

**POSTER ABSTRACTS**  
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**Measuring Emergency Department Crowding and Hospital Capacity**

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**OBJECTIVES:** Emergency department crowding (EDC) is widely seen as a serious health policy issue, yet we lack valid measures of the problem. Our goal is to develop reproducible measures of EDC that correlate with important patient (pt) and system outcomes.

**METHODS:** We report the derivation phase of our study. We prospectively collected ED and hospital capacity data at 2 urban teaching hospitals during 8 randomly selected 24-hour periods. We collected administrative data and surveyed providers (MDs and RNs). Data include ED volume, pt acuity, ED boarding of inpatients, staffed inpatient bed capacity, waiting times to see an MD, and provider ratings of EDC using a rating scale. We recorded ambulance diversion episodes and pts leaving without being seen (lwbs), then analyzed the correlation between measures of EDC and these outcomes. We performed factor analysis to understand which measures of EDC address similar domains. Volume-dependent measures were adjusted using the total number of bed hours available for pts in each ED.

**RESULTS:** Two measures correlated with ambulance diversion: 1) ED occupancy (EDocc)[ $r=0.31$ ,  $p=0.03$ ]; and 2) ED workload (EDwk), an acuity-adjusted measure of ED census [ $r=0.35$ ,  $p=0.01$ ]. Three measures correlated with lwbs: 1) ED boarding burden (EDbb), the percent of total ED bed hours used to board inpatients [ $r=0.31$ ,  $p=0.03$ ]; 2) hospital census (hc)[ $r=0.42$ ,  $p<0.01$ ]; and 3) waiting times to see an MD [ $r=0.69$ ,  $p<0.01$ ]. Factor analysis identified two domains: 1) ED capacity domain (includes EDbb, EDocc, EDwk, and provider ratings of EDC); and 2) Hospital capacity domain (includes EDbb and hc).

**CONCLUSIONS:** These measures of EDC correlate with important outcomes such as ambulance diversion and patients leaving without being seen, and address both ED- and hospital-based domains. ED boarding burden, acuity-adjusted ED workload, ED waiting times, and hospital census are promising outcome-based measures of EDC that require validation in multiple settings.