Predicting Emergency Severity Index Level Based on Emergency Department Pre-Arrival Information

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**Purpose:** This study examines phone referral information used to assign Emergency Severity Index (ESI) levels as a proxy to anticipate emergency department (ED) resources and help improve patient flow. Study aims were to evaluate: (1) The ability to predict ESI levels based on phone referral information. (2) The effect of collection of specific data points on the agreement between pre-arrival and arrival ESI levels. (3) Pre-arrival ESI level prediction of hospital/ICU admission.

**Background/Significance:** In the study ED, phone referral information is obtained for ‘pre-arrival’ patients in a standardized way by specially trained ED communication specialist nurses (CS RNs). After patients arrive in the ED, a staff nurse assigns a triage level based on the patient’s clinical status and anticipated resources. These levels are used to determine staffing and resource allocation. The nurses in this study used the ESI, a validated scoring system.

**Methods:** CS RNs assigned ESI levels to 481 patients based on phone referral information. ED nurses then assigned an independent ESI level upon arrival. The two levels were compared. Ultimate patient disposition was collected. Means and standard deviations were calculated for all continuous patient characteristics. Frequencies and percentages were calculated for all categorical patient characteristics.

**Results:** Moderate agreement was found between the pre-arrival and arrival ESI scores. No clear indication that the presence or absence of any specific data points had an impact on the agreement of the pre-arrival and arrival ESI levels. The majority of patients (71.3%) with a pre-arrival ESI level of 1 or 2 were admitted to the hospital. These patients were more likely to be admitted to the ICU.

**Conclusions:** Trained ED nurses were able to use standardized telephone referral information to assign pre-arrival ESI levels that had moderate agreement to the corresponding arrival ESI levels. Implementing this practice could inform ED team assignments and staffing plans. The knowledge that presumably sicker pre-arrival patients with ESI levels of 1 or 2 will likely need admission potentially gives the ED and the larger hospital system the ability to predict and plan for them. Based on this study, pre-arrival ESI assignment has been implemented at Seattle Children’s Hospital ED.

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