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BRIEF COMMUNICATION

COVID-19 in Patients with a Primary Refugee-Associated Language in a Kentucky Emergency Department During 2020

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Abstract

COVID-19 has heavily impacted the refugee population in the United States due to exposure risks, living and working conditions, and healthcare access, but little is known about outcomes. We reviewed emergency department visits to a Kentucky hospital among 2163 patients from March-December 2020, studying incidence of COVID-19 diagnosis for patients with a primary refugee-associated language compared to English speakers, and outcomes after diagnosis including hospitalization, length of stay, and in-hospital mortality. Patients in the population of interest had higher odds of COVID-19 diagnosis in the hospital (OR = 12.31, 95% CI 7.80–19.40), but, among those with COVID-19, lower odds of hospital admission (OR = 0.58, 95% CI 0.37–0.90) and shorter median length of stay (4.1 vs. 10.5 days) compared to English speakers. The study corroborates reports of comparatively higher COVID-19 incidence in patients speaking a primary refugee-associated language, but implies milder illness severity, possibly reflecting this population's baseline health.

Keywords Refugee · COVID-19 · Emergency department · Foreign language

Introduction

The COVID-19 pandemic has had a global impact, and the world's 82.4 million refugees comprise one of the most vulnerable populations [1]. However, information on COVID-19 cases and mortality in refugees is limited.

Refugees in the US may be at greater risk for COVID-19 illness than the general population due to living and working conditions, access to healthcare, and comorbidities [2]. This is pertinent to Kentucky, which ranked 5th in the U.S. for refugee resettlement in 2019 [3]. The Kentucky Office for Refugees reports that 30,800 refugees resettled in Kentucky since 1994, equaling 0.6% of the state's population [4].

In Minnesota, a study found that foreign-born individuals had twice the age- and sex-adjusted COVID-19 mortality rate compared to U.S.-born individuals [5]. A California study found that foreign-born non-Hispanic participants had a COVID-19 proportionate mortality ratio 10.7 times higher than U.S.-born non-Hispanic participants [6].

We hypothesize that patients with a primary refugee-associated language in Kentucky experienced COVID-19 disparities during 2020. We evaluated SARS-CoV-2 infection incidence and outcomes in patients seeking care at an academic medical center emergency department (ED), using primary language as a proxy for refugee status.

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METHODS

Participants

This is a retrospective cohort study of patients 18 years or older seen in the ED at the University of Kentucky hospital system between March 1, 2020, and December 31, 2020. COVID-19 testing during this period was not applied differentially based on language or immigration status. The ED initiated PCR-based COVID-19 testing on March 16, 2020 for any patient with fever plus cough or shortness of breath and expanded testing criteria on March 31, 2020, to include sore throat, myalgias, chills, loss of taste or smell, or unresponsiveness.

As refugee status is not specified in hospital records, we used documented primary language and hospital location in Kentucky to presumptively identify non-Hispanic refugee patients. Kentucky Office for Refugees reports that Swahili, Arabic, Kinyarwanda, Ukrainian, Bembe, Lingala, Somali, Haitian Creole, Chin, Tigrinya, Mai Mai, Bantu, Pashto, Dari/Farsi, Karen, Kurdish and "Other" are spoken among refugees relocated to Lexington and Louisville, Kentucky [7, 8]. The study population included patients with these documented primary languages who are referred to in the paper as "patients with a primary refugee-associated language." The method of using language, local resettlement data, and geographic location, has been validated for prediction of refugee status [9].

Data Collection

Patients with a primary refugee-associated language were frequency matched on age, sex, and insurance status to the general population of ED users during the same period. Our base sample included data from multiple visits (n = 14,447) during the study period made by the 2163 patients in our sample. We excluded 638 visits from Spanish speakers as their immigration status could encompass multiple categories; 4 visits from incarcerated individuals, 67 visits with erroneous admitting service listed, and patients with mean ED presentation greater than 4 times per month. After exclusions, our sample included data from 11,573 unique encounters among 2024 patients (1631 English-speakers).

Monthly ED patient volume was obtained via patient registration data from March 1, 2020, to December 31, 2020, and from March 1, 2019, to December 31, 2019.

Measures

Covariates included age, sex, language, insurance status, Charlson comorbidity index, body mass index (BMI) at time of visit, self-reported smoking status, self-reported alcohol consumption, and admission diagnosis.

COVID-19 illness as determined by ED documented ICD-10 code was the primary outcome. Patients with a positive COVID-19 PCR during their stay had this applied to their chart consistently due to need for triage to COVID-19 quarantine units of the hospital. Other outcomes included hospital admission, intensive care unit (ICU) stay, length of stay, and in-hospital mortality.

Analysis

Multivariate imputation by chained equations generated twenty complete data sets to handle missing covariate data while maintaining correlation structure. For continuous variables, regression-based predictive mean matching produced biologically plausible imputed values; discriminant function with a noninformative Jeffrey's prior imputed categorical variables [10]. Results across datasets were combined according to Rubin's rules [11].

Descriptive statistics and group comparison used $\chi 2$ tests for categorical variables and t-tests for continuous variables. Logistic regression with generalized estimating equations (GEE) and a compound symmetry correlation structure to account for multiple observations per person generated odds ratios to measure the associations with COVID-19 diagnosis. These models included primary refugee-associated language, age, sex, race, Charlson Index, BMI, smoking status, and insurance status as independent variables. Changes in ED volume were compared using one-tailed t-test.

Subgroup analysis was limited to patients with COVID-19. We used logistic regression with GEE and a compound symmetry correlation structure to account for multiple observations per person, adjusting for comorbidities using Charlson Index. Analyses were performed in SAS 9.4 (Cary, NC). A p-value < 0.05 was considered statistically significant.

Results

Patients with a primary refugee-associated language were significantly younger than English-speaking patients, more likely to be male, and more likely to identify as Black or Asian (Table 1). These patients were more likely to be insured with Medicaid and English-speaking patients with Medicare. BMI, Charlson Index and current smoking rates were significantly higher in English speaking groups. A larger percentage of patients with a primary refugee-associated language were admitted to the hospital and ICU but had shorter length of stay in both (Table 1).

Table 1 Demographics

Characteristic	Refugee (*N* = 870)	English speaker (*N* = 10,703)	*p*-value
Age, years	40.6 (16.3)	47.7 (17.2)	< 0.0001
Male Sex	291 (33.5)	2507 (23.4)	< 0.0001
Race			
White	266 (30.6)	8582 (80.2)	< 0.0001
Black	433 (49.8)	1864 (17.4)	
Asian	157 (18.1)	170 (1.6)	
Other	14 (1.6)	87 (0.8)	
Ethnicity			
Hispanic	5 (0.6)	305 (2.8)	< 0.0001
Non-Hispanic	807 (92.8)	9903 (92.5)	
Unknown	58 (6.7)	495 (4.6)	
Language			
English	0 (0.0)	10,703 (100.0)	< 0.0001
Nepali	224 (25.8)	0 (0.0)	
Swahili	217 (24.9)	0 (0.0)	
French	151 (17.4)	0 (0.0)	
Arabic	143 (16.4)	0 (0.0)	
Kinyarwanda	54 (6.2)	0 (0.0)	
Russian	51 (5.9)	0 (0.0)	
Lingala	12 (1.4)	0 (0.0)	
Farsi	7 (0.8)	0 (0.0)	
Ukrainian	4 (0.5)	0 (0.0)	
Kirundi	1 (0.1)	0 (0.0)	
Amharic	5 (0.6)	0 (0.0)	
Pushto	1 (0.1)	0 (0.0)	
Insurance			
Private	193 (22.2)	3417 (31.9)	< 0.0001
Medicare	47 (5.4)	2537 (23.7)	
Medicaid	520 (59.8)	3941 (36.8)	
Other	34 (3.9)	557 (5.2)	
None	76 (8.7)	210 (2.0)	
Unknown	0 (0.0)	41 (0.4)	
BMI, kg/m^2 [a]	27.6 (6.1)	31.7 (9.1)	< 0.0001
Smoking Status			
Never	521 (59.9)	4752 (44.4)	< 0.0001
Former	51 (5.9)	2189 (20.5)	
Current	60 (6.9)	2454 (22.9)	
Unknown	238 (27.4)	1308 (12.2)	
Alcohol Use Disorder	8 (0.9)	105 (1.0)	0.8592
COVID-19	71 (8.2)	64 (0.6)	< 0.0001
Admitted to Hospital	103 (11.8)	420 (3.9)	< 0.0001
Length of Stay, days [b, c]	2.8 (1.9, 3.9)	19.6 (3.2, 29.4)	< 0.0001
In-hospital Death	7 (0.8)	23 (0.2)	0.0010
Charlson Index[a]	1.2 (2.1)	2.5 (2.9)	< 0.0001
Admitted to ICU	20 (2.3)	127 (1.2)	0.0048
Length of ICU Stay[b, d]	3.0 (1.0, 4.0)	4.0 (2.0, 10.0)	0.0004

Values are presented as Mean (SD) or N (%) for continuous and categorical variables, respectively, unless otherwise noted

[a]Continuous variables with missing values: BMI (189 for refugees, 1022 for English speakers); Charlson Index (0 for refugees, 572 for English-speakers)

[b]Median (Q1, Q3)

[c]Limited to those admitted to the hospital

Table 1 (continued)

[d]Limited to those admitted to the ICU

COVID-19 was diagnosed in 16.5% (65/393) of patients with a primary refugee-associated language and in 3.1% (50/1,631) of English-speaking patients. Primary refugee-associated language status (OR = 12.31, 95% CI 7.80–19.40), age (OR per 10 years = 1.27, 95% CI 1.09–1.48), BMI (OR per 5 kg/m2 = 1.23, 95% CI 1.11–1.36), and Black (OR = 1.65, 95% CI 1.08–2.52) or Asian (OR = 2.15, 95% CI 1.16–3.99) race compared to White race were associated with greater odds of COVID-19 diagnosis (Table 2).

Among patients with COVID-19, those who spoke a primary refugee-associated language had lower rates of hospital admission (14.1% vs. 38.5%, p = 0.0009) and ICU admission (7.0% vs. 23.4%, p = 0.0074, Table 3) compared to English speaking patients. After adjustment for comorbidities via Charlson Index, the association between language status and hospital admission held (OR = 0.58, 95% CI 0.37–0.90), but the association with ICU admission was attenuated (OR = 0.56, 95% CI 0.30–1.06). Among admitted patients with COVID-19, English speakers had a greater median length of stay in the hospital (10.5 vs. 4.1 days) and in the ICU (11.0 vs. 4.0 days). In-hospital mortality among English speaking patients with COVID-19 was higher than that of patients with a primary refugee-associated language during the 9-month period of the study, although not statistically significant (6.3% versus 1.4%, p = 0.19). (Table 3).

Mean patient volume at the University of Kentucky ED decreased from 7290 patients per month during

Table 2 Predictors of a positive COVID-19 test

Variable	Odds ratio [95% CI]	*p*-value
Refugee status[a]	12.31 [7.80, 19.40]	< 0.0001
Age, per 10 years	1.27 [1.09, 1.48]	0.0026
Female vs. male sex	0.73 [0.49, 1.09]	0.1280
Black race vs. white	1.65 [1.08, 2.52]	0.0195
Asian race vs. white	2.15 [1.16, 3.99]	0.0155
Other race vs. white	1.95 [0.44, 8.60]	0.3789
Charlson index, per 1 point	0.91 [0.81, 1.01]	0.0860
BMI, per 5 kg/m^2	1.23 [1.11, 1.36]	0.0001
Former vs. never smoking	0.74 [0.41, 1.31]	0.3010
Current vs. never smoking	0.81 [0.45, 1.47]	0.4867
Medicare vs. private insurance	0.77 [0.40, 1.48]	0.4254
Medicaid vs. private insurance	0.80 [0.52, 1.22]	0.3035
Other insurance vs. private insurance	0.70 [0.27, 1.81]	0.4649
No insurance vs. private insurance	0.42 [0.14, 1.20]	0.1051

[a]Based on language and location in Lexington, KY—speakers of primary refugee-associated language

Table 3 Outcomes in COVID-19 positive patients

Summary statistics			
Characteristic	Refugee ($N=71$)	English speaker ($N=64$)	*p*-value
Age, years	44.7 (16.4)	48.4 (17.9)	0.2207
Male Sex	29 (40.9)	14 (21.9)	0.0182
Race[a]			<0.0001
White	19 (26.8)	42 (65.6)	
Black	33 (46.5)	21 (32.8)	
Asian	17 (23.9)	1 (1.6)	
Other	2 (2.8)	0 (0.0)	
BMI, kg/m^2[,b]	29.3 (5.9)	34.9 (10.7)	0.0008
Admitted to Hospital	10 (14.1)	25 (38.5)	0.0009
Length of Stay, days[c,d]	4.1 (2.3, 9.0)	10.5 (5.9, 24.5)	0.0028
In-hospital Death	1 (1.4)	4 (6.3)	0.1897
Charlson Index	1.2 (2.0)	2.1 (2.3)	0.0149
Admitted to ICU	5 (7.0)	15 (23.4)	0.0074
Length of ICU Stay[c,e]	4.0 (3.0, 6.0)	11.0 (3.0, 25.0)	0.0114
Model Results			
Variable	Outcome	Odds ratio [95% CI]	*p*-value
Refugee (vs. English-Speaker)	Hospital admission	0.58 [0.37, 0.90]	0.0150
	Admission to ICU	0.56 [0.30, 1.06]	0.0766

[a]Due to low proportion of non-white proportions and the small number of COVID-positive patients, all non-white races were combined for analyses limited to those with a diagnosis of COVID-19

[b] Missing values: BMI (13 for refugees, 6 for English speakers)

[c]Median (Q1, Q3)

[d] Limited to those admitted to the hospital

[e] Limited to those admitted to the ICU

March-December 2019 to 5532 patients per month during March-December 2020 (24% decrease, $p=0.0002$). For patients with a primary refugee-associated language, mean patient volume in the ED changed from 92.4 patients per month during March-December 2019 to 89.7 patients per month during March-December 2020 (2.9% decrease, $p=0.74$).

Limitations

Our study is retrospective and observational, and likely has misclassified some patients' refugee status because this is not designated in the record. Some participants are likely to be misclassified into both groups. The findings from our study may not generalize to all refugees given the heterogeneity of refugee communities and different access to care across the US. Our study does not comment on outcomes in Spanish-speaking patients due to overlap of Spanish-speaking refugee and migrant worker populations. We were unable to measure some potential confounding factors, including if ED providers offered more frequent COVID testing to non-English speakers. We were unable to measure reasons for high prevalence of COVID-19 in the refugee population. This is a single-institution study which limits generalizability of the results.

Discussion

In the 9-month study period from March 1, 2020, to December 31, 2020, patients with a primary refugee-associated language seeking care in the ED were more likely to receive a COVID-19 diagnosis; however, COVID-19 disease severity may have been lower in this group, as they were less likely to be admitted to the hospital and had shorter lengths of stay than English-speaking patients. Admission to the ICU among those with COVID-19 was lower in patients with a primary refugee-associated language compared to English-speakers, but upon adjustment for comorbidities, this association was attenuated, suggesting that patients with a primary refugee-associated language benefited from better baseline health status.

These findings clarify the results of studies performed in Minnesota, California, and Massachusetts [5, 6, 12]. The California and Minnesota studies used death certificate data and found higher mortality from COVID-19 in all foreign-born groups but particularly Hispanic men. In Massachusetts, Spanish-speaking patients with COVID-19 had a higher hospitalization rate. The opposite was true in our study, as patients with a primary refugee-associated language had lower hospitalization and mortality rate than English speakers.

Overall patient volumes in the ED decreased during the study period, while patients with a primary refugee-associated language utilized the ED at a similar rate. Other studies have shown that disadvantaged groups use the ED when lacking access to care, one of many potential reasons for higher rates and lower acuity of COVID-19 in our study population [13, 14].

In summary, our study suggests a high burden of COVID-19 in patients with a primary refugee-associated language. Additional research is needed to characterize ongoing disparities in access to prevention, diagnosis, and treatment of COVID-19 in refugees.

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Declarations

Conflict of interest The authors have nothing to disclose. The views expressed in the submitted article are the authors' own and not an official position of the institution.

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