

Valuing the Inpatient Dermatology Consult Service at a Single Academic Institution

Keywords: Inpatient dermatology; Dermatology consults; Value quantification; Hospital admissions; Cost quantification

Introduction

Despite increasing evidence that dermatology inpatient services add significant value and cost savings to health systems [1-4], obtaining hospital support for inpatient dermatology hospitalists can be challenging and professional reimbursement alone is insufficient to support the time required for this service [2-4]. We performed a retrospective, cross-sectional cohort study to characterize the inpatient population with skin-related conditions at Tufts Medical Center (TMC) in Boston in order to quantify the value of inpatient dermatologic consultations.

Our analysis included all hospital admissions at TMC in between January 1 to December 31, 2019. Out of 17,844 inpatient admissions, 2,468 (13.8%) had one or more skin diagnoses, with 179 patients (1.0%) receiving at least one dermatology consult. Table 1 provides the diagnostic breakdown of all coded inpatient dermatologic diagnoses. Infectious diagnoses were the most common at 44.6% (1523), of which 51.3% (781) were cellulitis, 29.3% (446) were abscesses, and 19.4% (296) were other infections. The mean duration of admission was 9.0 days [8.5-9.6] for patients with at least one dermatological diagnosis, versus 5.7 days [5.5-5.8] for the entire inpatient population. The mean admission duration of patients with dermatology consults was 11.4 days [8.2-14.5], suggesting higher complexity of disease.

Table 1: Frequency distribution and average length stay of general inpatient population with at least one dermatological diagnosis.

Diagnosis	Frequency	Average length of admission in days [95% CI]
Autoimmune	4.3% (146)	6.5 [6.2-6.7]
Blistering	0.4% (15)	6.7 [6.3-7.0]
Dermatitis	0.7% (24)	20.3 [18.4-22.1]
Drug-related	1.9% (63)	10.0 [9.6-10.4]
Endocrine	0.3% (11)	10.7 [10.3-11.1]
Genetic	1.3% (43)	8.9 [8.4-9.4]
Infectious	44.6% (1523)	9.3 [8.7-9.8]
Inflammatory	14.3% (488)	8.9 [8.3-9.4]
Miscellaneous	7.3% (248)	9.9 [9.4-10.3]
Neoplastic	7.2% (176)	5.6 [5.4-5.9]
Psychosomatic	0.4% (12)	12.4 [11.7-13.1]
Symptoms	1.0% (33)	9.2 [8.7-9.6]
Traumatic	5.9% (201)	6.9 [6.7-7.2]
Ulceration	4.1% (140)	15.1 [14.2-16.1]
Vascular	8.5% (290)	8.1 [7.6-8.5]
Total	100.0% (3413)	9.0 [8.5-9.6]

CI - Confidence Interval

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The dermatology inpatient service was most consulted for suspected infectious conditions 32.4% (59), unknown diagnoses 16.4% (30), and inflammatory conditions 14.8% (27). Of the 19 consults for suspected cellulitis only 7 cases (36.8%) were clinically consistent with cellulitis. This is consistent with a previous study in which the cellulitis misdiagnosis rate was 74% [1]. Of the 12 remaining cases admitted for presumed cellulitis, 8 still required admission and 4 were preventable admissions ultimately diagnosed as: dermatitis (3), and lymphedema (1). Performing a sensitivity analysis, at an average length of stay of 5.7 days and a national mean cost of \$2,607 per day of hospitalization [5], dermatology consultation could have saved the health system \$59,440 on these four preventable admissions. Savings could be as high as \$2,443,280 in 2019 at this institution if extrapolated to all inpatients with presumed cellulitis. These savings exclude the opportunity cost of turning away admissions given limited bed capacity. This upper limit of savings may be an overestimation since consultation cases may be more challenging to diagnose. Two prospective studies which randomly evaluated cellulitis in patients, showed a mis-diagnosis rate of 30.7-33.6% [1], translating to approximately \$2.5 million in savings.

Table 2 provides the diagnosis distribution and impact characteristics. About 62.6% of primary team diagnoses were incongruent with dermatology team diagnoses. Dermatology consults altered management in 67.6% of cases. On average, it took 1.4 days [1.1-1.7] for inpatient teams to initiate a dermatology consult once a skin condition was noticed. The average time to consult for specific categories of dermatology team final diagnoses is presented in Table 2.

The results of this study show the significant impact dermatology consults can have on hospital admissions, from changes in management to avoidance of hospitalization altogether. Furthermore, these demonstrated cost savings justify hospital funding of dedicated inpatient dermatology consultative services that otherwise would be difficult to sustain through professional billing services alone.

Table 2: Diagnosis distribution and impact characteristics of dermatology consults in the inpatient setting.

Final diagnosis (category) after dermatology consult	Frequency	Congruency with primary team diagnosis	Altered management	Altered discharge	Average length of admission in days [95% CI]	Days between onset and consult [95% CI]
Autoimmune	5.0% (9)	66.7% (6)	66.7% (6)	22.2% (2)	19.0 [0.0-38.6]	1.1 [0.7-1.5]
Blistering	2.8% (5)	80.0% (4)	100.0% (5)	80.0% (4)	6.4 [4.4-8.4]	1.4 [0.1-2.7]
Drug-related	11.2% (20)	55.0% (11)	80.0% (16)	50.0% (10)	9.2 [3.7-14.6]	0.5 [0.1-0.8]
Granulomatous	1.1% (2)	0.0% (0)	100.0% (2)	50.0% (1)	7.5 [6.5-8.5]	5.0 [3.0-7.0]
Infectious	25.1% (45)	46.7% (21)	64.4% (29)	46.7% (21)	9.4 [5.8-13.0]	0.9 [0.5-1.3]
Inflammatory	32.4% (58)	27.6% (16)	75.9% (44)	48.3% (28)	14.2 [5.5-22.9]	1.9 [1.2-2.5]
Neoplastic	4.5% (8)	25.0% (2)	25.0% (2)	25.0% (2)	8.5 [0.0-17.2]	1.0 [0.0-2.0]
None	1.7% (3)	0.0% (0)	0.0% (0)	33.3% (1)	13.0 [0.0-33.6]	0.7 [0.0-1.5]
Perforating	0.6% (1)	0.0% (0)	100.0% (1)	100.0% (1)	2.0 [2.0]	1.0 [1.0]
Psychosomatic	1.7% (3)	66.7% (2)	66.7% (2)	0.0% (0)	16.7 [0.0-37.6]	1.3 [0.0-3.9]
Traumatic	4.5% (8)	0.0% (0)	37.5% (3)	0.0% (0)	7.6 [4.4-10.9]	2.4 [0.3-4.6]
Vascular	9.5% (17)	29.4 % (5)	64.7% (11)	47.1% (8)	10.3 [5.9-14.7]	1.6 [0.6-2.7]
Total (n=179)	100% (179)	37.4% (67)	67.6% (121)	43.6% (78)	11.4 [8.2-14.7]	1.4 [1.1-1.7]

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