ARTICLE:
- Country: United States
- Funding Sources: Not disclosed

PURPOSE:
- Research Question(s): 1.) What are the limitations of the PSI as a triage for determining the need for inpatient vs. outpatient care? 2.) Based on outcomes other than mortality in low-risk patients admitted to the hospital, what is the effectiveness of the PSI in identifying patients appropriate for outpatient care?
- Hypothesis: Clinical judgment plays a central role (in the decision to admit a low-risk patient), and mortality rate is not the only factor clinicians consider when making the admission decision.

DESIGN:
- Study Design: Retrospective chart review
- Dependent / outcome Variable(s): Admission level of care, total bed days at each level of care, total length of stay, ICU length of stay, and intermediate care unit length of stay.
- Independent / research Variable: PSI score

SETTING / SUBJECTS:
- Research Setting: Large urban academic emergency department
- Subjects:
  - Study population: All patients with a diagnosis of community acquired pneumonia seen the ED of a university hospital from October 2002 to June 2003.
  - Inclusion / Exclusion criteria: Inclusion – All patients 18 years of age or older with a diagnosis of pneumonia coded in the physician diagnosis field
of the ED medical record. Exclusion – Patient with immunosuppression (transplant patients, patients undergoing recent chemotherapy, patients with human immunodeficiency virus, patients using 10 mg or more of prednisone or equivalent daily for ≥ 30 days, known neutropenia with absolute neutrophil count < 1000), patients hospitalized in the prior 10 days, and pregnant women were excluded, consistent with the design of the PSI derivation study. Additionally, patients who had no clinical diagnosis of pneumonia verified by chart review, and those with the absence of radiographic findings consistent with CAP were excluded.

- **Number (control / intervention groups):** Charts for 483 patients with CAP were reviewed. 309 patients were excluded (radiograph negative, HIV +, age <18, recent hospitalization, other diagnosis, organ transplant, chart unavailable, recheck visit, recent chemo, incarcerated, or neutropenic). 174 patients were included including 56 patients with disposition inconsistent with PSI and 118 patients with disposition consistent with PSI.

- **Demographics:** All patients were 18 years of age or older. No other demographic information about the low-risk group is provided. Characteristics of high-risk patients discharged home include age ranging from 66-93 and 5 males/3 females.

- **Attrition:** Outcomes data were available for 94% of the low-risk patients admitted for CAP. Survival to follow-up was available for 6 of the 8 high-risk patients who were discharged.

**METHODS:**

- **Interventions:** N/A

- **Study Groups:** The study group included patients with PSI classes I, II, and III who were admitted to the hospital. Descriptive information is also available for PSI IV patients discharged from the hospital.

- **Instruments:** Pneumonia Severity Index

- **Data Collection:** Two of the investigators (one MD, one BS) retrospectively abstracted charts from October 2002 – June 2003. Approximately 1/3 of the charts were cross-checked for internal validity by two other investigators (both MD’s). No information about consistency among data collectors was provided. Data collection included calculation of PSI score, disposition, and presence of comorbidities felt to increase likelihood of hospitalization for CAP (lung disease, neurologic disease, or other comorbidities, inability to tolerate oral medications, failure of oral antibiotics, substance abuse, psychiatric disorders, homelessness, or other psychosocial barriers to follow-up).

**DATA ANALYSIS:**

- **Level of Data:** Categorical
Statistics Used: Chi square used to compare patients with PSI classes I, II, II with regard to admission level of care and total bed days at each level of care. Non-parametric statistics were used to compare patients with PSI classes I, II, and II with regard to total length of stay, ICU length of stay, and intermediate care unit length of stay.

What, if any, variables were controlled for?: None.

RESULTS:

Brief answers to research questions: 54/174 (56%) of patients had a disposition inconsistent with the PSI score, and of these, 48 (86%) were patients hospitalized despite a low-risk PSI score. 48/118 (41%) of low-risk patients were admitted and 8/56 (14%) of high-risk patients were discharged. Follow-up was available for 6 of these patients, all of whom survived. A total of 37 (82%) were admitted to a ward bed. The percentage of patient admitted to a higher level of care did not differ by PSI class. Mean ICU stay was 0.31 days and mean intermediate care unit length of stay was 1.23 days. Median bed days were 0 for both units. Patients had significantly longer stays in intermediate care compared to class I. Overall bed days increased with PSI class. Average length of stay in the low-risk cohort was 5.22 days, with 78% staying more the 48 hours. There were no deaths.

Additional findings: Hypoxia was the most frequent factor contributing to the decision to admit low-risk patients, representing 23 (48%) of the low risk discrepancies. Concomitant lung disease accounted to 15 (31%) of discrepancies. 75% of these patients were hypoxic on presentations. Psychosocial indications accounted for 7 (15%) of discrepancies. Homelessness, psychiatric disease, and substance abuse each accounted for 2 (4%) of discrepancies. Finally other comorbidities requiring admission made up 12 (25%) of the discrepancies. Five (10%) of low-risk patients were admitted without indication of any of the predefined comorbidities. These findings were expected as the authors were looking for factors that would contribute to the decision to admit despite a low-risk PSI score.

Limitations:

- Retrospective design may have leg led to misclassification of risk when PSU scores were calculated with missing data. IT was assumed that missing data needed to calculate PSI were normal, so underestimation of severity of illness could have occurred in the low risk cohort.
- Risk factors that were present but not clearly documented in the ED record were not captured in the analysis so the 10% of low-risk patients admitted without identifiable risk factors may be an overestimate. Also, additional comorbidities may not have been identified. Finally, there is no explanation how the comorbidities that were screened for were chosen.
- Performed at large academic medical center so findings may not be generalizable to other hospitals. However, exclusion of
immunosuppressed patients presumably makes population more similar to other hospitals. Still, no other demographic data is provided about admitted or discharged patients so it would be difficult to know if they are similar to other hospital settings.

- We do not have any information about the comorbidities or outcomes of PSI class I, II, III patients disposition consistently with their PSI classification. Nor do we have any information about the outcomes of the patients who were admitted.

**IMPLICATIONS FOR PRACTICE:**
- *Applicable to this clinical practice:* This is applicable to practice in the ED because we have to make decisions about whether a patient with pneumonia is appropriate for discharge home or requires admission. I do not think that this study sheds any new light on decision-making, however. It just tells us something we already know – clinical decision making is an important factor in determining need for admission. The study does not provide any information about the low-risk patients who were sent home, so we have no idea if this was acceptable disposition (and the second research question is not really answered). It is possible that the discharged patients had the same comorbidities, social issues, etc as the admitted population, but their physicians did not see this as a factor that would necessitate admission. We do not know if all of the people discharged home did well, bounced-back, or died. Therefore, I am not sure that this study actually answers the question of whether the PSI is suitable for determining the appropriateness of outpatient care.

**LEVEL OF EVIDENCE / DECISION FOR USE:**
- Background Consider Replication Ready for use

- *Level of Evidence:*
  - Ia Evidence obtained from meta-analysis of randomized controlled trials
  - Ib Evidence obtained from at least one RCT
  - IIa Evidence obtained from at least one well-designed controlled study without randomization
  - IIb Evidence obtained from at least one other type of well-designed quasi-experimental study
  - III Well-designed non-experimental studies
  - IV Expert committee reports, opinions of experts