

INTRODUCTION

Dyspnea is a common symptom of patients presenting to emergency departments (EDs) and is associated with a spectrum of underlying pathologies. The utilization of point-of-care ultrasound (POCUS) has gained prominence in the evaluation of dyspneic patients, offering rapid diagnostic insights at the bedside. Several studies have shown that POCUS use in acute dyspnea can reduce time to diagnosis (1, 2) and improve diagnostic accuracy (3, 4), but it is uncertain if use of POCUS can decrease the use of other diagnostic modalities, leading to decreased overall cost of ED visits. We investigated the association of POCUS with ED charges and concurrent use of traditional diagnostic modalities (chest X-ray, CXR) in patients presenting with dyspnea.

METHODS

A Nationwide Emergency Department Sample (NEDS) database query from 2020 was conducted to identify patients presenting to the ED with acute dyspnea, based on ICD-10 codes R06.01-03, R06.09, R09.02, J44.1, J81.0, I50.9, I50.23, I50.33, and I50.43 entered as a primary diagnosis. Patients who died in the ED, left against medical advice, or had missing data on study variables were excluded. POCUS and CXR use in the ED were identified using CPT codes 76604 and 71045-6, respectively. The primary outcome was total ED charges, and the secondary outcome was use of CXR. Covariates included sex (male or female), age (<18, 18-45, >46), presence of select cardiac or pulmonary comorbid conditions, based on Clinical Classifications Software Refined (CCSR) codes, that may trigger use of CXR independent of dyspnea; and hospital type (urban teaching, urban non-teaching, or rural).

RESULTS

We identified 328,794 cases meeting inclusion criteria (weighted 54% male/46% female; 3% age <18, 20% age 18-45; 77% age >45). Sixty-four percent of cases involved CXR use while only 0.1% involved documented POCUS use (unweighted n=294). Mean ED charges were \$6,247. On bivariate analysis, charges were higher among cases involving POCUS use (\$8310 vs. \$6245, $p<0.001$), and CXR use was more likely among cases with documented POCUS use (74% vs. 64%, $p<0.001$). Multivariable analysis adjusting for all study covariates confirmed that documented POCUS use was associated with \$2082 higher ED charges (95% confidence interval [CI]: 1339, 2826; $p<0.001$) and 71% higher odds of CXR use (odds ratio: 1.71; 95% CI: 1.30, 2.25; $p<0.001$).

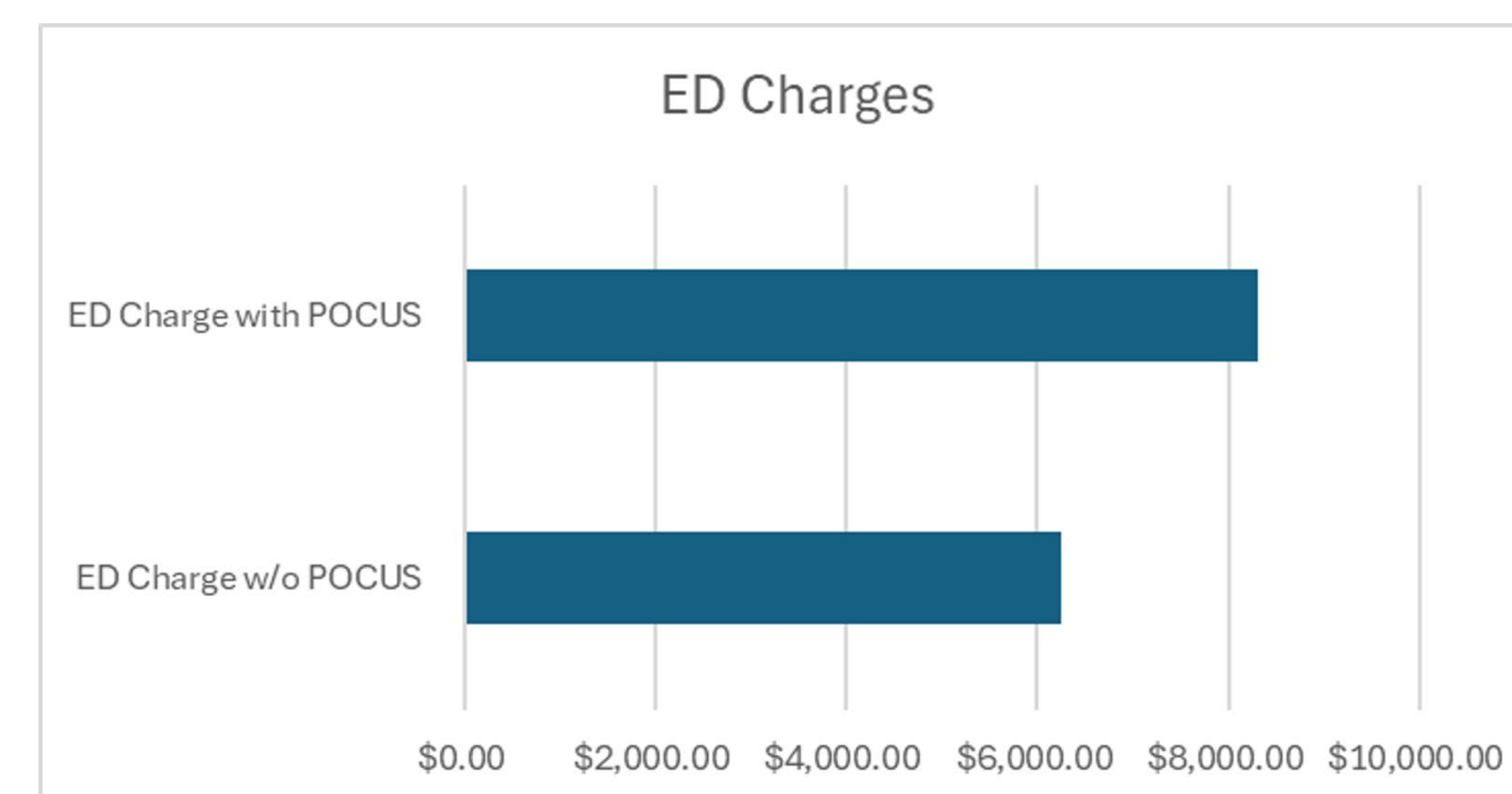
Figures

Covariates used in multivariable analysis

	Proportion	Standard Err	[95% Confidence interval]
Male	0.4613417	0.000902	[0.4595743-0.46311]
Female	0.5386583	0.000902	[0.53689-0.5404257]
Age<18	0.0327966	0.0003183	[0.0321785-0.0334262]
Age 18-45	0.1994441	0.0007109	[0.1980544-0.2008412]
Age >46	0.7677592	0.000749	[0.766288-0.769224]
No Cir Comorbidities	0.8189426	0.0005722	[0.8178183-0.8200615]
Cir Comorbidities	0.1810574	0.0005722	[0.1799385-0.1821817]
Np Rsp Comorbidities	0.8031221	0.0005752	[0.8019924-0.804247]
Rsp Comorbidities	0.1968779	0.0005752	[0.195753-0.1980076]
Urban Teaching	0.5991908	0.0000207	[0.5991503-0.5992313]
Urban Non-Teaching	0.2078021	0.0000257	[0.2077517-0.2078525]
Rural	0.1930072	0.0000116	[0.1929845-0.1930298]

Proportion of POCUS and CXR use

	Proportion	Standard Error	[95% Confidence interval]
POCUS	0.0009821	0.0000583	[0.0008742 - 0.0011033]
No POCUS	0.9990179	0.0000583	[0.9988967 - 0.9991258]
CXR	0.6391347	0.0008368	[0.6374929- 0.6407733]
No CXR	0.3608653	0.0008368	[0.3592267- 0.3625071]



ED charges with and without POCUS use ($p<0.001$)

DISCUSSION

The use of POCUS in patients presenting with dyspnea was associated with increased cost in ED charges. Previous studies have shown decreased costs in EDs when POCUS was used; however, these studies did not exclusively examine dyspnea as the presenting symptom (5, 6). This may have been due to the majority of patients included in our analysis receiving a CXR in addition to POCUS.

In the clinical practice it is common for POCUS to be used but not documented as a procedure. POCUS is also frequently used in patients who are critically ill. POCUS can be used to rapidly identify multiple causes of dyspnea that can also be diagnosed with CXR. This leads to consideration of potentially not obtaining a CXR in patients with dyspnea in the ED if the diagnosis is obtained quicker with POCUS. These elements may have affected data gathered and are important in future research regarding cost analysis in use of POCUS.

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