Evaluation of Current Cellulitis Management in the St. Paul's Hospital Emergency Department

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Background

- Cellulitis, a localized skin infection, is a common presentation of skin and soft tissue infections (SSTIs).
- In 2010, there were approximately 1770 cases of cellulitis and abscesses that were assessed and/or treated at the St. Paul's Hospital Emergency Department (SPH ED).
- The ED – based IV antibiotic program was initiated at SPH in the early 1990's to prevent hospitalization of otherwise immunocompetent patients with infections.
- More recently, a protocol was developed for the management of mild to moderate skin and soft tissue infections.
- Despite the availability of this protocol, there appears to be ongoing variability in prescribing including unnecessarily prolonged IV antibiotics and the use of oral and IV antibiotics simultaneously.
- The purpose of this study was to evaluate the protocol compliance of current prescribing practices in the ED and identify possible areas for improvement.

Methods

- The ED database was used to identify eligible patients who met the inclusion and exclusion criteria.
- A retrospective healthcare record review was performed to collect data on admission and discharge antibiotic regimen and clinical outcomes.
- Only the data from first visit were collected and assessed for the purpose of this study.
- Inclusion Criteria: Patients who presented at SPH fast-track for treatment of skin and soft tissue infections (specifically simple cellulitis, furuncles or carbuncles, folliculitis, or erysipelas) and with an ED disposition of "Discharged with Advice" were included in the review.
- Exclusion Criteria: Patients who presented with suspected diabetic ulcers, pressure ulcers, open wounds, human, animal, or insect bites, necrotizing fasciitis, those with PVD or pressure ulcers, and those with immunocompromised states (ie: diabetes mellitus, HIV serology, active cancer, etc) were excluded from the study.

Primary Outcomes

- The proportion of patients who received protocol compliant antibiotic therapy on admission and on discharge.
- The proportion of physicians that prescribe oral versus intravenous antibiotics.

Secondary Outcomes

- Failure rate of initial therapy (as defined by change in agent, route, admission, or death) when patient is given appropriate versus inappropriate therapy.
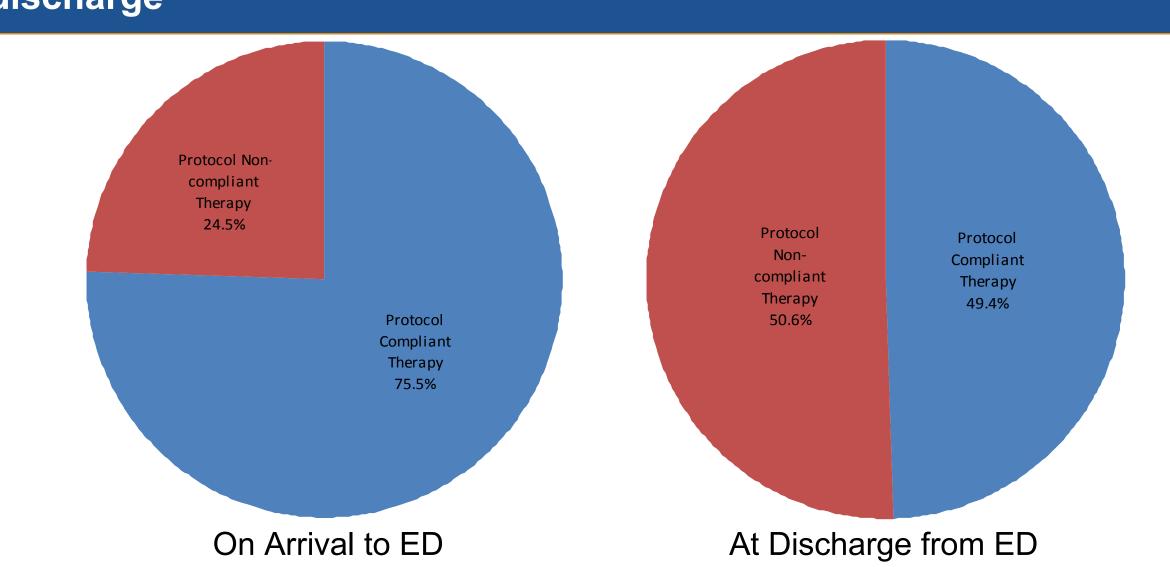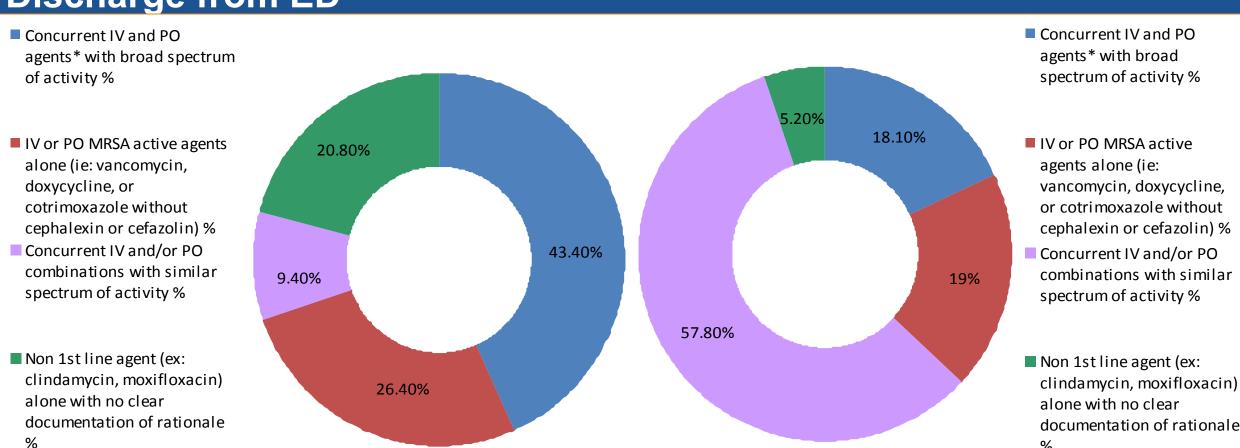- Physician rationale for deviating from SPH protocols.

Table 1: Selected Baseline Characteristics of Patients Reviewed

Characteristic	N=237
Average age of all patients	52.2
Female gender %	41.2%
IVDU %	9.3%
MRSA+ or history of MRSA %	7.2%
Site of Cellulitis	
Leg %	35.9%
Head and Face %	12.2%
Foot and ankle %	10.5%
Arm %	16%
Other %	25.3%

Figure 1: Protocol compliance of therapy on admission and on discharge

On Arrival to ED — Protocol Compliant Therapy 75.5%, Protocol Non-compliant Therapy 24.5%

At Discharge from ED — Protocol Compliant Therapy 49.4%, Protocol Non-compliant Therapy 50.6%

Figure 2: Patterns of Non-Protocol Therapy on Arrival to and at Discharge from ED

On Arrival to ED — 43.40%, 20.80%, 9.40%, 26.40%

At Discharge from ED — 18.10%, 19%, 57.80%, 5.20%

Legend:
- Concurrent IV and PO agents* with broad spectrum of activity %
- IV or PO MRSA active agents alone (ie: vancomycin, doxycycline, or cotrimoxazole without cephalexin or cefazolin) %
- Concurrent IV and/or PO combinations with similar spectrum of activity %
- Non 1st line agent (ex: clindamycin, moxifloxacin) alone with no clear documentation of rationale %
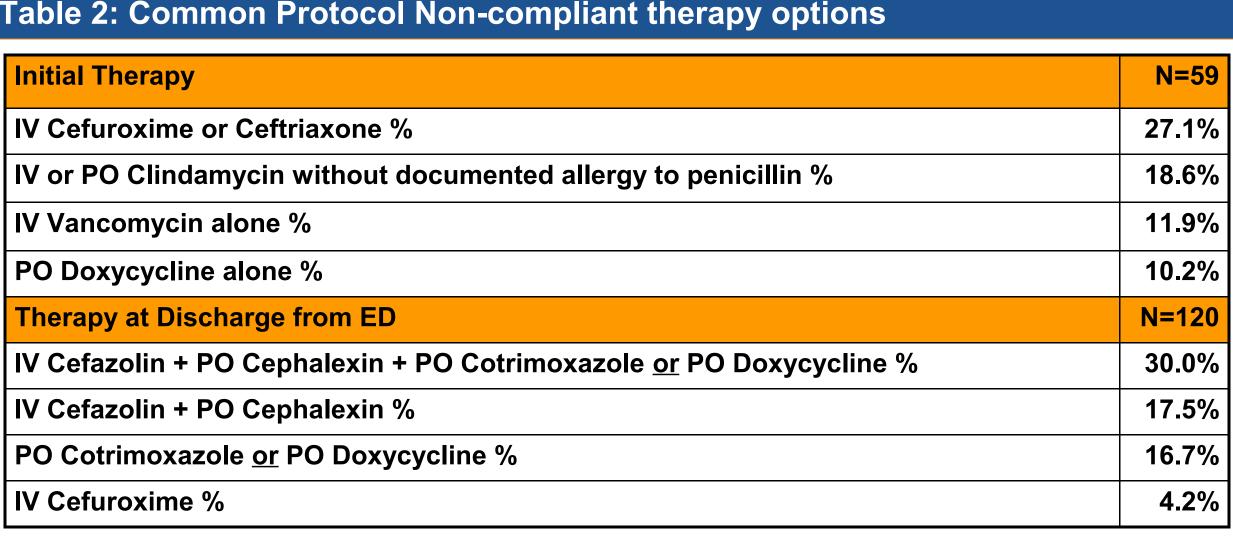
*For the purpose of this study, IV cefazolin with PO MRSA active agent was deemed to be protocol compliant but use of IV agents is indicated for moderate to severe infections only.

Table 2: Common Protocol Non-compliant therapy options

Initial Therapy	N=59
IV Cefuroxime or Ceftriaxone %	27.1%
IV or PO Clindamycin without documented allergy to penicillin %	18.6%
IV Vancomycin alone %	11.9%
PO Doxycycline alone %	10.2%
Therapy at Discharge from ED	N=120
IV Cefazolin + PO Cephalexin + PO Cotrimoxazole or PO Doxycycline %	30.0%
IV Cefazolin + PO Cephalexin %	17.5%
PO Cotrimoxazole or PO Doxycycline %	16.7%
IV Cefuroxime %	4.2%

Results N=237

Primary Outcomes:

- Proportion of patients receiving protocol compliant therapy (Figure 1):
  - On admission, 75% (n=178).
  - At discharge, 47% (n=112).
- Proportion of patients receiving oral versus intravenous antibiotics:
  - At initial presentation, 74% (n=174) of patients received IV antibiotics, 14% (n=33) received PO antibiotics, and 12% (n=29) received both IV and PO antibiotics.
  - 21% (n=50) of patients were discharged on an IV antibiotic requiring them to return daily for treatment, 41% (n=94) were given a prescription for PO antibiotics, and 38% (n=87) were instructed to return daily for IV antibiotics and an additional prescription for PO antibiotics to be take concurrently.

Secondary Outcomes:

- Failure rate of patients (N=30):
  - 6.7% of patients who received protocol appropriate therapy on admission were found to have failed on treatment.
  - 30.5% of patients who received protocol non-compliant therapy on admission were found to have failed on treatment.
  - However, this difference in failure rate was not statistically significant.
- Common reasons for deviation from SPH-protocol were:
  - Comorbid conditions (ex: dental carries, pneumonia).
  - Previous history of MRSA colonization.
  - IVDU or other risk factors for CA-MRSA infection.

Other Observations:

- There seemed to be lack of communication between ED physicians when patients returned daily for reassessment. Documentation was scarce and therapy was often continued on from previous day or visit.
- Often, there was no treatment plan at discharge. The most common theme was for the patient to return daily for reassessment.
- Severity or size of infected area was seldom mentioned in documentation.
- The SPH protocol can result in 8 different treatment possibilities. During the review, 27 different therapies ordered on arrival to ED and 38 different therapies on discharge from ED.

Conclusions

- While the protocol was followed over 50% of the time on admission, there was still a substantial deviation from the recommended therapy.
- A majority of patients were discharged on protocol non-compliant therapy.
- Some of the most common non-compliant therapies included:
  - Use of IV and PO antibiotics of the same class or with similar spectrums of activity.
  - Use of MRSA active agents alone (ie: without cephalexin or cefazolin).
  - Use of non-1st line agents (ex: clindamycin, moxifloxacin) without clear indication or rationale.
  - Use of agents with broader spectrum of activity than necessary (ex: ceftriaxone).
- A majority of patients were prescribed IV therapy (with or without oral therapy) on discharge. Due to lack of documentation about patients' severity of illness, need for prolonged IV therapy could not be determined with this review.
- Failure of therapy appeared to occur less frequently with patients who received appropriate or pathway-guided therapy. However, this will require further study to determine true significance.
- Physician rationale for choice of agent and/or route was not always clearly defined and may not have always reflected patients' presentation.
- An apparent lack of clear communication between ED physicians may have led to an increased need for patients to return for re-assessment.