

Impact of Specialist Consultations on Inpatient Admissions for Dermatology-Specific and Related DRGs

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BACKGROUND: Studies of dermatologic inpatients are important, given the rise in the number of admissions and of Medicare spending for dermatology-specific and dermatology-related diagnosis related groups (DRGs) in recent years. Yet inpatient studies of patients admitted for skin conditions have mainly focused on dermatology consults, which neglect the experiences of patients not seen by dermatology. Identifying patients based on DRG codes includes all patients admitted for skin conditions and therefore allows for a more comprehensive analysis of the dermatologic care delivered.

OBJECTIVES: Our primary aim was to characterize the care of all patients admitted for a skin-related condition using dermatology DRGs. Our secondary aim was to assess the impact of a dermatology consult for those patients for whom a consult was called.

DESIGN AND PARTICIPANTS: We conducted a retrospective chart review of 512 inpatient admissions assigned a dermatology-specific or dermatology-related DRG over fiscal year 2009 at an academic medical center in Boston. Comparisons were made between patients with and without dermatology consults.

MAIN MEASURES: Dermatology DRG admission and consult rates. For consults, frequency of dermatologic procedures performed, treatment recommendations made, changes in diagnoses, and readmissions.

KEY RESULTS: Dermatology was consulted in 51 % of cases for dermatology-specific DRGs and in 3 % of cases for dermatology-related DRGs. Dermatology was consulted mainly for common dermatoses such as drug eruptions and cellulitis; among all cellulitis patients, 5 % received a dermatology consult. The most frequent interventions performed were skin biopsies, topical steroid recommendations, and nursing education on skin care. Dermatology consults changed the diagnosis in 45 % of cases.

CONCLUSIONS: Dermatologists were often not consulted for the care of patients with dermatology-related DRGs. When dermatologists were consulted, we found an impact on both diagnosis and management.

KEY WORDS: inpatient dermatology; dermatology diagnosis related groups; dermatology consults; dermatology admissions; hospital dermatology.

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INTRODUCTION

Examining dermatology-specific and dermatology-related diagnosis related groups (DRGs) provides a window into hospitalizations for skin-related conditions. These DRGs are assigned to each admission for a skin-related issue. Since the adoption of DRGs in 1983, hospitals are reimbursed according to DRGs assigned to patients. Each DRG is associated with a payment rate. Hospital payments are calculated in part on the basis of the DRG coded, with more complicated DRGs commanding a higher rate. For example in 2009, DRG 595 major skin disorder with major complications (MCC) such as in a case of Stevens-Johnson syndrome was paid a case-rate of \$11,476 by Medicare. By comparison, DRG 596 major skin disorder without MCC such as in a case of herpes zoster was paid a case-rate of \$4,321. The mean Medicare case rate in 2009 was \$18,965 for all inpatient hospitalizations.¹ In 2009, there were 285,249 Medicare admissions for dermatology DRGs, which represents 2.4 % of inpatient admissions. Medicare spending for dermatology DRGs totaled \$1.8 billion in 2009.¹

Few US studies to date have examined dermatology DRGs. The studies that do exist show that while admissions for dermatology DRGs overall have increased, admissions to inpatient dermatology wards have decreased. Correspondingly, the number of designated dermatology inpatient units has decreased. Increasingly, specialists in fields other than dermatology are the primary care providers for patients hospitalized with skin-related conditions.^{2,3}

In the US, the study of inpatient dermatology has mainly relied on consult data. These studies have shown that dermatology consults make important contributions to patient care by correcting misdiagnoses and optimizing treatments.⁴⁻⁷ However, while these studies have illuminat-

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ed how dermatology consults are utilized in hospitals, they do not capture the experiences of the entire spectrum of patients admitted for skin disorders. These studies provide only a window into the cases where a consult was called. In this study, we use a combination of dermatology DRGs and inpatient consult data in one hospital to examine the care of all patients admitted with skin-related conditions, regardless of consult status.

METHODS

A retrospective chart review of 512 admissions for dermatology-specific DRGs and dermatology-related DRGs was conducted for the 2009 fiscal year at Brigham & Women's Hospital, a large urban academic medical center. DRG classifications of diagnoses specific and related dermatology were first selected based on standard coding guidelines and on the basis of dermatology DRGs selected in prior studies.² Then all admissions assigned the selected DRGs were identified through an electronic cost accounting database (EPsi). The four dermatology-specific DRGs were 595, 596: major skin condition with and without MCC; and 597, 598: minor skin conditions with and without MCC. The ten dermatology-related DRGs were 573, 574, 575: skin graft and/or debridement for skin ulcer or cellulitis with MCC, with complications (CC), and without MCC/CC; 576, 577, 578: skin graft and/or debridement excision for skin ulcer or cellulitis with MCC, with CC, and without MCC/CC; and 602, 603: cellulitis with and without MCC. Medical record review was approved by the Institutional Review Board of Brigham & Women's Hospital.

The following variables were collected and entered into a Microsoft Excel database: patient demographics and comorbidities, skin-related diagnosis on admission and discharge, discharge placement (home, home with services, skilled nursing facility, or other), length of stay and 30-day readmission rate for Brigham & Women's Hospital. Patient comorbidities, which were ascertained from the admission note, included active diseases treated during the admission and underlying diagnoses. Diagnosis on discharge and discharge placement were ascertained from the discharge summary. Hospitalization data at Brigham & Women's was tracked in order to obtain the 30-day readmission rate. For admissions where a dermatology consult was called, the following data was collected: service requesting consult, reason for consultation, time lapse from admission to consultation request, laboratory testing obtained, and treatment recommendations (if any) made by the consulting team. This information was collected from the initial consultation note and supplemented with information from the discharge summary. Lastly, we measured how often a dermatology consult resulted in diagnostic changes. A change in diagnosis was counted when the diagnosis made

by the dermatology team as documented in the dermatology consult note (that was also different from the admission diagnosis, as documented in the history and physical) was entered as the final diagnosis on the discharge summary. Where appropriate, statistical analysis was performed using the two-tailed chi-squared to compare proportions and Mann-Whitney *U* test to compare distributions, with $p < 0.05$ indicating significance.

RESULTS

There were 512 admissions for dermatology-specific or dermatology-related DRGs in fiscal year 2009, 58 (11 %) of which requested a dermatologic consult. Table 1 shows the frequency of admissions and dermatology consultation rates for dermatology-specific and dermatology-related DRGs. A dermatology consult was requested in 44 (51 %) of admissions for dermatology-specific DRGs and 14 (3 %) of admissions for dermatology-related DRGs.

Table 2 summarizes demographic features such as the age and sex distribution of patients, number of comorbidities, origin of admission, and discharge placement. There were no statistically significant differences in sex and age between the consult and non-consult groups. Median age of consults and non-consults were 53 and 58 years ($p=0.68$) for dermatology-specific DRGs and 66 and 55 years ($p=0.30$) for dermatology-related DRGs. For dermatology-specific DRGs, the median number of comorbidities for consults was lower than for non-consults (2.5 versus 3 comorbidities, $p=0.16$), but this was not statistically significant. The median number of comorbidities for consults was higher than for non-consults (3.5 versus 2 comorbidities, $p=0.02$) in the dermatology-related DRG population. With regards to admission location, no statistically significant difference was observed for dermatology-specific DRG consults and non-consults ($p=0.17$). A statistically significant difference was observed in terms of admission location ($p < 0.02$) for dermatology-related consults and non-consults. Both dermatology-specific and dermatology-related DRG consult and non-consult patients were admitted through the emergency department in the majority of cases. A higher percentage of consults were direct transfer admissions from other hospitals, whereas non-consult patients were more likely to have been admitted from clinic. In terms of discharge placement, the majority of dermatology-specific and dermatology-related consult and non-consult patients were discharged home. There were no statistically significant differences with regards to where consult and non-consult patients were discharged in the dermatology-specific ($p=0.53$) or dermatology-related DRG groups ($p=0.39$). With respect to follow-up, the majority of patients in both groups were seen in clinic. Twenty-two (50 %) of dermatology-specific consult patients

Table 1. Frequency of Admissions and Consults for Dermatology Diagnosis Related Groups (DRGs)

DRG Title	No. of admissions (n=512) and percent of total	No. of consults (n=58) and percent per DRG receiving consults
Dermatology-specific DRGs (%)	86 (17)	44 (51)
595 Major skin disorders with MCC	4 (1)	2 (50)
596 Major skin disorders without MCC	24 (5)	15 (63)
606 Minor skin disorders with MCC	13 (3)	8 (57)
607 Minor skin disorders without MCC	45 (9)	19 (43)
Dermatology-related DRGs (%)	426 (83)	14 (3)
573 Skin graft and/or debridement for skin ulcer or cellulitis with MCC	12 (2)	0(0)
574 Skin graft and/or debridement for skin ulcer or cellulitis with CC	23 (4)	0(0)
575 Skin graft and/or debridement for ulcer or cellulitis without MCC or CC	18 (4)	0(0)
576 Skin graft and/or debridement excision for ulcer or cellulitis with MCC	5 (1)	0(0)
577 Skin graft and/or debridement excision for ulcer or cellulitis with CC	31(6)	0(0)
578 Skin graft and/or debridement excision for ulcer or cellulitis without MCC or CC	53 (10)	0(0)
592 Skin ulcers with MCC	6 (1)	1 (17)
593 Skin ulcers with CC	12 (2)	1 (8)
602 Cellulitis with MCC	43 (8)	3 (7)
603 Cellulitis without MCC	223 (44)	9 (4)

CC complication; MCC major complication

and two (14 %) of the dermatology-related consult patients followed up specifically in dermatology clinic within 30 days.

Table 3 summarizes the referring services. The majority of consults originated from the medicine service. Dermatology DRGs represented 214 (1.1 %) of all admissions to medicine. General medicine called 31 consults, which constitutes 14 % of the dermatology DRG admissions to medicine. With respect to timing, more than half of all dermatology consults were called within the first quarter of a patient's total hospitalization time. The mean and median times to consult were 0.88 and 1 day, respectively. In fact, 7 (12 %) consult requests originated in the emergency department. As assessed using the final discharge diagnoses (Table 4), the two diagnoses that generated the highest

frequency of dermatology consults were drug rash and cellulitis. Additionally, we looked at the diagnoses where a consult was not called (Table 4). There were 246 cases of cellulitis, which represents 54 % of all non-consults. As assessed by the final diagnoses, a consult was called for cellulitis in 5 % of cases.

Dermatology consults impacted diagnosis, workup and management. A dermatology consult changed the primary team's diagnosis in 26 (45 %) of cases. Twenty-five (43 %) of diagnoses remained the same, and 7 (12 %) of cases could not be assessed for changes in diagnoses because of the lack of sufficient documentation. The top three diagnostic changes by final diagnosis were: seven (27 %) cases of drug rash, five (19 %) cases of stasis dermatitis, and four (15 %) cases of cellulitis.

Table 5 summarizes the impact of a dermatology consult on the management of skin conditions. In 56 (96 %) of the consulted cases, a medication change was made. The most frequent intervention was the addition of a topical corticosteroid, followed by nursing instructions. Dermatology also recommended further work-up such as additional consults in nine (16 %) cases and additional laboratory work-up in 14 (24 %) of cases. Furthermore, dermatologists performed 37 diagnostic tests, of which 19 (33 %) were skin biopsies and 11 (19 %) were cultures.

Finally, we assessed the impact of a consult on hospital utilization for dermatology-specific DRGs. The median length of stay was longer by 2 days for dermatology-specific DRG consults versus non-consults (4 days vs. 2 days, $p < 0.0001$); however, as compared to the dermatology-specific non-consults, readmission rates at 30 days were lower for the consult population. Five (11 %) consults versus nine (21 %) non-consults were readmitted within 30 days, but this did not achieve statistical significance ($p = 0.21$).

DISCUSSION

The aim of this study was three-fold: (1) to characterize patients admitted for dermatologic concerns, (2) to analyze hospital utilization patterns for dermatology consults, and (3) to assess the impact of dermatology consults. Whereas previous studies have analyzed inpatient dermatology through chart review of dermatology consults, our study offers a novel approach by analyzing all skin-related admissions using dermatology DRGs. We believe an analysis of all skin-related admissions regardless of consult status offers a more complete characterization of inpatients with dermatologic disease.

This study supports Kirsner's assertion that in the context of a growing number of skin-related inpatient admissions, dermatologists still play a surprisingly small role in taking care of these patients. From 2008 to 2010, dermatology

Table 2. Patient Demographics

	Dermatology-specific DRG		P value*	Dermatology-related DRG		P value*
	Consult (n=44)	Non-consult (n=42)		Consult (n=14)	Non consult (n=412)	
Age, years (%)						
< 19	1 (2)	0 (0)	0.68	0 (0)	1 (0)	0.30
19–45	12 (27)	14 (33)		4 (29)	127 (31)	
46–65	19 (43)	14 (33)		3 (21)	158 (38)	
> 65	12 (27)	14 (33)		7 (50)	126 (31)	
Female gender (%)	25 (57)	21 (50)	0.52	9 (64)	195 (47)	0.21
Comorbidities (%)						
0–1	6 (14)	7 (17)	0.16	3 (21)	179 (43)	0.02
2–5	26 (59)	23 (55)		7 (50)	203 (49)	
> 5	4 (9)	8 (19)		4 (29)	30 (7)	
Origin of admission (%)						
Emergency Department	28 (64)	32 (76)	0.17	7 (50)	231 (56)	0.03
Direct Transfer	11 (25)	4 (10)		3 (21)	20 (5)	
Clinic	5 (11)	6 (14)		4 (29)	160 (39)	
Discharge placement (%)						
Home without services	27 (61)	26 (62)	0.53	5 (36)	163 (40)	0.39
Home with services	9 (20)	12 (29)		5 (36)	173 (42)	
Post-acute care facility	7 (16)	4 (10)		1 (7)	42 (10)	
Other	1 (2)	0 (0)		3 (21)	34 (8)	

*P values were calculated using Pearson's chi-square test of association to compare proportions, and Mann–Whitney test to compare distributions

DRG Medicare admissions increased on average 6 % per year. Medicare spend increased 14 % per year from 2008 to 2010. During this period, the volume of dermatology-specific Medicare discharges increased on average 3.9 % per year, from 16,868 to 18,366. Total Medicare patient days for dermatology-specific DRGs increased on average 3.4 % per year, from 78,521 to 82,426. Dermatology-related Medicare discharges increased at a higher rate, averaging 4.5 % per year from 227,607 to 251,494. Total Medicare patient days for dermatology-related DRGs increased on average 5.4 % per year from 1,270,097 to 1,297,835.¹ Consequently, it is within the context of rising admissions for skin-related conditions that our study finds a 51 % consult rate for dermatology-specific DRG admissions and a 3 % consult rate for dermatology-related DRG admissions. Often other medical professionals are caring for patients admitted for skin conditions in lieu of dermatologists.

Our analysis of dermatology admissions where no consult was called showed that these patients had common dermatologic diseases, including cutaneous malignancies, skin ulcers, and drug rashes (Table 4). We were surprised to find that only 5 % of cellulitis patients received a consult. At the same time, dermatologists are consulted to care for oncology patients to a greater extent due to the emergence of new medical and radiation protocols and their associated complications.⁸ In this study, oncology originated 11 % of consults (Table 3). These consults often concerned rashes associated with new chemotherapeutics or with infections as a result of immunosuppression.

When a consult is called, dermatologists exert a significant impact on diagnosis and management. Our study found that a dermatology consult changed the diagnosis in

45 % of admissions, which is consistent with previous reports of misdiagnosis rates ranging from 30 % to 78 %.^{4,5} Also in line with previous studies, our study showed that misdiagnoses were not only associated with rare dermatology conditions, but often involved common dermatoses such as drug rash, cellulitis, and allergic and stasis dermatitis.^{4–6} This calls into question our current inpatient model for skin-related admissions, whereby dermatologists now see a minority of these patients. Furthermore, this study suggests weaknesses in past medical curriculums with regards to diagnosing and treating common dermatoses.

Our study showed that dermatologists contribute to patient care by performing diagnostic tests and recommending appropriate treatment. As suggested by previous studies, the leading procedures dermatologists performed are skin biopsies and skin cultures.^{4–6} Also in line with prior studies, the most common therapy recommended by dermatologists was topical corticosteroids.^{4–6} Interestingly, after topical steroids, the second most common intervention was nursing education, occurring in 43 % of cases. Our study highlights the importance of dermatology consults in educating nurses on dressing changes, wound care, and dermatologic skin care. This becomes especially important in the setting of a decline in

Table 3. Referring Services

Referring service (%)	Consults (n=58)
General medicine	31 (53)
Oncology	12(21)
Emergency	7 (12)
Bum ICU	4 (7)
Cardiology	1 (2)
Neurology	1 (2)
Neurosurgery	1 (2)
Renal Transplant	1 (2)

Table 4. Final Diagnoses

Final diagnosis	All DRGs		Dermatology-specific		Dermatology-related	
	Consult (n=58)	Non-consult (n=454)	Consult (n=44)	Non-consult (n=42)	Consult (n=14)	Non-consult (n=412)
Cellulitis	12 (21)	246 (54)	0 (0)	0 (0)	12 (86)	246 (60)
Skin ulcer	1 (2)	85 (19)	0 (0)	1 (2)	1 (7)	84 (20)
Drug rash	13 (22)	12 (3)	13 (30)	12 (29)	0 (0)	0 (0)
Stevens-Johnson syndrome	6 (10)	0 (0)	6 (14)	0 (0)	0 (0)	0 (0)
Hidradenitis	5 (9)	5 (1)	5 (11)	2 (5)	0 (0)	3 (1)
Psoriasis	3 (5)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)
Neutrophilic dermatoses	3 (5)	0 (0)	2 (5)	0 (0)	1 (7)	0 (0)
Herpes simplex, zoster	3 (5)	10 (2)	3 (7)	10 (24)	0 (0)	0 (0)
Dermatitis	2 (3)	3 (1)	2 (5)	3 (7)	0 (0)	0 (0)
Cutaneous malignancy	0 (0)	49 (11)	0 (0)	1 (2)	0 (0)	48 (12)
Blistering disorder	3 (5)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)
Other	7 (12)	44 (10)	7 (16)	13 (31)	0 (0)	31 (8)

inpatient dermatology services and the corresponding lack of dedicated nursing expertise. Without inpatient dermatology wards to develop and cultivate expertise around skin care, it falls increasingly upon dermatologists to educate nursing on the care of dermatologic patients.

A third aim of this study was to assess the impact of dermatology consults on hospitalization utilization for dermatology-specific DRGs. To this end, we found that on average dermatology consult patients had a longer length of stay than non-consults. This may reflect a higher level of complexity in the consult population. Whereas non-consult patients were often direct admits from clinic with known diagnoses, consult patients were transfers from other hospitals for both diagnosis and management. Dermatology-specific consult patients had a lower 30-day readmission rate, but this was not statistically significant. This trend may be in part due to the inpatient care provided by dermatologists as well as dermatology follow-up post-hospitalization. 50 % of consult patients as opposed to 2 % of non-consult dermatology-specific DRG patients had follow-up in dermatology clinic. Our study suggests that the impact of a dermatology consult encompasses the entire patient care cycle. Dermatologists improve diagnostic accuracy, perform diagnostic tests, recommend treatments, ensure the appropriate administration of treatment regimens, and follow up with patients post-hospitalization.

The primary limitation of this study was its reliance on discharge data, which is of varying quality. This limitation was addressed through cross-referencing with admission and consult notes, which were uniformly of higher quality. Furthermore, since the impact of dermatology consult was primarily assessed through the initial consult note (without taking into consideration additional progress notes), this study may underestimate the impact of dermatologists. Conversely, the primary team may also have changed diagnoses prior to consulting the dermatology team. If such cases were not documented in progress notes, our study may overestimate misdiagnoses rates. However, this is less likely given that patients were seen by dermatology with less than a day of lag time between admission and consult on average. Another

limitation of this study was the use of unadjusted comparisons. To address this, comparisons were stratified by dermatology-specific and dermatology-related groups. Still, a larger consult population extending across multiple years would have allowed for more statistically significant subset analyses. This current study represents the experience of a metropolitan academic medical center, so its findings may have limited generalizability. Nevertheless, our results are in agreement with findings at rural and urban settings, including Geisinger Medical Center, University of Iowa Hospitals and Clinics, and University of Miami Jackson Memorial Hospital.⁴⁻⁶

Another limitation of this study is that in cases where no consult was called, it is unclear whether a dermatology consult would have indeed changed management. Furthermore, in some cases it may be appropriate to forgo a dermatology consult. For example, if specialties such as plastic surgery, vascular surgery, or allergy are available, they may manage select dermatologic disorders such as skin ulcers and drug rashes without requiring dermatology input. Additionally, in the setting of a teaching hospital, the medicine house staff may benefit from strong dermatology training; and therefore staff may have a higher threshold for calling a dermatology consult. Furthermore, dermatology may be informally consulted at hospitals with dermatology consult services. Lastly, in cases

Table 5. Effect of a Dermatology Consult

Changes in treatment (%)	All DRGs (n=56)	Dermatology-specific DRGs (n=44)	Dermatology-related DRGs (n=14)
Corticosteroids topical	27 (48)	24 (55)	3 (21)
Nursing instructions	25 (43)	20 (45)	5 (36)
Emollients	17 (29)	12 (27)	5 (36)
Antihistamines oral	14 (24)	13 (30)	1 (7)
Discontinue offending drugs	14 (24)	12 (27)	2 (14)
Antibiotics topical	11 (19)	7 (16)	4 (29)
Antifungals topical	10 (17)	6 (14)	4 (29)
Corticosteroids oral	8 (14)	7 (16)	1 (7)
Antibiotics oral	5 (9)	5 (11)	0 (0)
IVIG	5 (9)	5 (11)	0 (0)
Antivirals	5 (9)	2 (5)	3 (21)
Antifungals oral	2 (3)	2 (5)	1 (7)

where the inpatient team is in close communication with a patient's outpatient dermatologist, an inpatient consult may not be necessary or cost-effective.

This study represents an effort to characterize the clinical care of inpatients admitted for skin-related diagnoses. Further study of this patient group is needed in order to appropriately understand how to best care for these patients. Such studies could help define the timing, conditions and circumstances around when a primary team should call a dermatologic consult. Moreover, such studies could inform how to most effectively deliver inpatient dermatologic care—whether through an inpatient service with a dedicated nursing unit, through a consulting hospitalist model, or through temporary rotating clinicians who primarily work on an outpatient basis.⁹

Finally, in the era of rising healthcare costs, additional studies are needed to explore the cost of caring for dermatologic conditions, and whether dermatologists in the inpatient setting can impact hospitalization utilization with regards to decreasing length of stay, emergency room visits, and readmission rates. The dermatology-related DRG group is especially worthy of intervention, given its high rise in hospital admissions, hospital days, and Medicare payments.

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