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Title

Ethnic Disparities in COVID-19 Among Older Adults Presenting to the Geriatric Emergency Department.

Permalink

<https://escholarship.org/uc/item/7md9r2jd>

Journal

The Journal of emergency medicine, 61(4)

ISSN

0736-4679

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Publication Date

2021-10-01

DOI

10.1016/j.jemermed.2021.04.019

Peer reviewed



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racial and ethnic differences in COVID-19 disease burden. In particular, Hispanic patients are overrepresented in the number of COVID-19 infections and appear to have worse outcomes than other racial and ethnic groups. As of January 4, 2020, there have been 1,684,586 cases of COVID-19 and 26,333 deaths due to this disease among individuals of Hispanic ethnicity in the United States (11). The overall COVID-19 disease burden among individuals of Hispanic ethnicity (21.6%) in the United States is higher than that observed among other minorities, including those of Black (12.6%), Asian (3.4%), and American Indian or Alaskan Native (1.3%) race and ethnicity, as of January 4, 2020 (11). In addition, a recent report showed higher rates of hospitalization among Hispanic (46.5%) relative to Black (39.5%) and non-Hispanic White (34.4%) patients with COVID-19 (12). Studies examining ethnic disparities in clinical presentation and outcomes from COVID-19 are urgently needed. However, there is a dearth of epidemiological data on ethnic differences among patients with COVID-19, especially among adults 65 years and older.

To date, no study has examined the clinical features or outcomes from COVID-19 among older patients presenting to a geriatric emergency department (GED). Common features of GEDs include staff with training in geriatric medicine, evidence-based protocols for geriatric care, and physical modifications to accommodate functional limitations (13,14). GEDs have been shown to improve health outcomes in older adults, such as lowering risk of hospital admission and readmission and reducing length of stay (15–20). To better inform the emergency care of diverse populations of older adults with COVID-19, we examined clinical characteristics and outcomes from COVID-19 among older U.S. patients aged 65 years and older presenting to two GEDs at a large academic health system. Importantly, nearly half of the older patients with COVID-19 were Hispanic, allowing us to evaluate ethnic differences in clinical presentation and outcomes.

Materials and Methods

Study Design, Setting, and Population

This was a retrospective cohort study among older U.S. patients with COVID-19 presenting to two GEDs within a single academic health system, University of California (UC) San Diego Health, between March 10, 2020 and August 9, 2020. One GED is located in an urban teaching hospital with a level I trauma center, with an annual census of approximately 50,000 patients per year. The second GED is located in a suburban, community-based hospital with an annual census of approximately 35,000 patients per year. The suburban hospital consists

of an accredited GED with a dedicated space to provide emergency care to adults 65 years and older. The urban ED functions as a GED, but does not have a separate space for older adults. The two GEDs have a shared electronic medical record system. The suburban GED received level I GED accreditation by the American College of Emergency Physicians (the highest level), which is awarded to GEDs that are guided by 20 best practices in education, staffing, policies, protocols, quality improvement, outcome measures, equipment, and physical environment. The urban GED is currently undergoing review for accreditation. The present study was approved by the Human Research Protections Program of University of California, San Diego.

This study included all patients 65 years and older presenting to the GED who tested positive for COVID-19 while in the GED or within 2 h of their triage temperature if admitted and tested after leaving the GED. Two rapid diagnostic tests were used to determine the presence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the Abbott ID Now COVID-19 assay (Abbott Inc., Chicago, IL), which uses a nasal, nasopharyngeal, or throat swab to detect viral RNA, and the ePlex SARS-CoV-2 (GenMark Diagnostics Inc., Carlsbad, CA), which uses a nasopharyngeal swab to detect virus particles. Tests were performed at our health system's clinical laboratory according to U.S. Food and Drug Administration Emergency Use Authorization guidelines.

Data Collection

Clinical characteristics and outcomes were extracted using standard structured query language queries from Epic, the electronic medical records system, and retrospective chart review. The following data were queried: demographic characteristics (age, sex, race, and ethnicity); health insurance (Medicare, Medicaid, or private insurance); chronic diseases that have been previously reported in patients with COVID-19 (documented with International Classification of Diseases, 10th Revision [ICD-10] codes), including cardiovascular disease (I10, I50, I25, I60–I69), asthma (J45), chronic obstructive pulmonary disease (J44), chronic liver disease (K70–K77), chronic kidney disease (N18), diabetes (E10 and E11), cancer (C0–D49), and cognitive impairment (including mild cognitive impairment and dementia; F0150, F0151, F0280, F0281, F0390, F0391, G300, G301, G308, G309, G3101, G3109, G311, G3183); obesity, which has been shown to be associated with more severe outcomes from COVID-19, documented either through body mass index (weight in kilograms divided by height in meters squared) or ICD-10 diagnosis code E66; and presenting COVID-19–related symptoms and vital signs at the time of the GED visit (2–8,21). Race was defined as self-reported

White, Black, Asian, or other race mixed race. Ethnicity was defined as self-reported Hispanic or non-Hispanic.

The following major clinical outcomes after COVID-19 diagnosis, which have been reported previously in studies of patients with COVID-19, were queried: acute medical conditions, including pneumonia (ICD-10 codes J10–J18), acute respiratory distress syndrome (ICD-10 code J80), respiratory failure (ICD-10 code J96), sepsis (ICD-10 code A41), acute kidney failure (ICD-10 code N17), and electrolyte disturbance (ICD-10 code E87); hospitalization; hospital length of stay; intensive care unit (ICU) admission; and death (2–10). Many patients with COVID-19 with complex care needs were transferred to the intermediate unit, where they received a high level of care, were carefully monitored, and received treatment, or the telemetry unit, where they received cardiac monitoring. In general, only patients with COVID-19 who required a higher level of oxygen support or a ventilator were transferred to the ICU. Here, we report only on ICU admissions (either following the ED or during inpatient stay), because they are of greater clinical interest. We also queried 30-day return visits to the GED after GED or hospital discharge and 30-day hospital readmissions, which have not yet been widely reported in patients with COVID-19. Use of Remdesivir, the antiviral medication approved by the U.S. Food and Drug Administration for treatment of cases of COVID-19 requiring hospitalization, was also collected.

Statistical Analysis

We report the distribution of clinical characteristics and outcomes overall and by ethnicity (Hispanic vs. non-Hispanic). Findings are presented as means and standard deviations for continuous variables, and frequencies and proportions for categorical variables. We also report differences in proportions and mean differences with associated 95% confidence intervals (CIs). Analyses were conducted using SPSS for Windows, Version 25.0 (IBM Corp, Armonk, NY).

Results

From March 10, 2020 to August 9, 2020, one hundred patients 65 years and older who visited a GED tested positive for COVID-19. Half of the patients were male and the mean (standard deviation) age was 75.9 (9.1) years (Table 1). Overall, 44.0% were White, 46.0% were Hispanic, 10.0% were Black, 6.0% were Asian, and 39.0% were other race or mixed race. Hispanic and non-Hispanic patients with COVID-19 did not vary with respect to age, sex, or insurance coverage. The percentage of obesity was significantly higher in Hispanic relative

to non-Hispanic patients with COVID-19 (39.1% vs. 20.4%; difference: 18.7%; 95% CI 0.9–35.5%). The percentage of comorbidities, including hypertension, coronary artery disease, chronic liver disease, and diabetes, was not significantly different between Hispanic compared with non-Hispanic patients with COVID-19. Symptoms including sore throat (21.7% vs. 7.4%; difference: 14.3%; 95% CI 0.5–28.9%) and shortness of breath (78.3% vs. 51.9%; difference: 26.4%; 95% CI 7.6–42.5%) were more common in Hispanic relative to non-Hispanic patients with COVID-19. However, the percentage of other symptoms (e.g., fever, cough, loss of appetite, diarrhea, or chest pain) did not differ significantly between Hispanic and non-Hispanic patients with COVID-19. The percentage of abnormal vital signs, including respiratory rate ≥ 24 breaths/min or temperature $\geq 38^\circ\text{C}$ was not significantly different between Hispanic and non-Hispanic patients with COVID-19, but oxygen saturation $< 94\%$ (45.7% vs. 22.6%; difference: 23.1%; 95% CI 4.4–39.9%) was significantly higher in Hispanic relative to non-Hispanic patients with COVID-19.

Acute medical conditions among the entire sample of patients with COVID-19 included pneumonia (65.0%), electrolyte disturbance (55.0%), respiratory failure (44.0%), sepsis (38.0%), acute kidney failure (31.0%), and acute respiratory distress syndrome (7.0%) (Table 2). The prevalence of pneumonia (82.6% vs. 50.0%; difference: 32.6%; 95% CI 14.1–47.9%), acute respiratory distress syndrome (13.0% vs. 1.9%; difference: 11.1%; 95% CI 0.7–23.9%), and acute kidney failure (41.3% vs. 22.2%; difference: 19.1%; 95% CI 0.9–36.0%) was significantly higher in Hispanic relative to non-Hispanic patients with COVID-19, whereas other acute medical conditions did not vary by ethnicity. A total of 79.0% of patients with COVID-19 were hospitalized and 19.0% died; however, the rate of hospitalization or death was not significantly different between Hispanic and non-Hispanic patients with COVID-19. Rates of other poor outcomes, including 30-day return visits to the GED among those discharged from the GED or hospital, ICU admission, 30-day hospital readmissions, or length of hospital stay, were not significantly different between Hispanic and non-Hispanic patients with COVID-19.

Discussion

In a sample of 100 adults 65 years and older who presented with COVID-19 to a GED at a large academic health system, Hispanic patients with COVID-19, who represented 46.0% of the sample, had higher percentage of shortness of breath, pneumonia, acute respiratory distress syndrome, and acute kidney failure relative to non-Hispanic patients with COVID-19. However, rates of

Table 1. Clinical Characteristics by Ethnicity Among 100 Patients 65 Years and Older Who Tested Positive for COVID-19 from March 10, 2020 to August 9, 2020, Geriatric Emergency Departments, UC San Diego Health, San Diego, CA

Characteristic	Total (N = 100)	Non-Hispanic (n = 54)	Hispanic (n = 46)	Proportion Difference (95% CI)
Age, y, mean (SD)	75.9 (9.1)	77.4 (9.9)	74.2 (7.7)	3.2 (-0.4 to 6.8)*
Age, n (%)				
65–74 y	56 (56.0)	28 (51.9)	28 (60.9)	9.0 (-10.2 to 27.2)
75–84 y	26 (26.0)	12 (22.2)	14 (30.4)	8.2 (-8.8 to 25.2)
85 y or older	18 (18.0)	14 (25.9)	4 (8.7)	17.2 (2.0 to 31.3)
Male, n (%)	50 (50.0)	23 (42.6)	27 (58.7)	16.1 (-3.4 to 34.0)
Expected payer, n (%)				
Private insurance	38 (38.0)	17 (31.5)	21 (45.7)	14.2 (-4.8 to 32.0)
Medicaid	6 (6.0)	2 (3.7)	4 (8.7)	5.0 (-5.3 to 16.9)
Medicare	56 (56.0)	35 (64.8)	21 (45.7)	19.1 (-0.3 to 36.8)
Any cardiovascular disease, n (%)	54 (54.0)	27 (50.0)	27 (58.7)	8.7 (-10.6 to 27.0)
Hypertension, n (%)	48 (48.0)	23 (42.6)	25 (54.3)	11.7 (-7.6 to 30.0)
Coronary artery disease, n (%)	11 (11.0)	4 (7.4)	7 (15.2)	7.8 (-4.9 to 21.6)
Cerebrovascular disease, n (%)	7 (7.0)	5 (9.3)	2 (4.3)	5.0 (-6.5 to 16.0)
Heart failure, n (%)	7 (7.0)	4 (7.4)	3 (6.5)	0.9 (-11.0 to 11.9)
Asthma, n (%)	10 (10.0)	6 (11.1)	4 (8.7)	2.4 (-10.6 to 14.7)
Chronic obstructive pulmonary disease, n (%)	2 (2.0)	2 (3.7)	0	3.7 (-4.5 to 12.5)
Chronic liver disease, n (%)	4 (4.0)	1 (1.9)	3 (6.5)	4.6 (-4.3 to 15.8)
Chronic kidney disease, n (%)	10 (10.0)	5 (9.3)	5 (10.9)	1.6 (-10.7 to 14.9)
Diabetes, n (%)	29 (29.0)	12 (22.2)	17 (37.0)	14.8 (-3.1 to 31.8)
Cancer, n (%)	15 (15.0)	10 (18.5)	5 (10.9)	7.6 (-7.0 to 21.4)
Cognitive impairment, n (%)	9 (9.0)	6 (11.1)	3 (6.5)	4.6 (-7.9 to 16.5)
Obese, n (%)	29 (29.0)	11 (20.4)	18 (39.1)	18.7 (0.9 to 35.5)
Signs and symptoms, n (%)				
Fever	64 (64.0)	31 (57.4)	33 (71.7)	14.3 (-4.5 to 31.5)
Cough	68 (68.0)	35 (64.8)	33 (71.7)	6.9 (-11.3 to 24.2)
Sputum production	18 (18.0)	7 (13.0)	11 (23.9)	10.9 (-4.3 to 26.4)
Loss of appetite	15 (15.0)	7 (13.0)	8 (17.4)	4.4 (-9.7 to 19.3)
Diarrhea	22 (22.0)	9 (16.7)	13 (28.3)	11.6 (-4.7 to 27.8)
Sore throat	14 (14.0)	4 (7.4)	10 (21.7)	14.3 (0.5 to 28.9)
Fatigue	22 (22.0)	12 (22.2)	10 (21.7)	0.5 (-16.0 to 16.3)
Abdominal pain	11 (11.0)	4 (7.4)	7 (15.2)	7.8 (-4.9 to 21.6)
Shortness of breath	64 (64.0)	28 (51.9)	36 (78.3)	26.4 (7.6 to 42.5)
Rhinorrhea	8 (8.0)	3 (5.6)	5 (10.9)	5.3 (-6.0 to 18.0)
Hemoptysis	2 (2.0)	1 (1.9)	1 (2.2)	0.3 (-7.8 to 9.6)
Chest pain	12 (12.0)	5 (9.3)	7 (15.2)	5.9 (-7.2 to 20.0)
Neurologic symptoms [†]	41 (41.0)	24 (44.4)	17 (37.0)	7.4 (-11.6 to 25.6)
Vital signs, n (%) [‡]				
Respiratory rate \geq 24 breaths/min	21 (21.2)	9 (17.0)	12 (26.1)	9.1 (-7.0 to 25.3)
Temperature \geq 38°C	14 (14.1)	6 (11.3)	8 (17.4)	6.1 (-7.9 to 20.7)
Oxygen saturation < 94%	33 (33.3)	12 (22.6)	21 (45.7)	23.1 (4.4 to 39.9)

CI = confidence interval; COVID-19 = coronavirus disease 2019; SD = standard deviation.

* Represents mean difference.

[†] Neurologic symptoms include headache, dizziness, confusion, delirium, taste impairment, smell impairment, vision impairment, and myalgia.

[‡] n = 99 (n = 53 non-Hispanic; n = 46 Hispanic).

Table 2. Clinical Outcomes by Ethnicity among 100 Patients 65 Years and Older Who Tested Positive for COVID-19 from March 10, 2020 to August 9, 2020, Geriatric Emergency Departments, UC San Diego Health, San Diego, CA

Outcome	Total (N = 100)	Non- Hispanic (n = 54)	Hispanic (n = 46)	Proportion Difference(95% CI)
Acute medical conditions, n (%)				
Pneumonia	65 (65.0)	27 (50.0)	38 (82.6)	32.6 (14.1 to 47.9)
Acute respiratory distress syndrome	7 (7.0)	1 (1.9)	6 (13.0)	11.1 (0.7 to 23.9)
Respiratory failure	44 (44.0)	20 (37.0)	24 (52.2)	15.2 (-4.2 to 33.1)
Sepsis	38 (38.0)	16 (29.6)	22 (47.8)	18.2 (-0.8 to 35.7)
Acute kidney failure	31 (31.0)	12 (22.2)	19 (41.3)	19.1 (0.9 to 36.0)
Electrolyte disturbance	55 (55.0)	25 (46.3)	30 (65.2)	18.9 (-0.6 to 36.4)
Hospitalized, n (%)	79 (79.0)	39 (72.2)	40 (87.0)	14.8 (-1.5 to 29.6)
30-d GED return visit among patients discharged from the GED, n (%) [*]	9 (45.0)	6 (42.9)	3 (50.0)	7.1 (-32.6 to 45.1)
ICU admission, n (%) [†]	30 (38.0)	12 (30.8)	18 (45.0)	14.2 (-7.0 to 33.7)
Length of hospital stay, [†] d, mean (SD)	12.3 (9.7)	10.9 (8.7)	13.7 (10.5)	2.8 (-1.0 to 6.6) [‡]
30-d GED return visit among patients discharged from the hospital, n (%) [§]	7 (13.0)	2 (8.3)	5 (16.7)	8.4 (-11.5 to 26.3)
30-d hospital readmission, n (%)	4 (7.4)	2 (8.3)	2 (6.7)	1.6 (-14.2 to 19.8)
Remdesivir during hospital stay, n (%) [†]	18 (22.8)	6 (15.4)	12 (30.0)	14.6 (-4.0 to 32.1)
Total died, n (%)	19 (19.0)	12 (22.2)	7 (15.2)	7.0 (-8.8 to 21.8)

CI = confidence interval; COVID-19 = coronavirus disease 2019; GED = geriatric emergency department; ICU = intensive care unit; SD = standard deviation.

^{*} Among patients who were discharged from the GED (n = 20; n = 14 non-Hispanic; n = 6 Hispanic).

[†] Among patients who were admitted to the hospital (n = 79; n = 39 non-Hispanic; n = 40 Hispanic).

[‡] Represents the mean difference.

[§] Among patients who were admitted to the hospital from the GED (n = 54; n = 24 non-Hispanics; n = 30 Hispanics). Number represents those who returned to the GED within 30 days of hospital discharge. Denominator excludes those who died during hospitalization (n = 18) or were transferred or discharged to continued inpatient care (n = 7).

^{||} Among patients who were admitted to the hospital from the GED (n = 54; n = 24 non-Hispanics; n = 30 Hispanics). Number represents those who returned to the GED within 30 days and were again admitted to the hospital. Denominator excludes those who died during hospitalization (n=18) or were transferred or discharged to continued inpatient care (n = 7).

other poor outcomes, including hospitalization, ICU admission, 30-day return visits to the GED, or death, were not significantly different between Hispanic and non-Hispanic patients with COVID-19.

Although individuals from underrepresented groups may have higher risk of acquiring COVID-19 than White individuals, not all studies have shown higher rates of severe outcomes from COVID-19 in underrepresented populations (22,23). Similar to our study, in a cohort of 5902 patients with COVID-19 with a median age of 58 years at a large, urban academic medical center, Hispanic patients and non-Hispanic Black patients did not experience worse survival than White patients (24). A study among 369 patients with COVID-19, among whom 40%

were 60 years or older, found an increased risk of hospitalization among Black patients but observed no racial differences in ICU admission, mechanical ventilation, or death (23). A study in 2729 patients with COVID-19 from Boston Medical Center, in which one-third of patients were 60 years or older, reported higher hospitalization but lower likelihood of death in Hispanic compared with non-Hispanic patients with COVID-19 (12). That study also observed that Hispanic patients were more likely to be male and have underlying health conditions, including diabetes and obesity, but were less likely to have hypertension than non-Hispanic Whites (12). A study among 116 patients with COVID-19 with a mean age of 52.6 years who presented to a large urban ED, found that

Hispanic patients were more likely to be hospitalized than discharged (54.5% vs. 24.1%), whereas Black, White, and individuals from other races were more likely to be discharged (25). However, the latter two studies did not report racial or ethnic differences in comorbidities, symptoms, vital signs, critical illnesses, or other clinical outcomes from COVID-19. Our findings extend prior studies by suggesting potential ethnic differences in a few COVID-19-related symptoms (e.g., shortness of breath) and critical conditions (e.g. pneumonia), but also suggest that rates of many poor outcomes, including hospitalization, ICU admission, or death, may not vary by ethnicity.

Ethnic differences in clinical presentation and outcomes from COVID-19 may be due to several factors. It is possible that older Hispanic patients wait longer than non-Hispanic patients to seek care for their infection, which may result in more severe illness on presentation to the health care setting. Prior studies have shown that older patients with COVID-19 with comorbidities, such as cardiovascular disease, chronic kidney disease, or obesity, experience more severe outcomes from COVID-19 (21,26–28). It is possible that ethnic differences in clinical presentation from COVID-19 in our study may be explained in part by higher prevalence of obesity in older Hispanic compared with non-Hispanic patients with COVID-19. In the United States, individuals of Hispanic ethnicity have a 23% higher percentage of obesity than non-Hispanic Whites, placing them at increased risk of severe COVID-19 outcomes (29). Furthermore, individuals of Hispanic ethnicity are more likely to be employed in essential work settings, such as grocery stores, farms, factories, and transportation, and have low-paying and less stable jobs that lack adequate paid leave benefits (30). This may force individuals of Hispanic ethnicity in these occupations to continue working when sick, leading to a more serious clinical presentation when visiting the GED.

Limitations

Our study has several limitations. The study design was retrospective and data were extracted from electronic medical records. Our study was limited to a single academic health system and to patients 65 years and older who visited a GED. Thus, findings may not necessarily translate to younger patients with COVID-19 or those seen in other health care settings. We focused on presenting descriptive statistics, given the modest sample size, and thus did not present associations of risk factors with clinical outcomes. However, our preliminary findings highlight important ethnic differences that warrant further examination in larger studies of older patients. Strengths of this study include the ethnically diverse

sample with information on a large number of clinical characteristics and outcomes.

Conclusions

We observed ethnic disparities in COVID-19 among adults 65 years and older in this preliminary and initial analysis of patients presenting to two GEDs at a large academic health system. Older Hispanic patients relative to non-Hispanic patients with COVID-19 had a higher percentage of shortness of breath and acute medical conditions, including pneumonia, acute respiratory distress syndrome, and acute kidney failure. However, rates of other poor outcomes, including hospitalization, ICU admission, 30-day return visits to the GED, or death, did not differ by ethnicity. These preliminary findings suggest that not all poor outcomes among older patients with COVID-19 may differ by ethnicity. Prospective studies are needed to evaluate ethnic disparities in clinical presentation and outcomes from COVID-19 in larger populations of ethnically diverse older patients presenting to the GED. Further studies are also needed to compare our findings with clinical outcomes among patients with COVID-19 presenting to EDs that do not function as GEDs.

Acknowledgments

Aladdin H. Shadyab, Edward M. Castillo, Jesse J. Brennan, and Vaishal M. Tolia were supported by grant R00RG2401 from the University of California Office of the President, California Breast Cancer Research Program. The sponsor had no role in the design, methods, data collection, analysis, or preparation of this paper.

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ARTICLE SUMMARY

1. Why is this topic important?

A better understanding of ethnic differences in coronavirus disease 2019 (COVID-19) is needed to guide public health strategies to address disparities in disease outcomes among underrepresented populations.

2. What does this study attempt to show?

We characterized ethnic differences in clinical presentation and outcomes from COVID-19 among older adults presenting to geriatric emergency departments.

3. What are the key findings?

We found that older Hispanic relative to non-Hispanic patients with COVID-19 had higher percentage of shortness of breath and acute medical conditions, including pneumonia and acute respiratory distress syndrome. However, there were no ethnic differences in rates of other clinical outcomes, including hospitalization, intensive care unit admission, 30-day return visits to the geriatric emergency department, or death.

4. How is patient care impacted?

These preliminary findings suggest that older Hispanic patients may have more serious clinical presentation from COVID-19 than non-Hispanic patients but may experience similar rates of many poor outcomes. This information could be useful in the development of targeted strategies to reduce the burden of COVID-19 among older adults of Hispanic ethnicity.