

SKIN AND SKIN STRUCTURE INFECTIONS (SSSIs) IN THE EMERGENCY DEPARTMENT (ED): WHO GETS ADMITTED?

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ABSTRACT

Background: Between 1993 and 2005, the annual number of ED visits for SSSI increased ~3-fold with corresponding increases in the number of patients admitted to the hospital. Nationally, increasing attention has been paid to the cost and adverse consequences of avoidable hospital admissions.

Objectives: To characterize and compare SSSI patients seen in US EDs who were admitted to the hospital or discharged.

Methods: Using Healthcare Cost and Utilization Project Nationwide Emergency Department Sample (HCUP NEDS) data from 2008 to 2010, a retrospective cross-sectional database analysis was performed. HCUP NEDS is the largest US all-payer federal ED database, representing a 20% stratified sample of EDs from >950 hospitals across 28 states. Patients included were adults (≥18 yrs) with principal ICD-9 diagnosis of SSSI: 681.XX, 682.XX, 686.XX, 958.3, 998.5X, or 035. Data were weighted to produce national estimates. Only patients admitted to the same hospital as the ED visit are captured within NEDS as inpatient.

Results: Between 2008 and 2010, there were a total of 8,356,460 adult SSSI ED visits. Patients were median age of 40 yrs (27.3–53.5 IQR), 52% male, had varying insurance (28% private, 28% self-pay, 19% Medicare, 18% Medicaid), and 87% had no comorbidities. Common diagnoses were other cellulitis and abscess (682.XX, 83%), cellulitis and abscess of fingers and toes (681.XX, 9%), and postoperative wound infection (998.5X, 5%). Most were discharged home (80%); 17% hospitalized, 0.7% sent to a short-term hospital, 0.4% to SNF, and 0.1% to home health care. Admission rates significantly increased (9%, $p<0.0001$) over the 3-year study period. Hospitalization was significantly associated with male gender, advanced age, Medicare and no charge status, diagnosis of post-operative wound infection, higher Charlson score, presentation in the Northeast, and to a metropolitan teaching hospital.

Conclusions: A substantial proportion of ED-presenting SSSI patients are hospitalized with evidence that recent admission rates are increasing. Admission rates varied by age, comorbidities, hospital type, location, and insurance status. Although understanding reasons for hospital admission would inform the value of hospital care, these results suggest opportunities to reduce hospitalization rates for ED-presenting patients with SSSI.

BACKGROUND

■ Skin and Skin Structure Infections (SSSIs) represent a significant clinical and economic burden in infectious disease, commonly seen by emergency physicians with a wide range of clinical manifestations ranging from mild to life-threatening.

■ SSSIs are caused by a variety of bacterial pathogens and responsible for increasing utilization of healthcare resources, including emergency department (ED) visits, hospitalizations, and antibiotic use.

■ Between 1993 and 2005, the annual number of ED visits for SSSIs increased approximately 3-fold, with corresponding increases in the number of patients admitted to the hospital.¹

■ The objective of this study was to characterize and compare adult SSSI patients seen in U.S. emergency departments who were either admitted to the hospital, or discharged home following the ED visit.

METHODS

■ A retrospective cross-sectional database analysis was performed using the US Healthcare Cost and Utilization Project National Emergency Department Sample (HCUP NEDS) dataset from 2008 to 2010.

■ The HCUP NEDS database contains discharge data for ED visits from over 950 hospitals located in 30 states, representing a 20% stratified sample of U.S. hospital-based EDs.

– It is the largest all payer ED database in the U.S. and contains information about geographic, hospital, patient, and visit characteristics.

■ Specifically, HCUP NEDS includes clinical and resource-information on:

– ICD-9-CM diagnosis and external cause of injury codes

– ICD-9-CM and CPT-4 procedural codes

– Admission and discharge status

– Patient demographics

– Expected payment/insurance type

– Total ED charges and total hospital charges (for those that result in admission)

– Hospital characteristics (region, trauma center indicator, teaching status)

■ Inclusion criteria for the analysis were:

– Patients ≥18 years of age

– Primary diagnosis of SSSI, defined using the following ICD-9-CM codes:

Table 1. Inclusion Criteria (ICD-9) for the Primary Diagnosis Consistent with SSSI

ICD-9 Codes	Description
681.XX	Cellulitis and abscess of finger and toe
682.XX	Other cellulitis and abscess
686.XX	Other local infections of skin and subcutaneous tissue
958.3	Posttraumatic wound infection, not elsewhere classified
998.5X	Postoperative wound infection
035	Erysipelas

■ The ICD-9 codes selected are consistent with the SSSI infection types described in the FDA guidance (U.S. DHHS, FDA, CDER).²

■ Key comorbidities were identified by the Charlson-Deyo Comorbidity Index.

■ Descriptive and bivariate analyses were conducted to assess patient, ED, and hospitalization characteristics.

■ Multivariable analysis using generalized linear model (GLM- gamma distribution, loglink) was used to assess factors associated with hospital admission following an ED visit.

■ For all analyses, data were weighted to produce national estimates using a weight variable provided by HCUP.

■ Only patients admitted to the same hospital as the ED visit were captured within NEDS as inpatient.

■ Using the HCUP NEDS database, a total of 8,356,460 adults with SSSIs were seen in the ED from 2008 and 2010. SSSIs represented 2.8% of all ED encounters.

■ Overall, all ED patients were:

– 52% Male

– Median age 40 years (27.3–53.5 IQR)

– Varying insurance

● 28% private insurance

● 28% self-pay

● 19% Medicare

● 18% Medicaid

■ Most common diagnoses were:

– Other cellulitis and abscess (682.XX, 83%)

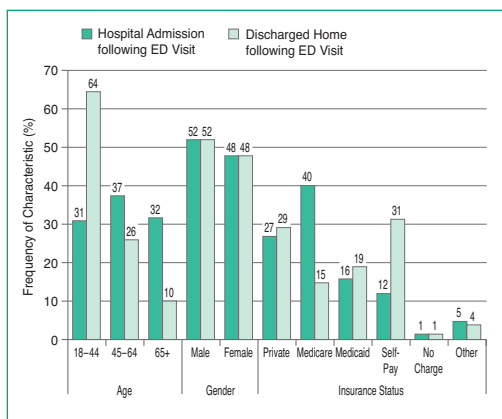
– Cellulitis and abscess of fingers and toes (681.xx, 9%)

– Postoperative wound infection (998.5X, 5%)

■ Of patients with SSSI seen in the ED, 80% of patients were discharged home from the ED; 17% admitted into the hospital, 0.7% sent to a short-term hospital, 0.4% to SNF, and 0.1% to home health care.

■ Mortality rate in hospitalized patients was 0.5%.

Figure 1. Comparison of the Frequency of Patient Characteristics between ED Patients with SSSI who were Hospitalized vs. Discharged Home



■ Of adult patients seen in the ED with SSSIs, the chances of being admitted as an inpatient from the ED (as compared to those discharged home from the ED) were:

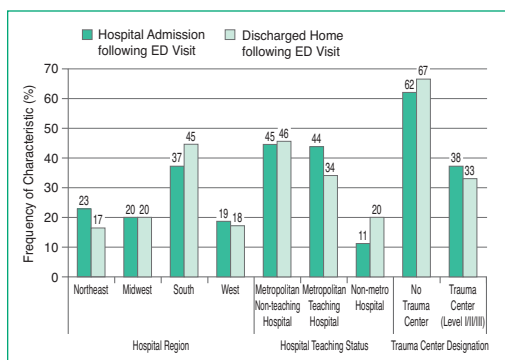
– 2.1 times higher for those aged 45–64 than 18–44 (RR=2.13, $p<0.0001$)

– 2.5 times higher for those ≥65 than 18–44 (RR=2.51, $p<0.0001$)

– 1.4 times greater for patients with Medicare as compared to those with private insurance (RR=1.35, 95% CI: $p<0.0001$)

RESULTS

Figure 2. Comparison of the Frequency of Hospital Characteristics between ED Patients with SSSI who were Hospitalized vs. Discharged Home

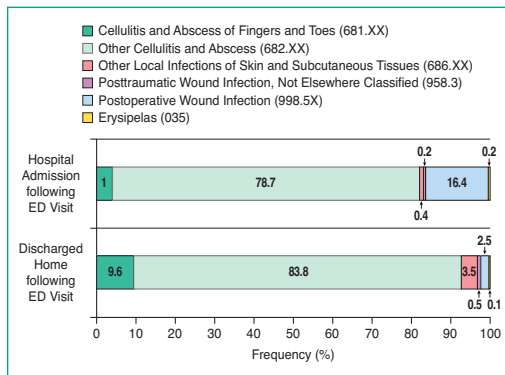


■ Compared to those discharged home from the ED, the chances of being hospitalized after the ED visit were:

– Greater for those visiting hospitals in the Northeast region compared to the South (RR=1.07, $p<0.0001$)

– Greater for those in a teaching hospital located in a metropolitan area (RR=1.16, $p<0.0001$), but less likely for those in a non-metropolitan hospital (RR=0.65, $p<0.0001$), compared to a metropolitan non-teaching hospital

Figure 3. Comparison of the Frequency of Infection Type between ED Patients with SSSI who were Hospitalized vs. Discharged Home



■ Compared to those discharged home from the ED, the chances of being hospitalized after the ED visit are 2 times higher for those with a post-operative wound infection as compared to other cellulitis patients (RR=2.0, $p<0.0001$).

Table 2. Comparison of the Frequency of Comorbidities between ED Patients with SSSI who were Hospitalized vs. Discharged Home

Comorbidity	Hospital Admission following ED Visit	Home Discharge following ED Visit
Diabetes without complications	25.4%	8.0%
Chronic Pulmonary Disease	18.1%	3.7%
Moderate to Severe Renal Disease	10.6%	0.5%
Congestive Heart Failure	10.1%	0.7%
Peripheral Vascular Disease	6.1%	0.2%
Diabetes with complications	5.5%	0.2%
Mild Liver Disease	4.0%	0.2%
Any Malignancy	3.7%	0.3%
Myocardial Infarction	3.3%	0.6%
Connective Tissue – Rheumatic Disease	2.9%	0.4%
Cerebrovascular Disease	2.0%	0.1%
Dementia	1.6%	0.04%
Metastatic Solid Tumor	1.3%	0.04%
Paraplegia and Hemiplegia	1.2%	0.1%
Moderate to Severe Liver Disease	0.7%	0.01%
AIDS	0.7%	0.1%
Peptic Ulcer Disease	0.6%	0.03%

■ The mean Charlson Comorbidity Index (CCI) was 0.94 (±1.5) for patients admitted as an inpatient following an ED visit, compared to 0.17 (±0.54) for those discharged home following an ED visit ($p<0.0001$).

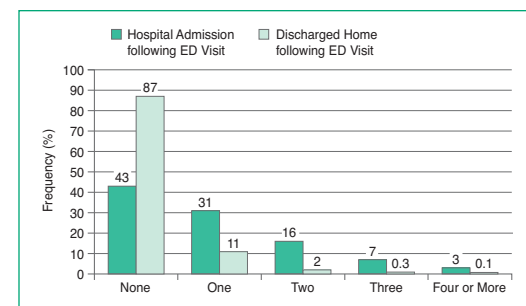
■ Of adult patients seen in the ED with SSSIs, the chances of being admitted as an inpatient from the ED (as compared to those discharged home from the ED) were significantly greater for patients with a CCI ≥1 compared to those with CCI=0:

– 4.2 times higher for patients with CCI=1 than CCI=0 (RR=4.16, $p<0.0001$)

– 6.2 times higher for patients with CCI=2 than CCI=0 (RR=6.15, $p<0.0001$)

– 7.6 times higher for patients with CCI=3 than CCI=0 (RR=7.60, $p<0.0001$)

Figure 4. Comparison of the Frequency of Comorbidities, by Number of Comorbidities Present per Patient, between ED Patients with SSSI who were Hospitalized vs. Discharged Home



CONCLUSIONS

■ A substantial proportion of SSSI patients presenting to the ED are hospitalized, with results supporting evidence that recent admission rates are rising.

– Inpatient admissions among patients with SSSIs result in significant increases in healthcare resource utilization.

■ Several factors were associated with hospital admissions from patients presenting to the ED for SSSI, including increasing age, comorbidities, hospital type, region, and type of insurance.

■ Identifying specific patient subpopulations that could be easier to treat may result in decreases in the overall economic burden to the healthcare system by minimizing the number of patients that need to be hospitalized long-term.

– A substantial group (43%) admitted to the hospital do not have comorbidities, which may be a potential easier-to-treat target group that may be in less need of intensive healthcare services.

■ Also, mortality rate in hospitalized patients was found to be very low (0.5%) suggesting that many patients could be of lower severity, and can receive outpatient treatment.

REFERENCES

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