

## Hospitals' Patterns of Use of Noninvasive Ventilation in Patients With Asthma Exacerbation

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## **e-Appendix 1.**

### **Cerner's HealthFacts database**

Health Facts is a database derived from the comprehensive EMRs of 116 geographically and structurally diverse hospitals throughout the US. Health Facts contains comprehensive pharmacy, laboratory, and billing information, all time-stamped. The database contains records of more than 84 million acute admissions, emergency and ambulatory visits, and 9 years (2002-2012) of detailed pharmacy, laboratory, and billing data. It includes hospital characteristics: geographic region, number of beds, rural/urban and teaching status. The date-stamped log allows us to ascertain not only whether a patient received NIV or IMV during their hospitalization, but also on what day it was started and which therapy was initiated first. Diagnostic tests, such as arterial blood gases and medical treatments, can be identified by the day and time of administration. Unlike most inpatient datasets, Health Facts contains laboratory results and clinical data (e.g., oxygen saturation, blood pressure, respiratory rate, BMI). The date and time stamp on laboratory and pharmacy elements permits conclusions about the associations between an intervention (e.g., NIV or IMV) and a health outcome. Beginning with 2009, it contains a present on admission (POA) indicator for each recorded diagnosis. Health Facts is a HIPAA-compliant comprehensive source of de-identified data that allows insight into real-world practice patterns, clinical decision-making, and use of different treatment strategies. Cerner aggregates the data provided by participating facilities and uses stringent quality assurance processes to ensure the ongoing integrity of the information. All data are acquired in real time from the hospitals' EMR.

In 2012 Cerner Healthfacts dataset comprised 125 acute hospitals which contribute to the dataset with both laboratory and medication data and have hospital characteristics. Compared with all US hospitals, those in HealthFacts are more likely to be urban, teaching and almost 50% are from hospital >200 bed. See below:

The composition is as follows: Urban: 94.4%, Geographic region: NE: 28.8%, S:35.2%, MW:20.8%, W:15.2%

Compared with the composition of all US hospitals: Urban 33.2%, Geographic region: NE: 13.4%, S: 40.3% MW: 27.1%, W:18.2%, Other:1.0%, Teaching: 26.7%, Bed size: <200 beds: 74.3%, 200-399:17.2%, >400:8.5%

**e-Table 1.**

**Hospitals and Patients excluded from the analysis of hospital-level rates after applying the cut-off of minimum 45 admissions with asthma**

Comparison between included and excluded hospitals; characteristics and NIV rates

	<b>39 hospitals excluded</b>	<b>58 hospitals included</b>
Urban; N(%)	33 (84.6%)	58 (100%)
Teaching; N (%)	14 (35.9%)	36 (62.0%)
Number of Beds		
<200	25 (64.1%)	18 (31.0%)
>200	14 (35.9%)	40 (69.0%)
Hospital-level NIV rates	Mean: 5.4%, SD=12.5% Range 0-50%	Mean: 3.4%. SD=3.9% Range: 0-16.3%

This criterion excluded 464 (3.2%) patients from 39 hospitals.

	Excluded patients	Included patients	Total
No ventilation	436 (93.9%)	12,268 (29.35%)	12,704 (90.4%)
NIV only	12 (2.6%)	519 (3.8%)	531 (3.8%)
IMV only	14 (3.02%)	691 (5.09%)	705 (5.02%)
NIV failure	1 (0.2%)	27 (0.2%)	28 (0.2%)

Fisher's exact P-value = 0.102

We also did not see a difference in mortality: 1.5% in excluded and 1.2% in our study, ( $p=0.60$ ).

e-Figure 1.

