JACEP OPEN
JOURNAL OF THE AMERICAN COLLEGE OF EMERGENCY PHYSICIANS OPEN
Open Access
A GLOBAL JOURNAL OF EMERGENCY MEDICINE
American College of Emergency Physicians®
ADVANCING EMERGENCY CARE

ORIGINAL RESEARCH

Infectious Disease

Check for updates

Factors Associated With Observation Unit Admission in Emergency Department Patients With Skin and Soft Tissue Infections

Brady Simpson MS[1], Kevin Han MS[1], Steven Yee MS[1], Rasha Alsaadawi MS[2], Roy Sabo PhD[2], Taruna Aurora MD[3], Joseph Lykins MD[4]

[1]*School of Medicine, Virginia Commonwealth University, Richmond, Virginia, USA*
[2]*Department of Biostatistics, School of Population Health, Virginia Commonwealth University, Richmond, Virginia, USA*
[3]*Department of Emergency Medicine, Virginia Commonwealth University Health System, Richmond, Virginia, USA*
[4]*Department of Emergency Medicine, Chobanian & Avedisian School of Medicine, Boston University, Boston, Massachusetts, USA*

Correspondence

Joseph Lykins, MD, Department of Emergency Medicine, Chobanian & Avedisian School of Medicine, Boston University, 725 Albany Street, Boston, MA 02118, USA. Email: joseph.lykins@bmc.org

Taruna Aurora, MD, Department of Emergency Medicine, Virginia Commonwealth University Health System, Box 980401, Richmond, VA 23298, USA. Email: taruna.aurora@vcuhealth.org

Authors Brady Simpson, Kevin Han, and Steven Yee contributed equally.

Received: June 25, 2024
Revised: September 18, 2024
Accepted: September 23, 2024
https://doi.org/10.1016/j.acepjo.2024.100002

Abstract

Objectives: Skin and soft tissue infections (SSTIs) constitute a significant portion of emergency department (ED) cases, with some requiring admission into the observation unit (OU) for ongoing care. Identifying factors linked to OU admission is essential for optimizing patient disposition decisions.

Methods: A retrospective cohort study identified patients with the International Classification of Diseases 10th Revision (ICD-10) codes indicating SSTI at an urban, tertiary care ED over 3 years (2017-2019) who were ultimately discharged. Patients admitted at index visit were excluded. Medical charts were reviewed for demographic and clinical data. Simple logistic regression models explored bivariate associations with OU admission, while a multiple logistic regression model adjusted for demographics, clinical characteristics, vital signs, and pre–index visit and in-ED management.

Results: Among 1675 patients (42.9% female; mean age, 45.5 ± 15.4 years; 56.4% identifying as Black), 20.7% (n = 346) were admitted to the OU. Unadjusted analysis showed associations between OU admission and factors, including age, history of intravenous drug use (IVDU), lower extremity SSTI, subjective systemic illness, fever at index visit, ED surgical consultation, and pre–index visit antimicrobial choice. After adjustment, age (odds ratio [OR], 1.16; 95% CI, 1.04-1.30), immunocompromised status (OR, 1.83; 95% CI, 1.07-3.13), extremity cellulitis (lower: OR, 2.51; 95% CI, 1.55-4.14; upper: OR, 2.35; 95% CI, 1.36-4.12), surgical consultation (OR, 2.64; 95% CI, 1.79-3.91), and prehospital methicillin-resistant *Staphylococcus aureus* (MRSA) antibiotic prescription (OR, 2.76; 95% CI, 1.69-4.54; *P* = .0001) remained statistically significant.

abstract continues

Supervising Editor: Christopher Baugh, MD, MBA

JACEP OPEN

Abstract (continued)

Conclusion: Identifying factors associated with OU admission provides insights into clinician decision making, potentially identifying patients who might benefit from OU admission through future work, which should focus on predictors of hospital admission, OU failure, and antimicrobial selection to reduce OU failure rates.

Keywords: *skin and soft tissue infection, SSTI, cellulitis, observation unit*

1 INTRODUCTION

1.1 Background

Skin and soft tissue infections (SSTIs) represent a frequent cause of emergency department (ED) visits, with several studies describing increasing frequency of ED visits for SSTI.[1–5] These conditions can cause morbidity and mortality and are not evenly distributed across the population, with some studies identifying higher risk for people of color, patients in the southern United States, and older patients.[1,6] Patients with a history of intravenous drug use (IVDU) are also at increased risk. The contribution to the epidemiology of SSTI from community-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) is also worthy of note and poses challenges in SSTI management.[7,8]

Patients presenting to the ED with SSTI can sometimes be discharged on oral antibiotics, but a subset require admission, often for continued monitoring for infection progression and frequently for parenteral antibiotics. The development of observation units (OUs) as alternative disposition contributes to the successful shunting of patients away from inpatient units, facilitating continued monitoring, intravenous (IV) antibiotics, and occasionally consultation with subspecialty and surgical colleagues.

1.2 Importance

There is a paucity of literature on predictors of OU admission from the ED in the context of SSTI. Several studies have investigated predictors of OU admission failure and subsequent inpatient admission for SSTI and have noted objective fever; elevated lactate level, white blood cell count, or inflammatory marker levels; localization of infection to the hand; and female sex as possible predictors of treatment failure.[9–12] These studies provide conflicting evidence regarding which factors influence OU admission, with some implicating demographic characteristics, others suggesting clinical factors like vital signs are useful predictors, and others finding no such relationship. This suggests further studies are needed to elucidate which factors might serve as prognostic signs influencing ED physician and advanced practice provider decision making regarding disposition.

1.3 Goals of This Investigation

The study described herein sought to identify factors that influence odds of OU admission for patients presenting to the ED with SSTI with the goal of providing data to inform decision tools to predict need for OU admission and to inform future investigation on SSTI OU treatment failure.

2 METHODS

The study complied with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[13]

2.1 Study Design and Setting

This was a retrospective cohort study from January 1, 2017, to December 31, 2019, and included patients treated in the adult ED at Virginia Commonwealth University Health System in Richmond, Virginia. The hospital is an urban, tertiary care center with ~78,644 annual visits during the first year of the study period and serves a predominantly African American population.

The OU at our institution is an 16-bed complex, type 2 OU staffed by a dedicated physician, board certified in emergency and internal medicine along with advanced practice providers. It is geographically separate from the ED, although it is on the same floor of the hospital. Monthly observation encounters average 340, with mean length of stay (LOS) of 23.7 hours. Conversion rate to inpatient, overall, is 16%, with an average of 283 observation discharges per month. The OU accepts patients beyond established OU protocols generally with the condition that the patient has not met admission criteria and an appropriate disposition (including other factors, ie, need for skilled nurse facilities or other care) can be completed in less than 2 midnights. Criteria used to place patients in observation status for SSTI are those patients who did not meet inpatient criteria from the ED, generally follow Milliman guidelines—hemodynamic instability, altered mental status that is severe or persistent, limb-threatening infection, clinical presentation or treatment regimen judged to require intensity of patient monitoring or care that cannot be provided at other than inpatient level of care, bacteremia, suspected necrotizing soft tissue infection, severe oral or head and neck cellulitis, orbital infection, preseptal or perineal infection that is severe or progressive, severe pain requiring acute inpatient management, inability to maintain oral hydration (ie, need for IV fluid support) that persists after observation care, and compartment syndrome monitoring. If patients do not meet these prespecified inpatient criteria and can likely have appropriate disposition within 2 midnights, they are often admitted to the OU if space

The Bottom Line

Our study investigated skin and soft tissue infections, which make up a substantive portion of emergency department visits, to figure out what factors lead to patients being placed in the observation unit for further care. We found that certain key factors—such as older age, having an immunocompromising condition, infections in the extremities, and already being on antibiotics for methicillin-resistant *Staphylococcus aureus* (MRSA) before hospital arrival—are strong predictors of whether a patient gets admitted to the observation unit. This helps clarify which patients might need extra attention and more intensive monitoring, thereby guiding better care decisions in the emergency department.

allows. It should be noted that although many OU admission processes rely heavily on protocols and rigid admission/exclusion criteria, admissions to the OU at Virginia Commonwealth University Health System are guided primarily by shared clinical judgment of the ED team and the clinicians in the OU.

2.2 Selection of Participants

The cohort was identified initially for a quality improvement initiative. The study was granted approval by the Institutional Review Board (Protocol Number HM20023552). Patients aged ≥18 years were selected on the basis of International Classification of Diseases 10th Revision (ICD-10) codes indicating SSTI. For a complete list of ICD-10 codes included, please see Table S1. Patients admitted to the hospital at index visit were excluded.

2.3 Measurements

Data were abstracted from the electronic medical record (Cerner). Demographic data, including age, self-identified race/ethnicity, as well as medical history (comorbid diabetes mellitus [DM], history of IVDU, history of immunocompromise [defined as active chemotherapy, history of HIV/AIDS, immunosuppressive medication prescriptions, etc], and pre–index visit antibiotics), clinical parameters (including vital signs and laboratory parameters), as well as aspects of clinical management (whether or not antibiotics were administered in the ED, and if so, which ones, whether incision and drainage [I&D] was performed, whether surgical consultation was ordered in the ED, etc) were obtained and recorded. For an exhaustive list of data abstracted from each chart, please see Table S2. These variables were down-selected to the variables included in the models by looking for variables that were reliably available, minimizing missing data. All variables included in the model had low rates of missing data (0.5% or less), and thus, full analysis was performed. Abstractors (BS, KH, and SY) were trained using strict definitions and were monitored episodically for accuracy by one of the coprincipal investigators (JL), and a subset of charts were reviewed by the coprincipal investigator to assess agreement. Abstractors were not blinded to the purpose of this study.

2.4 Outcomes

The primary outcome measure was admission to the OU.

2.5 Data Analysis

All numerical measurements were summarized as mean ± SD and 95% CIs or as median (range), depending on the distributions they followed. Categorical measures were summarized with frequencies and percentages. Total and number of missing observations are reported for each item. Temperature and heart rate were dichotomized to normal and abnormal (elevated) to more accurately correspond to clinician decision making. Abnormal heart rate was defined as ≥100 beats/min, and abnormal temperature was defined ≥38 °C. Simple logistic regression models were used to investigate bivariate associations of each measurement with OU admission. A multiple logistic regression model was used to adjust the model for demographics and other measurements. Significant associations at the 5% level are reported as odds ratios (ORs) with 95% CIs and *P* values. These statistical tests were performed by a biostatistician blinded to study hypotheses. All summaries and analyses were performed in R 4.2.2 (R Development Core Team).

3 RESULTS

3.1 Cohort Selection

A total of 1970 patients presented to the ED with ICD-10 codes for SSTI. Twenty-eight patients were excluded from the study for inappropriately applied ICD-10 code/misdiagnosis (7), leaving before receiving medical treatment (8), wound recheck (11), and other (2 medication refills and a throughput misunderstanding). This resulted in 1942 patients. Of these patients, final analysis was performed on 1675 patients presenting for cellulitis and excluding patients with paronychia or felon, which were deemed less representative of patients of interest with cellulitis and other SSTI and who were less likely to be admitted to the OU given lower acuity.

3.2 Cohort Descriptive Statistics

The study identified 1675 patients who presented with SSTI to the ED from 2017 to 2019. Table 1 presents descriptive statistics of the entire cohort, including age, sex, race/ethnicity, as well as past medical history and clinical characteristics. The cohort was 42.9% female (n = 718), with a mean age of 45.5 ± 15.4 years. With respect to self-reported race/ethnicity, 56.4%

TABLE 1. Summary of patient characteristics.

Characteristic	Category	Frequency (%)
Sex	Female	824 (41.7%)
	Male	1118 (56.5%)
Age (y)	Mean (SD)	44.9 (15.3)
Race	Black	1142 (57.7%)
	White	688 (34.8%)
Diabetes	No	1575 (79.5%)
	Yes	370 (18.7%)
Intravenous drug use	No	1796 (90.8%)
	Yes	146 (7.4%)
Immunocompromised	No	1793 (90.7%)
	Yes	149 (7.5%)
Systemic illness	No	1766 (89.3%)
	Yes	174 (8.8%)
ICD-10	Lower extremity	928 (46.9%)
	Upper extremity	537 (27.1%)
	Head, neck	239 (12.1%)
	Trunk	130 (6.6%)
	Unspecified cellulitis	99 (5.0%)
Received anti-MRSA abx pre-ED	No	1764 (89.2%)
	Yes	178 (9.0%)
Received anti-MRSA abx intra-ED	No	1195 (60.4%)
	Yes	747 (37.8%)
Received anti-MRSA abx post-ED	No	826 (41.8%)
	Yes	1116 (56.4%)
Abscess	No	1794 (90.7%)
	Yes	148 (7.5%)
OU admit	No	1590 (80.4%)
	Yes	352 (17.8%)
ED return	No	1784 (90.2%)
	Yes	158 (8.0%)
Heart rate (beats/min)	Mean (SD)	87.3 (14.7)
SBP (mm Hg)	Mean (SD)	138.4 (21.3)
DBP (mm Hg)	Mean (SD)	83.5 (19.9)
Temperature (°C)	Mean (SD)	36.8 (0.8)

abx, antibiotics; ED, emergency department; DBP, diastolic blood pressure; ICD-10, International Classification of Diseases 10th Revision; MRSA, methicillin-resistant *Staphylococcus aureus*; OU, observation unit; SBP, systolic blood pressure.

(n = 944) identified as Black. A total of 20.7% (n = 346) were admitted to the OU.

In terms of comorbid conditions and medical history, 19.8% (n = 331) had a history of DM, 8.1% (n = 135) had a history of IVDU, and 7.4% (n = 124) had a history of immunocompromising conditions (ie, active chemotherapy, history of HIV/AIDS, history of organ transplantation on immunosuppressive medication, etc). The majority of the patients, 71.5% (n = 1199), had cellulitis of their extremities.

For those patients not admitted to the OU, 30 day return to the ED for the same complaint occurred in 119 of 1329 (~9%) patients, while for those patients admitted to the OU, it occurred in 28 of 346 (~8%). This suggests a lower, but comparable, rate of return among those admitted to the OU.

Average LOS for those patients discharged from the ED was 255 ± 189 minutes, while average LOS for patients admitted to the OU was 1475 ± 478 minutes. Of the 346 patients admitted to the OU, only 5 (1.4%) had LOS of >48 hours, suggesting the vast majority of patients achieved disposition decision within the allotted time of an observation stay.

3.3 Unadjusted Logistic Regression Analysis

To determine factors associated with admission to the OU, simple logistic regression models were fitted to investigate bivariate associations of each measurement with OU admission. The results are summarized in the left part of Table 2. Statistically significant factors increasing odds of OU admission included age (OR, 1.11; 95% CI, 1.03-1.20; $P = .0095$), White race (OR, 1.29; 95% CI, 1.01-1.65; $P = .0381$), history of IVDU (OR, 1.50; 95% CI, 1.00-2.22; $P = .0445$), history of immunocompromised status (OR, 1.86; 95% CI, 1.24-2.75; $P = .0023$), report of subjective systemic illness (OR, 2.07; 95% CI, 1.46-2.90; $P < .0001$), SSTI of the lower extremity (OR, 1.88; 95% CI, 1.27-2.84; $P = .0020$), prehospital administration of anti-MRSA antibiotics (OR, 2.42; 95% CI, 1.71-3.40; $P < .0001$), in-ED administration of anti-MRSA antibiotics (OR, 22.27; 95% CI, 15.49-33.03; $P < .0001$), fever (OR, 2.72; 95% CI, 1.00-7.12; $P = .0443$), and surgical consultation (OR, 3.68; 95% CI, 2.78-4.88; $P < .0001$) or I&D by surgical consultants (OR, 4.00; 95% CI, 2.08-7.68; $P < .0001$).

3.4 Adjusted Multiple Logistic Regression Analysis

A multiple logistic regression model was fitted to adjust for the demographics and other variables outlined in Table 1. Results from this model are summarized in the right half of Table 2. Of the variables identified above, age (OR, 1.16; 95% CI, 1.04-1.30; $P = .0088$), immunocompromised status (OR, 1.83; 95% CI, 1.07-3.13; $P = .0262$), upper (OR, 2.35; 95% CI, 1.36-4.12; $P = .0024$) and lower (OR, 2.51; 95% CI, 1.55-4.14; $P = .0002$) extremity localization of SSTI, prehospital (OR, 2.76; 95% CI, 1.69-4.54; $P = .0001$) and in-ED (OR, 33.4; 95% CI, 20.48-56.74; $P < .0001$) anti-MRSA antibiotic administration, surgical consultation (OR, 2.64; 95% CI, 1.79-3.91; $P < .0001$) remained statistically significant predictors of OU admission. ORs are depicted in the Figure.

TABLE 2. Simple and multiple logistic regression models for observation unit admission.

	Unadjusted analysis		Adjusted analysis	
Characteristic	**OR (95% CI)**	***P* value**	**OR (95% CI)**	***P* value**
Age at visit	1.14 (1.05-1.22)	.0009[a]	1.20 (1.07-1.35)[a]	.0013[a]
Gender (M)	0.95 (0.75-1.20)	.664	0.79 (0.58-1.09)	.1513
Race (White)	1.48 (1.16-1.88)	.0013[a]	1.08 (0.79-1.49)	.6195
Race (Other)	0.74 (0.40-1.28)	.3081	0.86 (0.40-1.75)	.6885
Obesity	1.08 (0.85-1.36)	.527	1.14 (0.82-1.58)	.4421
Diabetes	1.37 (1.04-1.81)	.0255[a]	0.95 (0.63-1.40)	.7827
Intravenous drug use	1.66 (1.11-2.43)	.0106[a]	0.97 (0.58-1.59)	.9014
Immunocompromised	1.81 (1.23-2.62)	.0022[a]	1.75 (1.04-2.92)	.0322[a]
Systemic illness	2.35 (1.66-3.29)	<.0001[a]	1.24 (0.79-1.94)	.3539
Symptom duration (d)	1.00 (0.99-1.01)	.651	0.99 (0.98-1.01)	.3485
Cellulitis of upper extremity	1.34 (0.88-2.09)	.1795	1.84 (1.07-3.22)	.0288[a]
Cellulitis of lower extremity	1.76 (1.19-2.66)	.0055[a]	2.40 (1.48-4.00)	.0006[a]
Cellulitis of trunk	0.75 (0.38-1.44)	.4041	0.71 (0.30-1.60)	.4147
Abscess	1.16 (0.75-1.74)	.481	1.25 (0.67-2.31)	.4761
Unspecified cellulitis	0.40 (0.15-0.93)	.0485[a]	0.85 (0.27-2.36)	.7676
Pre-ED anti-MRSA antibiotic prescription	2.64 (1.88-3.67)	<.0001[a]	2.95 (1.82-4.83)	<.0001[a]
Intra-ED anti-MRSA antibiotic administration	24.43 (17.18-35.81)	<.0001[a]	37.30 (23.08-62.71)	<.0001[a]
Post-ED anti-MRSA antibiotic prescription	3.12 (2.39-4.11)	<.0001[a]	0.57 (0.37-0.88)	.0122[a]
Temperate (°C)	2.02 (1.44-2.82)	<.0001[a]	1.53 (0.99-2.38)	.0542
Heart rate (beats/min)	1.10 (1.02-1.19)[a]	.0135[a]	1.00 (0.99-1.01)	.5193
Systolic blood pressure (mm Hg)	1.00 (1.00-1.01)	.274	1.00 (0.99-1.01)	.9167
Diastolic blood pressure (mm Hg)	1.00 (0.99-1.00)	.4537	0.99 (0.97-1.00)	.23
Surgical consult	3.52 (2.69-4.60)	<.0001[a]	2.83 (1.92-4.17)	<.0001[a]
I&D by ED team	0.44 (0.28-0.65)	<.0001[a]	0.72 (0.40-1.26)	.2576
I&D by surgery team	1.86 (1.12-3.00)	.0126[a]	0.91 (0.43-1.95)	.8149

ED, emergency department; I&D, incision and drainage; M, male; MRSA, methicillin-resistant *Staphylococcus aureus*; OR, odds ratio.
[a] Statistically significant, $P < .05$.

4 LIMITATIONS

The present study is limited in the sense that it is retrospective, and data that might have been valuable (size and distribution of SSTI, patient's housing status, additional data regarding insurance status, etc) were not available from the medical record in a reliable and consistent manner. The study is single-center, limiting its generalizability compared with other multicenter studies and trials, although it represents, to our knowledge, the first study of predictors of OU admission for patients with SSTI. Additional limitations to the generalizability of the study include lack of OU admission criteria for patients with SSTI at our institution. As described above, this study focuses on emergency clinician decision making in our tertiary care ED that does not use specific admission or exclusion criteria for admission to our OU. There are no standardized, validated criteria, although institution-specific criteria do exist. Ideal candidates for OU admission are patients who (1) failed outpatient treatment or require IV antibiotics, (2) are expected to improve clinically within ~24 hours, and (3) do not have excessively severe presentations (tissue necrosis, Fournier's gangrene, and sepsis). Additionally, lack of comparison between patients presenting with SSTI who are directly discharged from the ED, admitted to the OU, or are admitted directly to the inpatient service from the ED limits the internal validity of the study—that is, comparison between these groups could more directly highlight the clinical differences between these categories and further guide future decision making regarding patient disposition. Laboratory studies were not ordered with enough frequency to include laboratory parameters such as serum lactate, white blood cell count, and inflammatory markers in statistical analysis, limiting the ability to determine if such values significantly influence odds of OU admission. It is possible that those individuals in whom inflammatory markers are ordered are different from those in whom these laboratory studies are ordered, and this likely merits further assessment in future studies. These laboratory studies have been linked to odds of OU failure in prior studies.[9–12]

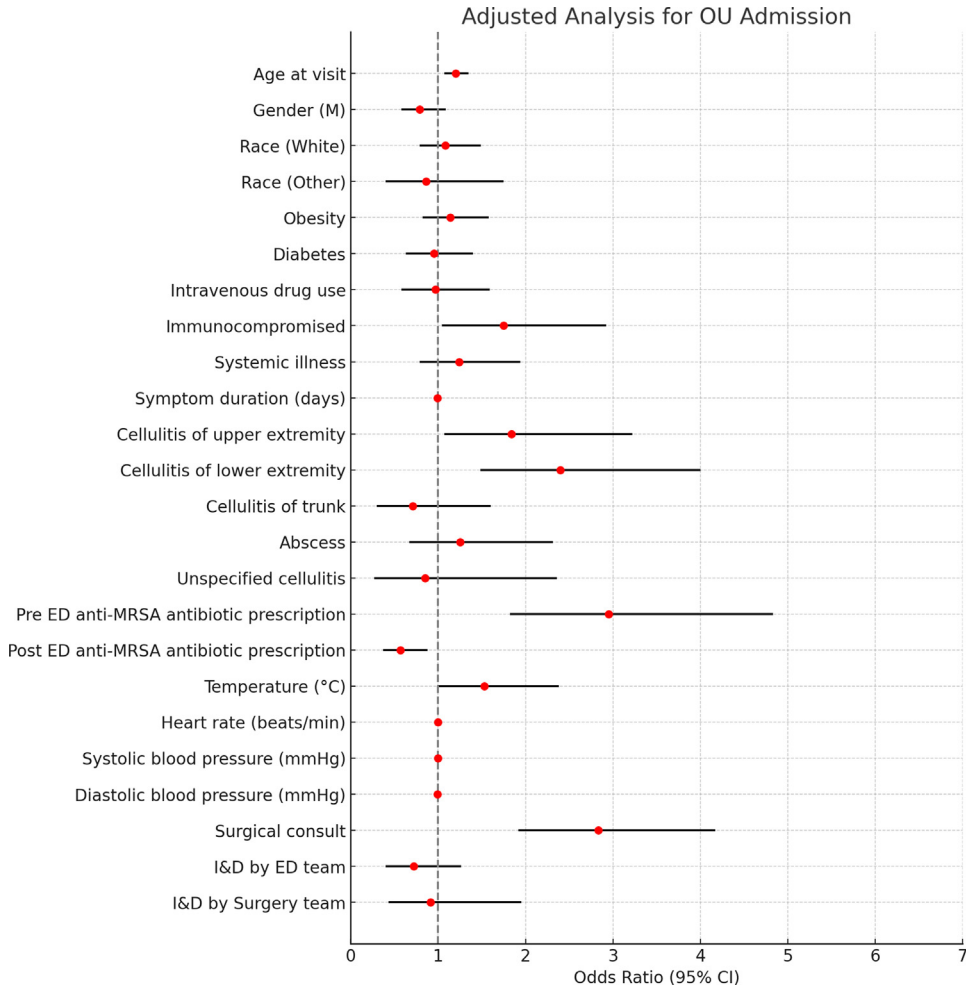

FIGURE. Odds ratio for observation unit admission; adjusted analysis. ED, emergency department; HR, heart rate; I&D, incision and drainage; M, male; MRSA, methicillin-resistant *Staphylococcus aureus*; Temp, temperature.

5 DISCUSSION

The study described herein identified multiple factors that increase odds of OU admission for ED patients presenting with SSTI. These data could be interpreted as factors that influence ED physician and advanced practice provider decision making regarding patient disposition and should be discussed in the context of what data are available regarding predictors of inpatient hospitalization for patients with SSTI (a study by Talan et al, from 2015), although it should again be noted that the Talan study did not focus on observation admissions, specifically.[6] Rationale for admission in the Talan study was explored, which unfortunately is not possible given the retrospective study design of our study. The Talan study found that fever, larger size of skin lesions, and comorbid conditions increased odds of admission. In our adjusted analysis, we did not find that temperature was associated with increased odds of OU admission, although the OR was >1.9 with large CI, suggesting that there might be some small effect that would be better observed with a larger sample size. Additionally, fever at time of OU admission has been associated with increased odds of OU failure in other studies and is worthy of further study.[10] Data regarding the size of affected lesions could not be obtained from the chart abstraction, so a comparison cannot be drawn. The Talan study identifies "any co-morbidity" as a predictor of hospitalization, with extensive data collected on a range of comorbid conditions. The Talan study also found that patients with DM, history of IVDU, and HIV were at increased relative risk of hospitalization. Our unadjusted analysis observed similar patterns, although after adjustment, only immunocompromised status proved to be a predictor of OU admission.

While size of skin lesions could not be identified in the present study, ICD-10 codes do provide some clarity as to affected areas of the patients' bodies, affording additional insight into those individuals who are at increased odds of OU admission. Our study identifies those patients with SSTI of the extremities as having increased odds of OU admission. One other study did identify cellulitis of the hand as a predictor of failure of OU management of SSTI.[10]

Antimicrobial choice, both pre–index visit and during the ED visit are also factors that contribute to odds of OU admission. Pre-ED coverage with MRSA-targeting antimicrobials for example increased odds of OU admission by a factor of almost 3, making it one of the factors with the highest ORs studied. While alternative oral anti-MRSA antibiotics are available, and discharge with another agent might be a reasonable alternative, this factor increases the odds of OU admission, indicating it clearly is a factor in ED physician decision making. Further study of antimicrobial choice in this context is the topic of a future manuscript.

As part of the unadjusted analysis, White race was found to increase odds of OU placement. This finding, while not corroborated after statistical adjustment, does raise questions about the impact that patient race might have on disposition decisions in the context of SSTI in the ED. It is well documented that disparities exist in outpatient care for dermatological conditions along racial and ethnic lines, both in terms of medical education of skin diseases and their presentation on non-white skin and in terms of outcomes.[14] There is also a study that found that non-White patients were more likely to be discharged after presenting to the ED with SSTI than their non-White counterparts despite data existing suggesting increased risk of SSTI in this group, and other studies have found management differences between racial/ethnic groups in SSTI.[15–17] This area of investigation merits further analysis.

The present study lays a foundation for additional studies in the future that can further characterize the care of SSTI and other infectious diseases in the context of the OU. Similar studies that identify predictors of OU admission can study patients with community-acquired pneumonia and complicated urinary tract infection, pyelonephritis, and other common infectious processes that frequently prompt OU admission. Additionally, replicating prior studies assessing risk of OU failure and ultimately the development of prospectively-derived decision tools to identify those patients who are at increased odds of OU failure and therefore should be directly admitted to the hospital would be of clinical utility, contributing to decreased LOS and improving health care quality, potentially reducing health care expenditures and patient morbidity and mortality.

AUTHOR CONTRIBUTIONS

BS, KH, SY: formal analysis, investigation, writing—review and editing, visualization. RA, RS: formal analysis, writing—review and editing. TA: conceptualization, formal analysis, investigation, writing—review and editing, supervision, project administration. JL: conceptualization, methodology, validation, formal analysis, investigation, data curation, writing—original draft, writing—review and editing, visualization, supervision, project administration.

FUNDING AND SUPPORT

This project was supported in part by the Biostatistics, Epidemiology and Research Design (BERD) core of the C. Kenneth and Dianne Wright Center for Clinical and Translational Research (CTSA award number UM1TR004360 from the National Center for Advancing Translational Sciences).

CONFLICT OF INTEREST

All authors have affirmed they have no conflicts of interest to declare.

ORCID

Joseph Lykins MD https://orcid.org/0009-0008-4355-7518

REFERENCES

1. Hersh AL, Chambers HF, Maselli JH, Gonzales R. National trends in ambulatory visits and antibiotic prescribing for skin and soft-tissue infections. *Arch Intern Med*. 2008;168(14):1585-1591. http://doi.org/10.1001/archinte.168.14.1585
2. Pallin DJ, Egan DJ, Pelletier AJ, Espinola JA, Hooper DC, Camargo CA. Increased US emergency department visits for skin and soft tissue infections, and changes in antibiotic choices, during the emergence of community-associated methicillin-resistant *Staphylococcus aureus*. *Ann Emerg Med*. 2008;51(3):291-298. http://doi.org/10.1016/j.annemergmed.2007.12.004
3. Miller LG, Eisenberg DF, Liu H, et al. Incidence of skin and soft tissue infections in ambulatory and inpatient settings, 2005-2010. *BMC Infect Dis*. 2015;15:362. http://doi.org/10.1186/s12879-015-1071-0
4. Edelsberg J, Taneja C, Zervos M, et al. Trends in US hospital admissions for skin and soft tissue infections. *Emerg Infect Dis*. 2009;15(9):1516-1518. http://doi.org/10.3201/eid1509.081228
5. Kaye KS, Petty LA, Shorr AF, Zilberberg MD. Current epidemiology, etiology, and burden of acute skin infections in the United States. *Clin Infect Dis*. 2019;68(suppl 3):S193-S199. http://doi.org/10.1093/cid/ciz002
6. Talan DA, Salhi BA, Moran GJ, et al. Factors associated with decision to hospitalize emergency department patients with skin and soft tissue infection. *West J Emerg Med*. 2015;16(1):89-97. http://doi.org/10.5811/westjem.2014.11.24133
7. Frazee BW, Lynn J, Charlebois ED, Lambert L, Lowery D, Perdreau-Remington F. High prevalence of methicillin-resistant Staphylococcus aureus in emergency department skin and soft tissue infections. *Ann Emerg Med*. 2005;45(3):311-320. http://doi.org/10.1016/j.annemergmed.2004.10.011
8. Moran GJ, Krishnadasan A, Gorwitz RJ, et al. Methicillin-resistant S. aureus infections among patients in the emergency department. *N Engl J Med*. 2006;355(7):666-674. http://doi.org/10.1056/NEJMoa055356
9. Schrock JW, Laskey S, Cydulka RK. Predicting observation unit treatment failures in patients with skin and soft tissue infections. *Int J Emerg Med*. 2008;1(2):85-90. http://doi.org/10.1007/s12245-008-0029-z
10. Volz KA, Canham L, Kaplan E, Sanchez LD, Shapiro NI, Grossman SA. Identifying patients with cellulitis who are likely to require inpatient admission after a stay in an ED observation unit. *Am J Emerg Med*. 2013;31(2):360-364. http://doi.org/10.1016/j.ajem.2012.09.005
11. Mistry RD, Hirsch AW, Woodford AL, Lundy M. Failure of emergency department observation unit treatment for skin and soft tissue infections. *J Emerg Med*. 2015;49(6):855-863. http://doi.org/10.1016/j.jemermed.2015.02.007

12. Abetz JW, Adams NG, Mitra B. Skin and soft tissue infection management failure in the emergency department observation unit: a systematic review. *Emerg Med J*. 2018;35(1):56-61. http://doi.org/10.1136/emermed-2016-205950
13. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453-1457. http://doi.org/10.1016/S0140-6736(07)61602-X
14. Hooper J, Shao K, Feng H. Racial/ethnic health disparities in dermatology in the United States, part 1: Overview of contributing factors and management strategies. *J Am Acad Dermatol*. 2022;87(4):723-730. http://doi.org/10.1016/j.jaad.2021.12.061
15. Zheng NS, Shung DL, Kerby EH. Racial and ethnic differences in hospital admissions for cellulitis in the United States: A cross-sectional analysis. *J Am Acad Dermatol*. 2022;87(6):1413-1416. http://doi.org/10.1016/j.jaad.2022.08.038
16. Wurcel AG, Essien UR, Ortiz C, et al. Variation by race in antibiotics prescribed for hospitalized patients with skin and soft tissue infections. *JAMA Netw Open*. 2021;4(12):e2140798. http://doi.org/10.1001/jamanetworkopen.2021.40798
17. Ray GT, Suaya JA, Baxter R. Incidence, microbiology, and patient characteristics of skin and soft-tissue infections in a U.S. population: a retrospective population-based study. *BMC Infect Dis*. 2013;13(1):252. http://doi.org/10.1186/1471-2334-13-252

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.acepjo.2024.100002

How to cite this article: Simpson B, Han K, Yee S, et al. Factors Associated With Observation Unit Admission in Emergency Department Patients With Skin and Soft Tissue Infections. JACEP Open. 2025;6:100002.

https://doi.org/10.1016/j.acepjo.2024.100002