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Epidemiological Brief

Key Findings: During the first sixteen months of the COVID-19 pandemic in Mississippi, small facilities with less than 100 beds had a disproportionately high number of patients in need of emergency care. Patients who received COVID-19 emergency care in small facilities tended to be older, more rural, had greater comorbidity burdens, and higher mortality than patients who received comparable care in larger facilities. The majority of small hospitals are located in remote rural areas. Given their size and location, small hospitals provided a disproportionately high share of emergency care for COVID-19 patients. In addition, the cost of medical care was much lower in small facilities compared to larger hospitals. To reduce COVID-19-related complications and deaths among rural and older populations, the state should explore options for increasing the capacity of small hospitals and rural health services.

Goal and Data: This study described the characteristics of COVID-19 emergency department (ED) visits in Mississippi by hospital size. This data source has information on patient demographics, diagnoses, procedures, and hospital resource utilizations from all non-federal hospitals in the state. The study included only residents and the research period was March 2020-June 2021. We categorized hospitals in three groups: small (0-199 licensed beds); medium (200-299) and large (300+ licensed beds). The group of small hospitals had a total of 1,907 (17%) beds; the group of medium-size hospitals had 3,616 (33%) beds, and the group of large hospitals had 5,455 (50%) total beds.

Overview: The burden of COVID-19 ED visits was virtually identical for medium-size hospitals (100-299 beds) and large facilities with more than 300 beds. Relative to their size, small facilities with less than 100 beds had a disproportionately high number of patients (Figure 1). Usually located in underserved rural areas, these facilities accounted for nearly one-third (30.2%) of all COVID-19 ED visits—a finding reflecting the high number of rural patients receiving emergent medical care during the first sixteen months of Mississippi’s pandemic. In fact, nearly two third (64.2%) of the 44,324 COVID-19 ED visits were among patients residing in non-metropolitan areas.

FIGURE 1. COVID-19 EMERGENCY DEPARTMENT VISITS BY HOSPITAL SIZE, MS, MARCH 2020 - JUNE 2021

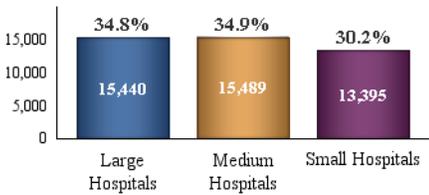
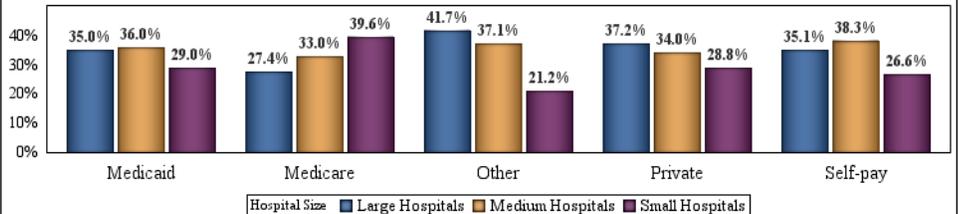


FIGURE 2. COVID-19 EMERGENCY DEPARTMENT VISITS BY HOSPITAL SIZE AND PAYER, MS, MARCH 2020 - JUNE 2021



Hospital Size and Payer: Stratification by hospital size and payer revealed that patients with private insurance coverage were more prevalent in large and medium-size hospitals than in small hospitals (Figure 2). By contrast, COVID-19 ED visits among the elderly population insured by Medicare were more prevalent in small hospitals. In fact, 39.6% of all COVID-19 ED visits among Medicare patients occurred in small hospitals. The distribution of COVID-19 ED visits among Medicaid patients mimicked the overall distribution of the studied population: 29.0% of such encounters were in small hospitals, while large and medium-size hospitals shared the rest.

Mean Charges: The mean charges for COVID-19 ED visits were 63.1% (1.6 times) higher in large hospitals than in small hospitals and 35.8% (1.4 times) higher in medium-size hospitals than in small hospitals (Figure 3). Compared to small facilities, charges for COVID-19 ED visits in large facilities were 87.2% higher for self-pay patients; 81.2% higher for privately insured patients; 68.5% higher for Medicaid patients; and 61.4% for Medicare patients (Figure 4).

FIGURE 3. COVID-19 EMERGENCY DEPARTMENT VISITS: MEAN CHARGES, MS, MARCH 2020 - JUNE 2021

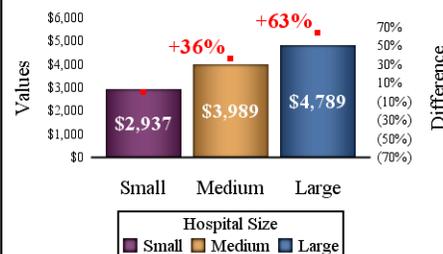
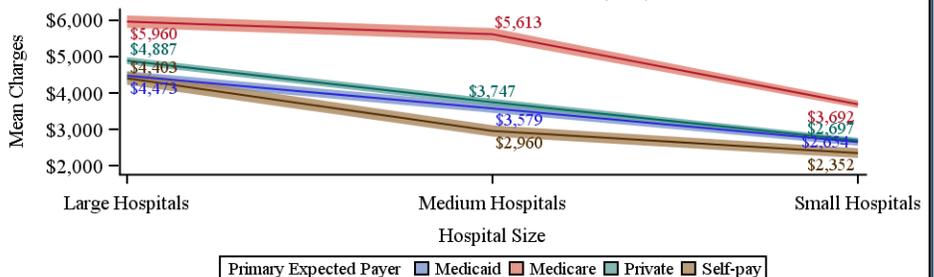


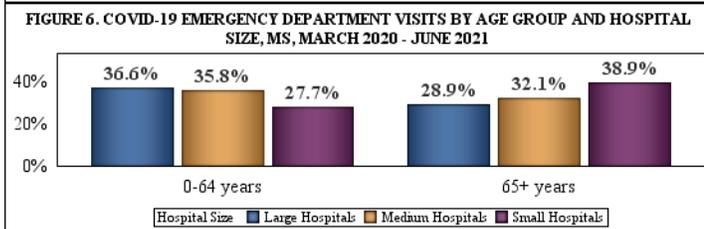
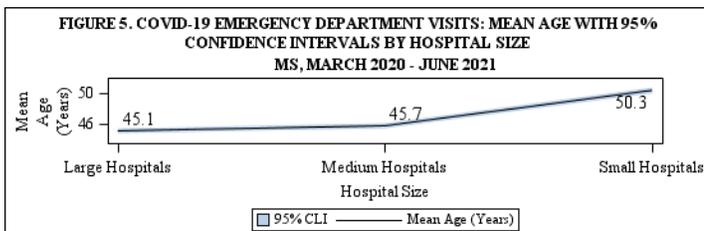
FIGURE 4. COVID-19 EMERGENCY DEPARTMENT VISITS: MEAN CHARGES WITH 95% CONFIDENCE INTERVALS PER PAYER AND HOSPITAL SIZE, MS, MARCH 2020 - JUNE 2021



Demographic Characteristics: Among the 44,324 COVID-19 ED visits, 59.7% were women, 55.1% were African Americans, and 77.4% were younger than 65 years of age (Table 1). Comparative analyses of patient characteristics by hospital size revealed some notable differences. There were significant differences in the distribution of patients by age and residence, for instance (Table 1). Reflecting Mississippi's aging rural population, COVID-19 patients visiting emergency rooms in small facilities for COVID-19 tended to be older than patients receiving such care in medium-size and large facilities, respectively 50.3 years, 45.7 years, and 45.1 years (Figure 5). In fact, 38.9% of all COVID-19 ED encounters among the 65+ age group were in small hospitals (Figure 6). Most (76.5%) small facilities providing emergency care are located in rural areas and residents in rural areas accounted for 53.8% of all COVID-19 ED visits.

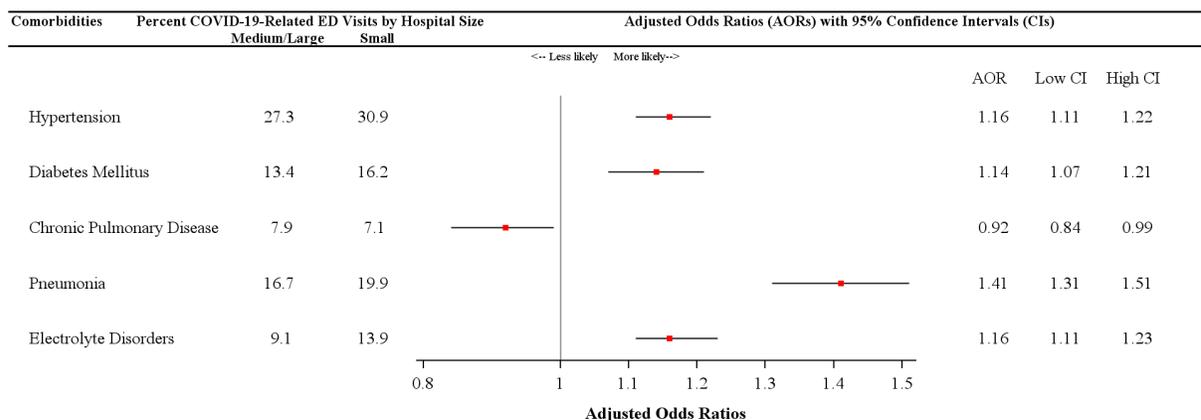
Table 1. COVID-19 Emergency Department Visits: Patient Characteristics by Hospital Size, MS, March 2020 - June 2021

Characteristics	Hospital Size		All (%)
	Medium/Large (%)	Small (%)	
Gender			
Female	60.1	60.0	59.7
Male	39.9	40.0	40.3
Age			
0-64 years	80.2	70.9	77.4
65+ years	19.8	29.1	22.6
Race			
African Americans	56.1	52.8	55.1
Caucasians	40.3	43.3	41.2
Other	3.6	3.9	3.7
Residence Status			
Metropolitan (Urban)	40.6	24.9	35.8
Micropolitan	42.1	21.3	35.8
Rural	17.4	53.8	28.4
Payer			
Private	38.3	35.8	37.6
Medicaid	24.7	23.3	24.3
Medicare	17.6	26.6	20.3
Self-pay	10.6	8.9	10.1
Other	8.8	5.5	7.8



Comorbidities: The comorbidity burden was higher among patients who visited emergency room for COVID-19 in small hospitals: 48.7% of such visits had at least one comorbid condition versus 44.3% of all COVID-19 ED encounters in medium and large hospitals. Likewise mortality was higher in small facilities. Of the 183 COVID-19 ED deaths, 70 (38.3%) occurred in small facilities. COVID-19 ED patients in small hospitals had a higher frequency of underlying chronic disease risk factors such as hypertension (30.9% vs. 27.3%, $p < .001$) and diabetes (16.2% vs. 13.4%, $p < .001$) (Figure 7). Such encounters had also a higher frequency of acute complications, including pneumonia (19.9% vs. 16.7%, $p < .001$) and fluid/electrolyte disorders (13.9% vs. 9.1%, $p < .001$). Compared with COVID-10 ED visits in medium/large facilities, those in small facilities had higher odds for having hypertension (OR, 1.16 95% CI, 1.11-1.22), diabetes (OR, 1.14; 95% CI, 1.07-1.21), pneumonia (OR, 1.41; 95% CI, 1.31 -1.51), and fluid/electrolyte disorders (OR, 1.16; 95% CI, 1.11 -1.23), after controlling for demographic factors, residence, and payer.

Figure 7. COVID-19-Related ED Visits; Comorbidities, Adjusted Odds Ratios (AORs), Mississippi, March 2020 - June 2021



Methods: To select COVID-19 cases, we used the following International Classification of Diseases (ICD-10-CM) diagnosis codes: B97.29 and B34.2 before 1 April 2020 and U07.1 from 1 April 2020 onward, as well as J1282 and M3581 from 1 January 2021 onward. We analyzed ED data from all non-federal hospitals in the state. The study included all-listed COVID-19 diagnoses among state residents. To select ED visits only related to COVID-19, we excluded all encounters for injuries, poisonings, and other external causes in any diagnostic field. To categorize residence status, we applied the Urban-Rural Classification Scheme for Counties developed by the National Center for Health Statistics (NCHS Urban-Rural Classification Scheme for Counties. National Center for Health Statistics. Vital Health Stat 2(166). 2014.). To categorize chronic comorbidities, we used the Elixhauser Comorbidity Index (Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care* 1998; 36:8-27). We compared characteristics between COVID-19 ED visits in small and large facilities with chi-square tests and obtained the adjusted odds ratios using multivariable regression models.

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