

ORIGINAL RESEARCH

Characterization and impact of COVID-19-tested and infected patients: Experience of The Johns Hopkins Health System Regional Emergency Departments

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Abstract

Background: There is limited understanding of the characteristics and operational burden of persons under investigation (PUIs) and those testing positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) presenting to emergency departments (EDs).

Methods: We reviewed all adult ED visits to 5 Johns Hopkins Health System hospitals in the Maryland/District of Columbia (DC) region during the initial coronavirus disease 2019 (COVID-19) surge, analyzing SARS-CoV-2 polymerase chain reaction test eligibility, results, demographics, acuity, clinical conditions, and dispositions.

Results: Of 27,335 visits, 11,402 (41.7%) were tested and 2484 (21.8%) were SARS-CoV-2 positive. Test-positive rates among Hispanics, Asians, African Americans/Blacks, and Whites were 51.6%, 23.7%, 19.8%, and 12.7% respectively. African American/Blacks infection rates (25.5%–33.8%) were approximately double those of Whites (11.1%–21.1%) in the 3 southern Maryland/DC EDs. Conditions with high test-positive rates were fever (41.9%), constitutional (36.4%), upper respiratory (36.9%), and lower respiratory (31.2%) symptoms. Test-positive rates were similar in all age groups (19.9% to 25.8%), although rates of hospitalization increased successively with age. Almost half, 1103 (44.4%), of test-positive patients required admission, of which 206 (18.7%) were to an ICU.

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Conclusion: The initial surge of SARS-CoV-2 test-positive patients experienced in a regional hospital system had \approx 42% of patients meeting testing criteria and nearly one-fifth of those testing positive. The operational burden on ED practice, including intense adherence to infection control precautions, cannot be understated. Disproportionately high rates of infection among underrepresented minorities underscores the vulnerability in this population. The high rate of infection among self-identified Asians was unexpected.

1 | INTRODUCTION

1.1 | Background

With 146 million annual emergency department (ED) visits in the United States,¹ EDs play a key role in the health system. EDs have served as the near exclusive front-line health system access and management of acute patient care during the coronavirus disease 2019 (COVID-19) pandemic. Although historically 40% to 70% of hospital admissions originate from the ED,^{2,3} it is highly likely that virtually all severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)-infected patients requiring hospital admission were initially seen in an ED.

Because of various factors, including stay-at-home orders, public health warnings, fear, and epidemiological differences in certain communities, there was a significant shift in the characteristics and demographics of patients seeking health care, particularly visits to hospital EDs in areas experiencing the initial wave of the COVID-19 pandemic.⁴⁻¹⁰ It has been well documented that EDs experienced large decreases in overall patient volume for multiple conditions, including time-sensitive conditions such as acute myocardial infarction and strokes during the initial wave of the pandemic.¹¹⁻¹⁴ However, little is known about the volume and characteristics of patients seeking ED care with symptoms consistent with SARS-CoV-2 infection requiring testing and the proportionate burden of visits, features, and dispositions for those who test positive. The one small study that examined emergency-related COVID-19-infected patients was restricted to the out-of-hospital setting.¹⁵

1.2 | Importance

Patients presenting with symptoms meeting criteria for SARS-CoV-2 testing in the ED present significant logistical challenges. These patients must be tested under strict infection control conditions, be kept individually isolated from the general ED patient population, and require heightened infection control precautions that include staff engagement only with fully protective personal protective equipment (PPE) until test results are returned. Those testing positive are maintained under airborne precaution isolation and full PPE requirements for all clinical staff.^{16,17}

1.3 | Goals of this investigation

To understand the impact of COVID-19 on EDs, we analyzed the volumes, characteristics, demographics (including race/ethnicity, age, sex), and dispositions of patients with presumed SARS-CoV-2 infections in our regional health system's EDs during the initial wave of the pandemic.

2 | METHODS

2.1 | Study design and setting

We conducted a multicenter retrospective observational cohort study of all registered adult ED patients presenting to any of 5 Johns Hopkins Health System hospitals in the mid-Atlantic region. The study was approved by the Johns Hopkins Institutional Review Board.

Four of the hospitals are in Maryland and one is in the District of Columbia (DC) (Figure 1). The Johns Hopkins Hospital is a 1000-bed tertiary care urban teaching hospital, level I trauma center, cardiac consultation center, and stroke center serving a local socioeconomically disadvantaged inner-city community. Johns Hopkins Bayview Medical Center is a 420-bed level II trauma center and the State of Maryland Burn Center and serves as a community teaching affiliate hospital. Johns Hopkins Howard County General Hospital is a 267-bed community hospital. Johns Hopkins Suburban Hospital is a 228-bed community hospital in southern Maryland, largely serving the National Capitol Region. Finally, Johns Hopkins Sibley Memorial Hospital is a 318-bed community hospital in Washington, DC. Distances from each other range from 3 miles to 45 miles. The regional hospitals include a large inner-city academic medical center, an urban community-oriented teaching affiliate, and 3 community-based non-teaching hospitals.

2.2 | Selection of patients

All patients 15 years of age and older presenting to the adult side of each of our 5 health-system EDs within the region from March 16

through May 15, 2020, were included. Patients who registered but left without being seen were still included. This time frame corresponded to the first wave and peak of COVID-19 hospitalizations in our region. On March 16, 2020, the Maryland State Government ordered the closures of all schools, followed by a closure of non-essential businesses on March 23, and then a stay-at-home order on March 30. Certain non-essential businesses reopened and the stay-at-home order was lifted on May 15, 2020.⁹

2.3 | Interventions–SARS-CoV-2 testing

On arrival to the ED, patients meeting COVID-19 symptom criteria based on Centers for Disease Control and Prevention (CDC) guidelines or who had high acuity presentations where COVID-19 risk assessment was impractical or unreliable were designated as “persons under investigation” (PUIs), separated from other patients, and tested for SARS-CoV-2. Patients who presented with a positive test elsewhere

The Bottom Line

The impact of the initial 2-month severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic surge on 5 Eastern regional emergency departments resulted in over 27,000 symptomatic patient visits with 42% being tested. There was a 22% infectivity rate with disproportionately high infection rates among minorities.

were similarly separated while test results were investigated. Screening criteria were adopted institution-wide and were incorporated into the triage screening tool within the electronic medical record and updated over time as the CDC published revised recommendations. In a few cases, doctors of physician assistants determined the presence of symptoms not discovered at triage and reclassified the patient as a PUI. Testing was by nasopharyngeal swab as per standard protocol. All

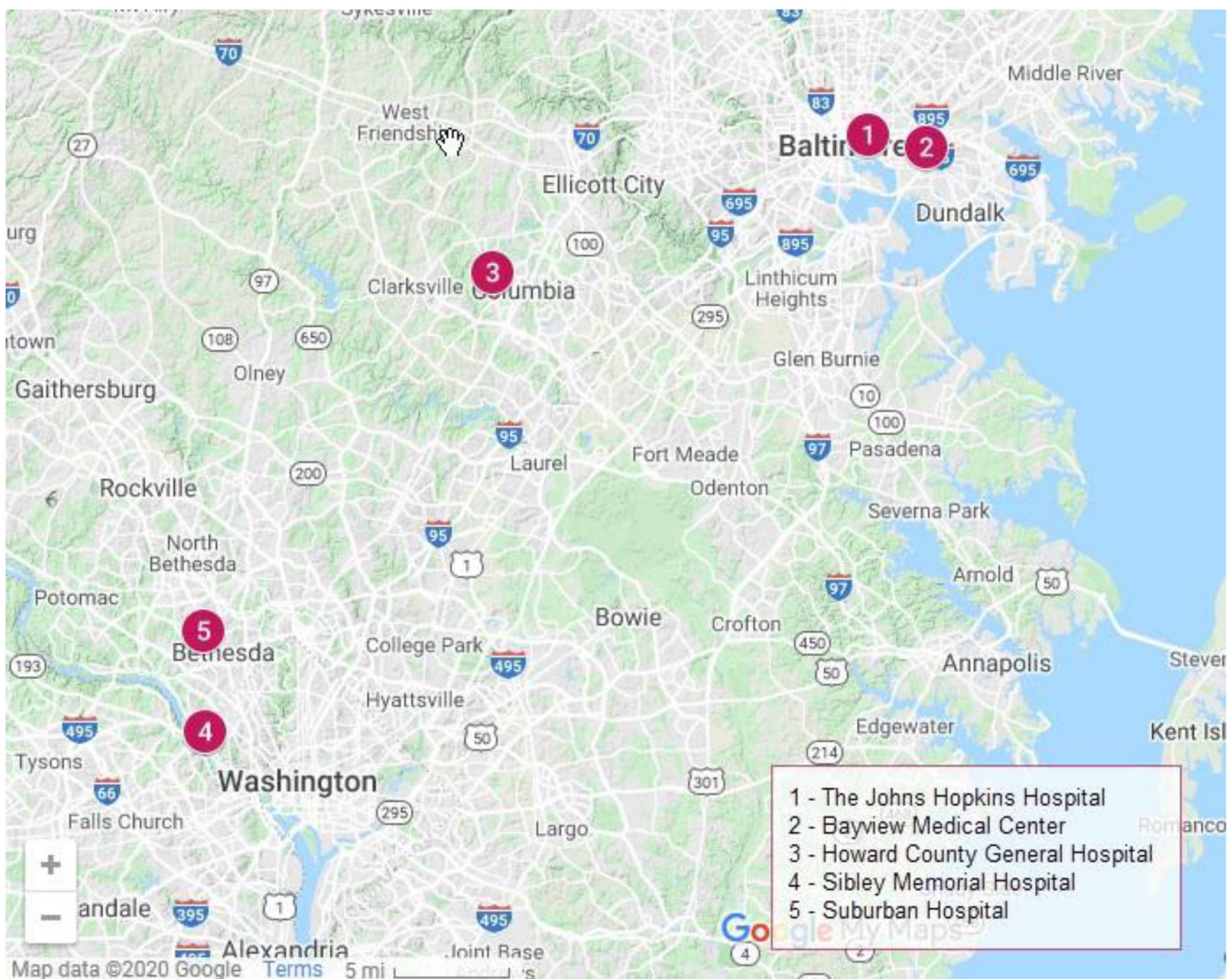


FIGURE 1 Location of 5 regional hospitals in the Johns Hopkins Health System

specimens underwent laboratory analysis in the main academic center (Johns Hopkins Hospital) or affiliate hospital laboratories using either the Cepheid Xpert[®]Xpress (Cepheid, Sunnyvale, CA) or a nucleic acid test developed and validated by Johns Hopkins Hospital laboratory. All patients in extremis or unable to answer screening questions were automatically considered PUIs and tested. Patients with a prior positive test were typically not retested in the ED because of limited testing capabilities but were considered as both PUI and test-positives.

2.4 | Measures and main outcomes

All 5 hospitals use a centralized electronic medical record (Epic). All clinical data were abstracted from the electronic medical record by an experienced data analyst for the 2-month date range. Data included demographic information such as age, sex, race, and ethnicity, as well as clinical data, including triage acuity, medical condition, ED disposition, comorbidities, and whether the patient was tested for SARS-CoV-2 and results. Race and ethnicity were treated as discrete data elements because of electronic medical record coding. Intake triage acuity was evaluated on a point scale, ranging from 1 (highest acuity) to 5 (lowest acuity).¹⁸

2.5 | Data analysis

We analyzed the data using descriptive techniques. For the study period we described variations in patients volumes and demographics. We also assessed SARS-CoV-2 testing rates and results, acuity, disposition, and comorbidities. To assess the factors associated with SARS-CoV-2 outcomes, we conducted a multivariate logistic regression. The dependent outcomes of interest were testing positive, admission if positive, or direct admission to an ICU if admitted. Independent variables included patient age, sex, race, ethnicity, and comorbidities. Analysis was conducted in Stata (Release 14. StataCorp LP, College Station, TX).

3 | RESULTS

3.1 | Volumes and patient demographics

There were 27,335 patient visits to the Johns Hopkins Health System's 5 regional EDs during the study period (March 16–May 15) (Table 1). The data across all 5 hospital EDs were closely similar and thus all the data were combined for presentation, unless otherwise noted. The overall reduction in patient visits between the 2020 study time period and a comparative span in 2019 was 15,795 or 36.7% (data not shown). Decreases were noted across all age groups, both sexes, and all self-identified races (except for Native Hawaiian/Pacific Islander, though this accounted for < 0.1% of all visits). Visits by patients who self-identified their ethnicity as Hispanic remained approximately the same across periods.

3.2 | SARS-CoV-2 testing

During the period of study, 11,402 (41.7%) visits met symptom criteria and were tested for SARS-CoV-2 or considered PUI due to prior test (Table 1). Of these, 2484 (21.8%) were positive tests. We are not aware of any patients declining to be tested. Similar positivity rates were seen across all ages and both sexes. For self-identified race groups with > 100 visits, Asians had the highest positivity rate (23.7%). African American/Black positivity rate was 19.8%, and Whites had the lowest positivity rate (12.7%). There were greater differences in SARS-CoV-2 test-positive rates in African Americans/Blacks versus Whites in 3 of the hospital EDs outside of the Baltimore corridor as follows: Bayview Medical Center (12.3% vs 7.3%) and Johns Hopkins Hospital (11.2% vs 8.0%) compared with Howard County General Hospital (25.5% vs 11.1%), Suburban Hospital (33.8% vs 21.1%), and Sibley Memorial Hospital (32.0% vs 14.9%) (data not shown).

Of the 3798 (13.9%) visits where the individuals declined to identify their race, half met testing criteria, and of these nearly half were positive. Slightly more than half of the visits by individuals self-identified as Hispanic met criteria for testing, and of these over half tested positive.

3.3 | SARS-COV-2 patient acuity and disposition

Slightly more than half of all ED patients were triaged as acuity level 3 on arrival to the ED (Table 2). Proportionately, about half of all test-positive patients were found in this acuity cohort. About one-third of ED visits resulted in hospitalization. Of these, almost two-thirds met testing criteria and 20.0% tested positive (Table 2). Hospitalizations among test-positive men and women, were similar (Table 3). Among all SARS-CoV-2 test-positive ED visits, rates of hospitalization increased with age, ranging from 13.2% (age 15–24) to 81.0% (age 75+). White, African American/Black, and Asian patients who were SARS-CoV-2 test-positive were hospitalized at similarly high rates, whereas positive Hispanic patients were hospitalized remarkably less (Table 3). Almost 20% of the hospitalized infected patients were admitted to an ICU. Seven patients with COVID-19 expired, representing 7.1% of all patients who expired in the ED. Four of these were men, 3 were women, and 4 were age 75 years or over.

3.4 | Comorbidities, presentations, and SARS-CoV-2 infections

The most common comorbidity among patients was hypertension, followed by diabetes and cancer (Table 2). This held true for patients who tested positive. There were 355 pregnant patients, of which 109 (30.7%) met criteria for testing, and 22% tested positive (Table 2). Clinical conditions with associated positivity rates are shown in Table 4. Conditions most associated with COVID-19 were hypotension, fever, constitutional symptoms, and pulmonary. Other conditions, including general medical, musculoskeletal, surgical

TABLE 1 SARS-CoV-2 testing and results by demographics

Category	Visits	SARS-CoV-2 Tested		SARS-CoV-2+		SARS-CoV-2+ (By distribution)
	N	N	(%)	N	(%)	(%)
Category	27,335	11,402	41.7%	2484	21.8%	
Age, y						
15-24	2406	765	31.8%	152	19.9%	6.1%
25-34	4983	1679	33.7%	330	19.7%	13.3%
35-44	4538	1784	39.3%	461	25.8%	18.6%
45-54	4335	1823	42.1%	465	25.5%	18.7%
55-64	4515	2039	45.2%	419	20.5%	16.9%
65-74	3046	1464	48.1%	304	20.8%	12.2%
75+	3512	1848	52.6%	353	19.1%	14.2%
Sex						
Male	13,844	5633	40.7%	1,331	23.6%	53.6%
Female	13,477	5764	42.8%	1,151	20.0%	46.3%
Other/Not Specified	14	5	35.7%	2	40.0%	0.1%
Race (self-identified)						
American Indian or Alaska Native	36	13	36.1%	2	15.4%	0.1%
Asian	968	464	47.9%	110	23.7%	4.4%
Black	11,024	4168	37.8%	826	19.8%	33.3%
Native Hawaiian or Pacific Islander	30	15	50.0%	6	40.0%	0.2%
White/Caucasian	11,086	4674	42.2%	594	12.7%	23.9%
Two or More Races	393	159	40.5%	31	19.5%	1.2%
Other/Not Specified	3798	1909	50.3%	915	47.9%	36.8%
Ethnicity (Self-Identified)						
Hispanic or Latinx	3297	1747	53.0%	901	51.6%	36.3%
Not Hispanic or Latinx	23,777	9555	40.2%	1,568	16.4%	63.1%
Other/Not Specified	261	100	38.3%	15	15.0%	0.6%

SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

(including trauma), psychiatric, and substance abuse, were associated with relatively lower SARS-CoV-2 positivity rates. Multivariate logistic regression found that older age groups were more likely to test positive and be admitted, as were males (Table 5). Although Hispanic individuals were more likely to test positive, they were no more likely to be admitted. Immunosuppression and diabetes were the only comorbidities significantly associated with admission, whereas only kidney disease was associated with admission to an ICU.

4 | LIMITATIONS

There are several limitations to our study. First, as with all clinical studies, some data were missing, and misclassification may have occurred in others. Second, we were unable to determine a comprehensive set of specific indication criteria that were applied from this data set when SARS-COV-2 testing was ordered. Testing criteria as per the

CDC evolved and changed throughout the study time frame as best practices were revised over time. The unit of analysis was ED visits; repeat visits by patients over a 2-month period is expected to be relatively low, but almost certainly some patients may have had more than one visit and were counted twice. Still, each visit was independently screened for COVID-19, and virtually none of these were likely to have had a second, newly diagnosed infection. Further, we did not retest patients who presented with known COVID-19, although if they had tested positive recently, they also had to be separated and treated under strict protocols. Some patients in the 15y-24y cohort, considered as pediatric (15y-17y), were handled slightly differently by our institutions. However, there were only a total of 62 such patients, and thus, impact on the data would be minimal. Our regional experience may not reflect that experienced in other parts of the country. Surges of COVID-19 infection asynchronously reached different parts of the country. Demographics of our city population, with large underrepresented minorities, would not be reflective of many metropolitan areas.

TABLE 2 Intake Triage Acuity, Comorbidities, and Final Disposition of ED Patients

	Visits	Tested for SARS-CoV-2		SARS-CoV-2 +		% Positive
	N (% Distribution)	N	% Distribution	N (+)	% Distribution	
Triage Score						
1 (Highest Acuity)	1,175 (4.3%)	539	4.7%	68	2.7%	12.6%
2	4,590 (16.8%)	2609	22.9%	550	22.1%	21.1%
3	14,750 (54.0%)	6308	55.3%	1272	51.2%	20.2%
4	5,117 (18.7%)	1612	14.1%	488	19.6%	30.3%
5 (Lowest Acuity)	1,210 (4.4%)	182	1.6%	58	2.3%	31.9%
Not Listed ^a	493 (1.8%)	152	1.3%	48	1.9%	31.6%
Dispositions						
Admitted	8,672 (31.7%)	5507	48.3%	1103	44.4%	20.0%
Observation/General Ward	7,499 (86.5%) ^c	4573	83.0% ^c	897	81.3% ^c	19.6%
Intensive Care Unit	1,173 (13.5%) ^c	934	17.0% ^c	206	18.7% ^c	22.1%
Discharged	17,025 (62.3%)	5499	48.2%	1316	53.0%	23.9%
Transfer	400 (1.5%)	211	1.9%	47	1.9%	22.3%
Other ^b	1,140 (4.2%)	144	1.3%	11	0.4%	7.6%
Expired	98 (0.4%)	41	0.4%	7	0.3%	17.1%
Comorbidities^d						
Hypertension	4,691 (17.2%)	2234	19.6%	344	13.8%	15.4%
Lung Disease	2,068 (7.6%)	1054	9.2%	95	3.8%	9.0%
Kidney Disease	1,796 (6.6%)	915	8.0%	127	5.1%	13.9%
Immunosuppressed	1,674 (6.1%)	822	7.2%	106	4.3%	12.9%
Diabetes	2,435 (8.9%)	1233	10.8%	225	9.1%	18.2%
Heart Failure	1,149 (4.2%)	633	5.6%	69	2.8%	10.9%
Atrial Fibrillation	1,109 (4.1%)	600	5.3%	75	3.0%	12.5%
Cerebrovascular Disease	1,095 (4.0%)	550	4.8%	62	2.5%	11.3%
Cancer	2,187 (8.0%)	1036	9.1%	127	5.1%	12.3%
Coronary Artery Disease	1,507 (5.5%)	751	6.6%	93	3.7%	12.4%
Obesity	1,636 (6.0%)	744	6.5%	139	5.6%	18.7%
Pregnancy	355 (1.3%)	109	1.0%	24	1.0%	22.0%
Smoker	1,489 (5.4%)	567	5.0%	20	0.8%	3.5%

^aPatients who can be placed in an ED bed immediately often do not undergo triage.

^bIncludes AMA (Against Medical Advice), Eloped, LWBS (Left Without Being Seen), Left before Triage, Screened and Left, Sent directly to specialty outpatient department.

^cPercentage is of total admissions.

^dPercentage distribution is of the total patients.

Finally, our regional experience may not reflect other jurisdictions, and we are aware that there has been some demographic shift of newly infected individuals over time.

5 | DISCUSSION

We believe this study is the first to describe in detail ED patient visit characteristics, associated criteria-based SARS-CoV-2 testing, and COVID-19 hospitalizations in a regional health system during

the initial surge of SARS-CoV-2. A substantial percentage (41.7%) of the ED population were tested for SARS-CoV-2 during their ED visit and the positivity rate was over 20%. EDs typically serve a front-line care function for acute care hospitals. As such, they are a window on the health of the community. The role of the ED is accentuated in pandemics as it is the main portal of evaluation for those with concerning symptoms. With very few exceptions, even those infected with COVID-19 who were ultimately transferred to major medical centers had their initial evaluation in an ED. The task of evaluating PUIs required the assumption that such patients are infected until proven

TABLE 3 Disposition of ED-diagnosed SARS-CoV-2-positive patients

	SARS-CoV-2 +		Hospitalized ^a		Expired ^b
	N	N	% of hospitalized	% of total	
Total	2484	1150	46.3%	100%	7
Age, y					
15–24	152	20	13.2%	1.7%	0
25–34	330	68	20.6%	5.9%	0
35–44	461	123	26.7%	10.7%	1
45–54	465	207	44.5%	18.0%	2
55–64	419	240	57.3%	20.9%	0
65–74	304	206	67.8%	17.9%	0
75+	353	286	81.0%	24.9%	4
Sex					
Male	1331	641	48.2%	55.7%	4
Female	1151	509	44.2%	44.3%	3
Other/Not Specified	2	0	0.0%	0.0%	0
Race (Self-Identified)					
American Indian or Alaska Native	2	1	50.0%	0.1%	0
Asian	110	55	50.0%	4.8%	1
African American/Black	826	433	52.4%	37.7%	3
Native Hawaiian or Pacific Islander	6	1	16.7%	0.1%	0
White/Caucasian	594	348	58.6%	30.3%	1
Two or more races	31	23	74.2%	2.0%	0
Other/not specified	915	289	31.6%	25.1%	2
Ethnicity (self-identified)					
Hispanic or Latinx	901	279	31.0%	24.3%	2
Not Hispanic or Latinx	1568	870	55.5%	75.7%	5
Other/Not Specified	15	1	6.7%	0.1%	0

SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

^aIncludes patients transferred to other hospitals.^bIncludes patients who expired in the ED not after admission, not included in hospitalized patient totals.

otherwise, forcing EDs to establish hot and cold zones for patients. Thus, hospital infection control highly depends upon ED practices.

Not surprisingly, patients with primary presentations consistent with COVID-19 symptoms had the highest rates of SARS-CoV-2 infection. Predominant among those were fever and respiratory-related presentations. Hypotension was not seen in high volumes as a primary presentation, but the rate of revealed viral infections was high, likely a reflection of sepsis. Consistent with other analyses,¹⁹ hypertension, obesity, and diabetes were seen in a large percentage of positive patients, though only diabetes was significantly associated with admission in positive patients in the multivariate regression.

Particularly troublesome was the high rate of infections in those self-identified as Hispanic at all of our hospitals and African Americans/Blacks in 3 of our community EDs toward southern Maryland and

in Washington, DC. During our study period, the pandemic particularly affected Washington, DC and 2 Maryland counties, Montgomery County and Prince George's County, proximate to DC (Fig 1), where higher infectious spread in the community likely revealed health disparities. Hispanics and African Americans/Blacks are considered particularly vulnerable populations for several reasons. Among these are higher rates of comorbidities, socioeconomic factors such as higher rates of poverty, crowded living conditions, lower rates of health insurance, relatively less access to health care, lack of sick leave for workers, and lower likelihood to work from home.^{20–23} Despite a high rate of infection, Hispanic patients had among the lowest admission rate (31.05%) of those who tested positive for SARS-CoV-2 in the ED. Interestingly, this finding is contrary to national CDC data showing a hospitalization rate ratio 4.6 times greater for Hispanic or Latino patients when compared to White, non-Hispanic people.²⁴ A

TABLE 4 Clinical Conditions and SARS-CoV-2 Positivity Rates

	ED patients	Tested		SARS-CoV-2 positivity rate	
	N	N	(%)	N	(%)
Conditions Associated with COVID-19					
Fever	1254	1049	83.7%	440	41.9%
Constitutional Symptoms	169	88	52.1%	32	36.4%
Pulmonary	3086	2342	75.9%	810	34.6%
Hypotension	36	27	75.0%	10	37.0%
Shortness of Breath	2725	2118	77.7%	511	24.1%
Altered Mental Status	510	347	68.0%	72	20.7%
Weakness	536	339	63.2%	79	23.3%
Syncope	309	122	39.5%	23	18.9%
Headache	542	194	35.8%	35	18.0%
Nausea Vomiting Diarrhea	629	304	48.3%	47	15.5%
Ob/Gyn (pregnancy related)	216	13	6.0%	2	15.4%
Medical					
Cardiac	2342	923	39.4%	91	9.9%
Cardiac Arrest (non-traumatic)	51	26	51.0%	1	3.8%
Gastrointestinal	2734	711	26.0%	59	8.3%
Gen Medical	667	225	33.7%	21	9.3%
Musculoskeletal	1795	269	15.0%	36	13.4%
Psych					
Primary	1322	430	32.5%	12	2.8%
Substance Abuse	676	195	28.8%	7	3.6%
Surgical					
Gen	944	112	11.9%	8	7.1%
Trauma	2906	707	24.3%	76	10.7%
Other	3597	758	21.1%	87	11.5%
Unmapped ^a	284	101	35.6%	25	24.8%

COVID-19, coronavirus disease 2019; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

^a Electronic health record field was inadequately recorded for proper coding.

surprising result was the relatively high rate of SARS-CoV-2 infection found among those self-identifying as Asians. We do not know why the infection rate was so high, as it differs from national CDC data showing that Asian case rates nationally are nearly identical to White, non-Hispanic people.²⁵

The 18.7% ICU admission rate among SARS-CoV-2 positive hospitalizations is somewhat higher than earlier previous reports.^{26,27} The requirements of ICU care pushed the overall ICU admissions to 4.3% of all ED patient visits versus 2.3% from the same period a year previous (data not shown). Unexpectedly, patients with higher acuity presentations had lower test positive rates compared to patients with lower acuity presentations. This may be explained by the fact that some high acuity patients who could not be properly assessed for COVID-19 risks because of an inability to communicate were tested by default, whereas lower acuity patients could consistently be assessed for COVID-19 symptoms. Alternately, it is possible that patients with high acuity conditions unrelated to COVID-19 gener-

ally avoided coming to the ED during the study period.⁵ Patients with lower acuity had nearly 30% test-positive rates. Although these patients likely represented less concerning medical conditions, we do know that individuals with moderate but stable COVID-19 symptoms have often been observed to deteriorate during the course of their hospitalization.^{26,28}

EDs have served a major front-line role in the COVID-19 pandemic to date and this is likely to continue. Each ED in this 5-hospital regional system was affected similarly despite considerable geographic dispersion among sites. During a 2-month period during the initial COVID-19 surge, our 5 regional EDs performed well over 11,000 SARS-CoV-2 tests and diagnosed at least 2400 patients with SARS-CoV-2 infections. We believe this study represents the first detailed descriptions of PUIs and patients testing positive for SARS-CoV-2, compared to all ED visits, although generalizability is not ensured. Of particular concern are the high rate of infection among the Hispanic population, the significant overall hospitalization rates for SARS-COV-2-positive

TABLE 5 Multivariate logistic regression of factors associated with testing positive for SARS-CoV-2, admission, and ICU

	Positive Odds Ratio (95% CI)	Admitted ^a Odds Ratio (95% CI)	ICU ^a Odds Ratio (95% CI)
Age, y			
15-24	0.40 (0.32-0.51)	0.04 (0.02-0.08)	0.66 (0.21-2.12)
25-34	0.41 (0.34-0.50)	0.07 (0.05-0.11)	0.52 (0.25-1.09)
35-44	0.62 (0.51-0.74)	0.10 (0.07-0.15)	0.74 (0.42-1.30)
45-54	0.74 (0.62-0.89)	0.20 (0.14-0.29)	0.99 (0.63-1.57)
55-64	0.80 (0.67-0.95)	0.31 (0.21-0.44)	1.23 (0.81-1.87)
65-74	0.97 (0.81-1.17)	0.45 (0.31-0.66)	1.83 (1.21-2.75)
75+	Reference	Reference	Reference
Sex			
Male	1.18 (1.07-1.30)	1.43 (1.19-1.73)	1.47 (1.11-1.95)
Female			
Race			
Black	0.90 (0.77-1.04)	1.10 (0.82-1.47)	1.15 (0.74-1.77)
White/Caucasian	0.44 (0.38-0.51)	1.09 (0.81-1.47)	0.98 (0.63-1.52)
Other	Reference	Reference	Reference
Ethnicity			
Hispanic or Latinx	4.20 (3.59-4.91)	0.80 (0.60-1.07)	1.34 (0.84-2.11)
Not Hispanic or Latinx			
Other/Not Specified	0.72 (0.41-1.27)	0.07 (0.01-0.56)	-
Comorbidities			
Hypertension	0.90 (0.76-1.06)	1.16 (0.82-1.65)	0.87 (0.58-1.31)
Lung Disease	0.57 (0.45-0.71)	1.06 (0.63-1.78)	1.22 (0.67-2.25)
Kidney Disease	0.84 (0.66-1.06)	1.52 (0.86-2.70)	2.06 (1.21-3.52)
Immunosuppressed	0.77 (0.61-0.98)	1.86 (1.06-3.25)	0.67 (0.36-1.25)
Diabetes	1.10 (0.91-1.32)	2.02 (1.37-2.99)	1.33 (0.88-2.01)
Heart Failure	0.70 (0.52-0.94)	1.85 (0.84-4.05)	1.39 (0.75-2.57)
Atrial Fibrillation	0.85 (0.65-1.12)	1.16 (0.59-2.28)	0.97 (0.50-1.87)
Cerebrovascular Disease	0.70 (0.53-0.93)	2.11 (0.97-4.61)	1.17 (0.61-2.22)
Cancer	0.68 (0.56-0.84)	0.99 (0.63-1.54)	0.74 (0.42-1.29)
Coronary Artery Disease	0.77 (0.60-0.99)	0.44 (0.26-0.77)	0.64 (0.33-1.24)
Obesity	1.32 (1.06-1.65)	1.49 (0.97-2.30)	1.44 (0.85-2.46)
Pregnancy	0.88 (0.54-1.46)	1.22 (0.44-3.39)	1.01 (0.11-9.48)
Smoker	0.20 (0.13-0.32)	1.62 (0.52-5.05)	1.33 (0.43-4.10)
N	11402	2482	1156

SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

^aIncludes expired patients.

patients reaching nearly 50%, and the increased operational challenges facing EDs that are addressing the pandemic.

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