<sup>1</sup> With respect to rash, access to dermatologists may be important for making difficult diagnoses, selecting treatments, and educating the patient. However, many rashes are self-limiting, and it is important to improve management and coordination of care between primary care providers (PCPs) and dermatologists.

Kaiser Permanente Northern California, a community-based health system, provides integrated, capitated care. For rash, patients are strongly encouraged to start their care in the primary care department. However, patients are permitted to self-refer to dermatology. We sought to understand which patients with rash self-refer to dermatology and which have a follow-up visit to dermatology. This information is important for understanding how best to manage dermatology utilization to achieve high-quality, affordable care.

## Methods

Data for this study were collected from the Kaiser Permanente Northern California electronic medical record system. We identified patients presenting to primary care or dermatology with a rash between January 1 and March 31, 2017. Rash diagnoses included ICD-10 codes for acne and other follicular disorders, bullous and other systemic disorders, alopecia and other disorders of hair, viral infections of the skin, inflammatory dermatoses, disorders of pigmentation, psoriasis, pruritis, radiation-related conditions, and sweat disorders (ICD-10 diagnostic codes: B00-B06, B08-B09, B35-B36, L00-L56, L58-L59, L63-L75, L77-L81, L83, L85-L95, and R21). Patients with complicating skin conditions (B07, C4A, C43-C44, D03-D04, D17-D18, D22-D23, D48-D49, D69, L57, L60-L62, L76, L82, L84, L96-L99, and R21) diagnosed on the same day or in the year prior to their initial rash diagnosis, or with a rash diagnosis or dermatology encounter in the preceding year were excluded from the study.

We fit 3 models to understand the use of dermatology visits in the care of rash initially and within 90 days of the first encounter, 90 days allowing for a range of follow-up practices, including time for patients whose rash did not resolve with initial management to schedule a follow-up visit. First, we modeled the outcome of location of initial rash encounter (dermatology vs primary care). Then, for the outcome of whether a patient had a follow-up visit in dermatology within 90 days of the first encounter (yes, no), we fit separate models for patients whose initial rash encounter was in dermatology and for patients whose initial rash encounter was in primary care. All models were fit using generalized linear mixed models adjusted for patient age, sex, race/ethnicity, history of dermatologist-diagnosed skin conditions, and initial diagnosis, with random effects to account for clustering by provider and/or medical center. We also computed the intra-class correlations (ICC) for the random effects using the latent-variable method, assuming a standard logistic distribution with a mean of 0 and variance  $\frac{\pi^2}{3}$ .<sup>2</sup> The model for location of the initial encounter included a random

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intercept for medical center. The ICC for medical center can be interpreted as the correlation of patients at the same medical center. The model for follow-up visit in dermatology among patients who received initial care in dermatology included a random intercept for dermatologist. The dermatologist ICC represents the correlation between 2 patients with the same dermatologist. The model for follow-up visit in dermatology among patients who received initial care in primary care included random intercepts for both PCP and medical center. Because PCPs are nested within medical centers, the medical center ICC is the correlation between 2 patients at the same medical center with different PCPs, and the PCP ICC is the correlation between 2 patients with the same PCP at the same medical center.

## Results

We identified 247,546 patients presenting in-office or via telephone to primary care or dermatology with a rash diagnosis between January 1 and March 31, 2017. Patients with a concurrent lesion or other non-rash dermatological condition, or with a dermatological diagnosis or dermatology encounter in the preceding year, were excluded from the study leaving 107,832 eligible patients (Table 1). Of these, 106,489 (99%) new rash patients initially presented to 3830 primary care providers, and 1373 (1%) initially presented to 166 dermatologists. The patients who had their first visit in the dermatology department were more likely to be 30-69 years of age and female, with half having been diagnosed with a skin condition in the past 10 years (although those with a condition in the past year were excluded from the study) (Table 1).

Having a first visit in dermatology was directly associated with having a history of a dermatological condition and inversely associated with diagnoses of inflammatory and infectious disorders, young and old age, and Hispanic ethnicity. For those with a history of a dermatological condition, 70% of the diagnoses recorded for the present episode were the same as recorded for the history. After accounting for patient-level covariates, patients who self-referred to dermatology were somewhat clustered within medical centers, although the effect was small (medical center ICC: 0.10).

In the subgroup whose first visit was in dermatology, 213 (16%) returned for a follow-up visit in dermatology in the 90 days following the original encounter, and this was directly associated with past acute skin conditions and with present hair and multiple conditions, as well as Hispanic ethnicity. Return for a follow-up visit in dermatology barely clustered by initial dermatologist (ICC: 0.02).

In the subgroup whose first visit was in primary care, 5755 (5%) returned for a follow-up visit in dermatology.

This visit was directly associated with past chronic and acute dermatologic conditions and with present hair, psoriasis, pigment, bullous, and multiple conditions. It was inversely associated with young age and Asian-American and Hispanic race/ethnicity. Return for a follow-up visit in dermatology clustered minimally by medical center (ICC: 0.04) and PCP (ICC: 0.09).

## Discussion

In our integrated system, we found 99% of patients with a new rash diagnosis were initially managed in primary care, of whom 5% required a dermatology office visit. The 1% of patients who started in dermatology had more complex histories of dermatologic diseases and were more likely to have a return dermatology office visit. We speculate that this stemmed from the patient having a prior relationship with the dermatologist. Current diagnosis was an important predictor of initially presenting to dermatology and of having a return dermatology office visit. Patients presenting with bullous disorders or disorders of pigmentation were especially likely to initially present to dermatology, most likely because these conditions require more extensive specialist knowledge and expertise, and consideration should be given to more rapidly escalating these patients to the care of a dermatologist. The minimal clustering in care patterns by medical center suggests relatively standardized care from one medical center to the next. Similarly, the minimal clustering by provider suggests that dermatologists and PCPs schedule follow-up visits in response to the patient needs and not because they have propensities to routinely schedule follow-up visits. Standardized care often reflects high-quality care.<sup>3</sup>

Our finding that PCPs manage most rash cases is consistent with a study of National Health Service Walk-in Centres that noted 21% of patients had a skin-related problem, of which 89% were rash.<sup>4</sup> To our knowledge, few papers have been published that separate rash from lesion. In a study of 208 primary care patients with rashes and lesions, nearly 40% were referred for a dermatology office visit, which is higher than our proportion of 5%.<sup>1</sup> However, the primary reason for referral was for biopsy or excision of a skin lesion, which would occur with few rash patients. The same study reported that after lesions, inflammatory diseases and infections were the most common diagnoses in primary care, similar to our study.

For 2 additional reports, to be published separately, we are examining the effectiveness of teledermatology modalities for managing rash and the use of e-consult and roving dermatologists (ie, specialist dermatology providers in the primary care department) for improving the coordination of care for rash. The present report identifies

**Table 1. Characteristics of 107,832 Kaiser Permanente Northern California members presenting with rash, aged 0-89 years, January through March 2017, %**

Characteristic	Department of first visit		Outcome = first visit in dermatology (N = 107,832)		Outcome = follow-up visit in dermatology			
	Primary care (N = 106,489)	Dermatology (N = 1,343)			First visit in primary care (N = 106,489)		First visit in dermatology (N = 1373)	
	%	%	OR	95% CI	OR	95% CI	OR	95% CI
<b>Initial diagnosis</b>								
Acne	16	25	2.8	2.4-3.2	0.9	0.8-1.0	0.9	0.5-1.4
Bullous	<1	2	8.3	5.2-13.2	1.9	1.3-2.7	1.8	0.6-5.4
Hair	3	5	3.4	2.6-4.4	3.0	2.6-3.3	2.2	1.2-4.2
Infection	24	3	0.3	0.2-0.3	0.4	0.3-0.4	0.6	0.2-1.7
Inflammatory	40	22	1.0	[Reference]	1.0	[Reference]	1.0	[Reference]
Pigment	1	7	10.3	8.1-13.1	2.1	1.8-2.6	1.2	0.7-2.3
Psoriasis	2	4	2.0	1.4-2.7	2.2	1.9-2.4	0.6	0.2-1.7
Other	7	15	4.8	4.0-5.7	1.0	0.9-1.1	0.8	0.5-1.4
Multiple	6	17	3.2	2.7-3.9	1.5	1.4-1.7	1.6	1.0-2.6
<b>Age (y)</b>								
0-17	27	14	0.7	0.6-0.9	0.6	0.6-0.7	1.3	0.8-2.2
18-29	17	17	1.0	[Reference]	1.0	[Reference]	1.0	[Reference]
30-49	28	33	1.2	1.0-1.4	1.0	1.0-1.1	0.9	0.5-1.3
50-69	22	29	1.1	0.9-1.3	1.1	1.0-1.2	0.8	0.5-1.3
70-89	6	8	0.8	0.6-1.0	1.0	0.9-1.1	0.3	0.1-0.8
<b>Sex/gender</b>								
Female	56	63	1.0	[Reference]	1.0	[Reference]	1.0	[Reference]
Male	44	37	0.9	0.8-1.0	1.0	1.0-1.1	0.8	0.6-1.1
<b>Race/ethnicity</b>								
Asian-American	21	20	0.9	0.8-1.1	0.8	0.7-0.9	1.2	0.8-1.8
African-American	7	7	1.0	0.8-1.3	1.0	0.9-1.1	0.8	0.4-1.6
Hispanic	24	20	0.7	0.6-0.9	0.8	0.7-0.9	1.4	1.0-2.1
White	40	44	1.0	[Reference]	1.0	[Reference]	1.0	[Reference]
Other/missing	9	8	1.0	0.8-1.2	0.9	0.8-1.0	0.8	0.4-1.5
<b>History of dermatological diagnosis<sup>a</sup></b>								
Any chronic	11	42	6.2	5.5-7.0	1.5	1.4-1.6	1.1	0.8-1.5
Acute, not chronic	3	9	3.8	3.1-4.6	1.2	1.1-1.4	1.7	1.1-2.8
None	86	50	1.0	[Reference]	1.0	[Reference]	1.0	[Reference]

<sup>a</sup> History of dermatological diagnosis was categorized as chronic (acne, inflammatory, psoriasis, skin cancer, actinic keratosis); acute, not chronic (bullous, hair, infectious, pigmentation, other conditions, or seborrheic keratosis); or none, in that order, based on 10-year history of primary care and dermatology diagnoses available in the electronic medical record.

patients with more complex needs and with greater access to dermatology because of existing relationships. Further characterization of these patients could lead to interventions to further improve care quality and cost efficiency. We also noted that Hispanic patients were less likely to have a first visit or follow-up visit with a dermatologist. To our knowledge, this has not been reported in the past, and additional research is merited.

A limitation of this study was our inability to assess rash severity. A premise of the design was that rash severity was distributed similarly across centers and providers. If so,

then the minimal correlations observed across centers and providers indicate that the patients with the most severe disease were the ones who needed a dermatology follow-up visit. Because many rashes are self-limiting, patients may be scheduled for a follow-up visit that is cancelled if the rash resolves with or without treatment.

It should also be kept in mind that results from our integrated care setting may not generalize to fee-for-service settings, where referral rates to dermatology are higher.<sup>5</sup> Primary care providers at Kaiser Permanente have access to teledermatology, e-consult, and roving dermatologists, system-level factors that

undoubtedly drive patient choice, although these care pathways could be implemented in fee-for-service settings if payment rules allowed. Notwithstanding these limitations, the study improves understanding of care patterns for rash, which is important for realizing health care value. ❖

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*The author(s) have no conflicts of interest to disclose.*

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**Authors' Contributions**

*Jennifer Dusendang, MPH, contributed to data collection, data analysis, and manuscript preparation. Sangeeta Marwaha, MD, contributed to study design, data collection, data analysis, and manuscript preparation. Stacey Alexeeff contributed to study design, data analysis and manuscript preparation. Lisa Herrinton, PhD, contributed to study design, data collection, data analysis, and manuscript preparation.*

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