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Understanding Patterns of Healthcare Utilization, Outcomes, and Climate-Related Migration of Immigrant Populations in Atlanta, Georgia

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An abstract of
a thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
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in Global Environmental Health
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Abstract

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By Hannah Claire Edelson

The global population of refugees and immigrants continues to rise, with an estimated 82.4 million forcibly displaced people in 2020 (3). Climate change is now widely recognized as a major contributing and exacerbating factor in global migration, displacement and conflict(4). The United States continues to have a significant population of immigrants and refugees, with over 40 million foreign-born individuals in 2016 (5). Patterns of healthcare utilization and climate migration of immigrants in the U.S., particularly in the southeast region, remain poorly understood (6,7). We developed a triage screen to identify refugees and immigrants in an ethically appropriate manner. We piloted the triage screen in the Grady Hospital Emergency Department (ED), conducted a mixed quantitative/qualitative follow-up survey and chart review to assess health status, healthcare encounters, and climate migration. 49/134 (36.57%) patients screened positive for foreign birth. 15 countries were represented, with 28/49 (57.14%) from Mexico. 5/49 (10.20%) of patients reported climate or weather-related factors influencing their migration to the U.S. Barriers to accessing care included worry about health insurance status (38.78%), language (20.41%), and country of origin (4.08%). Our patient sample experiences higher uninsurance (86.67%, $p<0.001$), compared to the general Grady patient population (21.55%) and state of Georgia population (22.20%), lack of primary care provider visits (44.44%, $p<0.05$), and higher prevalence of diabetes (44.44%, $p<0.001$) and myocardial infarction (11.11%, $p<0.05$). The ED, often the first access point to the healthcare system, is uniquely positioned to design interventions and advise preparation of system-level changes to provide high quality, accessible healthcare for immigrants and refugees—a growing population as a result of and multiplied by climate change.

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Introduction

The global population of refugees and immigrants continues to rise, with an estimated 82.4 million forcibly displaced people in 2020 (1). In addition to conflict and violence, human rights violations, and disrupted public order, climate change is widely recognized as a major contributing and exacerbating factor in global migration, displacement, and conflict (3,4). Whether through sudden onset *climate events*, such as flooding, forest fires, intensified storms, or as a result of slower *climate processes* including desertification, salination of agricultural land, sea-level rise, and changing patterns and loss of biodiversity, climate change is leading to a rise in the global population of displaced people(5) (6). The World Bank estimates that Latin America, sub-Saharan Africa, and Southeast Asia will generate 143 million more climate migrants by 2050 (7).

Climate migration often represents a confluence of compounding risk factors. How *vulnerable* a community is to *climate drivers* including those described above is a function of exposure and adaptive capacity, or the ability of a region or community to withstand, recover and adapt to system stresses and shocks (8,9). Important factors that may determine adaptive capacity and ultimately drive migration outright include: geopolitical conflict and government policy, socioeconomic status and income inequality, urbanization and population growth, infrastructure and ecosystem resilience, social networks and social capital. (6) (10,11).

Global migrants are a vulnerable population more likely to face injuries, disruptions in chronic disease management, adverse health outcomes, and loss of healthcare access (12,13). Those without UNHCR (United Nations High Commissioner for Refugees) refugee status, including climate migrants, lack access to healthcare, representation and safety in their new countries

(6,13,14). The UCL-Lancet High Commission on Migration and Health calls for the explicit inclusion of migrants in universal health coverage commitments (14).

Immigrant and Refugee Health in the US

The United States has a significant population of immigrants and refugees, with over 40 million foreign-born individuals in 2016 (15). Refugees and immigrants in the United States suffer from a relatively high burden of chronic disease and face multiple barriers to health, including lack of health insurance, language and cultural differences, as well as distance and transportation to care (16-22). Lack of legal status leads to inequities in access to material and healthcare resources for undocumented immigrants, including climate migrants, and perpetuates structural and cultural racism (23). As a result, immigration status is now considered a key social determinant of health by many (24,25).

In addition to inequities in access to quality primary, perinatal, pediatric, and preventive care services (26-28), immigrant and refugee populations, and particularly climate migrants, tend to experience a high burden of mental health disorders across each stage of displacement, migration, and acculturation, including anxiety, stress, profound loss, depression, trauma and chronic trauma (29-32). Mistrust and isolation can also stem from lack of legal status, as access to jobs and education are limited (30).

Given these barriers to healthcare, the emergency department (ED) often serves as an initial point of access for many refugees and immigrants and may provide ongoing healthcare that would typically occur in an outpatient setting. Grady Memorial Hospital (Grady) is a public hospital serving as safety net for Fulton and Dekalb counties. The Grady ED serves a crucial role in providing healthcare services to refugees and immigrants in Atlanta, GA. Dekalb County is home to the city of Clarkston, which is commonly referred to as “the most diverse square mile in

the United States" (33). Indeed, Dekalb County is home to 69% of Ethiopian refugees in the US (34). Georgia is one of the states in the U.S. with the largest populations of migrant Latino farmworkers (35,36).

Despite the large and growing population of refugees and immigrants, patterns of healthcare utilization by refugees and immigrants in the United States, particularly in the southeast region, remain poorly understood (37,38). Known challenges include accurate ascertainment of refugee/immigrant background, sensitivities and attitudes of patients and providers, and appropriate documentation in the electronic medical record (EMR) (39). Furthermore, data on prevalence of noncommunicable diseases (NCD) and preventive care metrics are limited for refugees and immigrants in Atlanta. Previous data from the Grady Refugee Clinic (no longer operational) demonstrated a substantial burden of NCDs among Bhutanese refugees including hypertension, diabetes and obesity, findings which are consistent with more recent data from dedicated refugee clinics in other urban areas (22,40).

The EMERI/I (Electronic Medical Records for Ethiopian Refugees and Immigrants) Project was created in 2019 by a multidisciplinary team at Emory University to identify and impact healthcare utilization and outcomes for immigrant and refugee patients at Grady Memorial Hospital. The project included the development and piloting of a short four-question ED triage screen to appropriately and ethically identify immigrant and refugee patients. In addition, a follow-up survey and chart review contribute important and previously lacking evidence to establish the baseline health status, healthcare utilization patterns, and preventive health metrics of immigrants and refugees as part of a greater effort to reduce health disparities of this vulnerable population.

Methods

Literature Review

A literature review was conducted utilizing the following search terms:

[refugee OR refugees OR displaced persons OR migrant OR migrants OR immigrant OR immigrants OR non-native English speakers]

-AND [climate change OR climate OR climate related OR climate induced OR weather OR drought OR flood OR hurricane]

-AND [Emergency Department OR ED OR Emergency Room OR ER OR Emergency]

-AND [EHR OR EMR OR electronic medical record OR electronic health record OR triage OR screening OR screen OR health OR health status OR healthcare access OR healthcare utilization

Phase I

In Phase I, we conducted 14 key informant interviews with individuals who work with refugee and immigrant populations (physicians, researchers, community leaders, former refugees) and 12 semi-structured qualitative interviews with non-English speaking patients presenting to the Grady ED. Interviews explored appropriate and ethical identifiers that can be incorporated into the EMR and ED triage systems in a standardized manner to allow for identification of refugees and immigrants. All interviews were audio recorded, transcribed, and coded by two independent members of the study team. Interviews were conducted until thematic saturation was achieved. Qualitative analysis of Phase I results informed the development of a short 3 question triage screen (see Table 1), which was consistent with screening tools used in similar settings (39,41). In-depth review of the methods and results of Phase I are outside the scope of this paper and will not be discussed in detail.

Phase II

In Phase II, we conducted 134 triage surveys, screening all patients 18 years or older at Grady ED ambulatory triage. Triage screens were conducted by a study team member who was present in the ED for a total of 22 hours at different times of day and days of the week over the course of four weeks in March 2022. For the cohort of patients screening positive for foreign birth, used as proxy for refugee and/or immigrant background, we conducted an additional follow-up survey (see Table 2) amongst those who consented to participate per IRB protocol to evaluate their comfort with the survey, health status, healthcare utilization patterns, and any climate related migration factors. The same study team member conducted 49 follow-up surveys in the ED. Appropriate language interpretation services were used for non-native English speakers. Triage screen and follow-up survey results were recorded electronically into the secure data storage platform REDCap, using an iPad on a secure network.

Phase III

At the conclusion of the follow-up survey in Part II, we asked to obtain consent per IRB protocol for participation in a de-identified chart review. We collected patient information including medical record number (MRN) and name in a password protected document on a secure network. Direct identifiers were removed once all data was collected, and analysis was performed on de-identified data. Chart review components included: medical history, clinical diagnoses, prescribed medications, lab results relevant to common chronic diseases, healthcare encounters from 2019-2022 (chart review completed March-April 2022), results of exams/procedures and age-appropriate preventative screening tests as determined by the United States Preventive Services Taskforce (USPSTF) and Grady Hospital protocol (42) (see Appendix A). Using healthcare encounter data, we calculated the ratio of mean ED visits per person to

Primary Care Provider (PCP) visits per person for each year, as done by Guess et al. (2019) (43). We also reported the Emergency Severity Index (ESI) triage score for the most recent ED encounter (1-5, 1= most urgent, 5= least urgent) (44). Chart review was conducted in the EPIC EMR.

Data Analysis

Quantitative data analysis was conducted in RStudio (Version 1.4.1106) and Microsoft Excel (Version 16.54). We conducted independent 2 sample t-tests correcting for unequal variances to assess for differences in groups based on follow-up survey responses. We conducted a Pearson's Chi-squared test to assess for difference in proportion of respondents reporting worry about health insurance by climate migration status. 1 sample z-test for difference in proportions with continuity correction where appropriate and exact binomial test were used to evaluate our sample compared to Grady and GA populations. To evaluate chart review data from groups of hemodialysis (HD) and non-hemodialysis (non-HD) patients, we utilized both independent 2 sample t-tests correcting for unequal variances and 2 sample z-tests for difference in proportions and exact binomial test where appropriate.

Results

Phase II: Triage Screen and Follow-Up Survey

Table 1. Triage Screen Questions and Results

Question		Triage Screen Results
1) Where were you born?	**Country of origin***	36.57% (49/134) foreign born
(If born outside of U.S., continue)		
2) When did you come to the U.S.? (How long have you been in the U.S.?)	**Year of arrival in the United States (U.S.)**	2001 (11.37) *mean (SD)***
3) What's your preferred language?	**Preferred language**	69.39% (34/49) Spanish
		24% (12/49) English
		4% (2/49) Bengali
		2% (1/49) Punjabi

Table 1. Triage Screen questions and results. *see Figure 2 for map depicting countries represented. **For year of arrival, see Figure 1.

134 patients were screened at triage in 22 hours randomized over the course of March 2022 (see Table 1). Forty-nine patients (36.57%) screened positive for foreign birth and were asked the remaining 3 triage screen questions. 15 countries were represented: 28/49 from Mexico (57.14%), 3/49 (6.12%) from Honduras and Nigeria each, 2/49 (4.08%) from Bangladesh and Guatemala each, and 1/49 (2.04%) from each of the following: Colombia, Dominica, El Salvador, Ethiopia, Nicaragua, Pakistan, Panama, Senegal, St. Thomas, Vietnam (see Figure 2). We chose to include 1 patient from Puerto Rico (a U.S. territory), in our climate migration reporting and analyses. Mean year of arrival in the US was 2001 (SD=11.37), depicted in Figure 2. Preferred languages were reported as 69.39% (34/49) Spanish, 24% (12/49) English, 4% (2/49) Bengali, and 2% (1/49) Punjabi.

Figure 1.

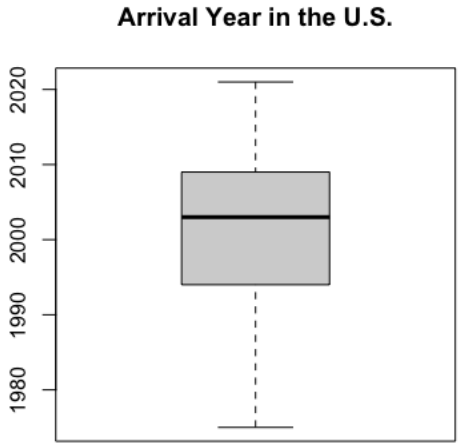

Figure 1. Boxplot depicting arrival year in U.S. of triage screen positive foreign-born individuals. Range= [1975 - 2021], median= 2003, IQR= 15.

Comfort with Triage Screen

45/49 (91.84%) of patients were comfortable with the triage screen questions. Of the four patients who responded as not comfortable with the triage screen questions, two were surprised--*"I'm surprised but not uncomfortable, it's just unusual to be asked these questions",* one was

suspicious—*"why do you need to know any of that information if I speak English?",* and one was curious—*"It's unexpected, I wasn't asked these questions the last time I was here."*

Climate Related Migration

5/49 (10.20%) reported climate or weather-related factors influencing their migration to the USA, with loss of land/job due to loss of crop production cited as the most common reason for 4/5 of these patients. The remaining patient cited hurricane/flooding as the reason. Patients reporting climate or weather-related migration factors came from Mexico, Honduras, El Salvador, and Puerto Rico (See Figure 2). Of those who responded No or Unsure to climate or weather-related migration, common themes that emerged from patient comments included: poverty and job opportunity *("poverty in my country", "no work", "for more opportunities", "for better work and a better lifestyle for my family"),* government corruption and political unrest, and arrival in the US as a child without knowledge of specific reasons for moving. Years of arrival in the U.S. for those reporting climate migration were 2001, 2002, 2005, 2007, 2021.

Figure 2. Map of Country of Origin Reported by Follow-Up Survey Participants

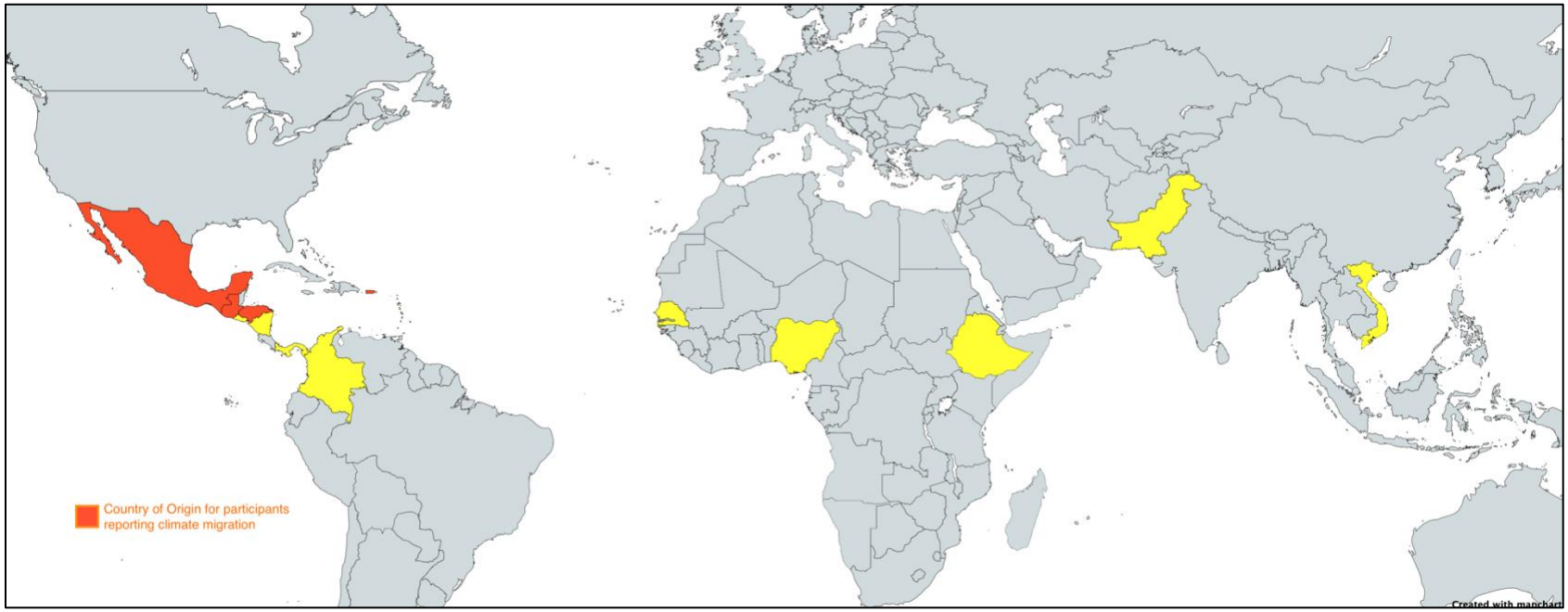

Figure 2. Countries colored in with yellow or orange were reported as country of origin by follow-up survey participants. These include (from left to right): Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Panama, Colombia, (Puerto Rico), St. Thomas, Dominica, Senegal, Nigeria, Ethiopia, Pakistan, Vietnam. Countries colored in orange specifically represent those country of origin for participants reporting climate migration (Mexico, Guatemala, Honduras, (Puerto Rico)).

Medical Visits

The average number of medical visits in the last 12 months was reported as 2.71 (SD=1.50). 22/49 (44.9%) of patients came to the ED for hemodialysis (HD). In the past 12 months, 41/49 (83.67%) of patients reported seeking care at the ED, 18/49 (36.73%) at their PCP office, and 3/49 (6.12%) at an Urgent Care Center. Patient comments when asked this follow-up survey question include: *"When I used to have insurance, I would go to my PCP", "I don't usually go to the doctor, I just take care of myself unless I can't", "I haven't been to the doctor in 10 years since I lost my insurance", "It's hard to get in to see my PCP, so I just come to the ED", "I can pay out of pocket at Buford Family Clinic."*

Perceptions of Health

35/49 patients (71.43%) reported taking daily prescription medication. The average self-rated health was 2.43 (SD=0.97) on a Likert scale with 1=poor, 2=fair, 3=good, 4=very good, 5=excellent. Subsequent analysis did not show a statistically significant difference in self-rated health between those that took daily medication (mean=2.36, SD=0.93) and those that did not (mean= 2.64, SD=1.12) (t= -0.741 (p=0.47)).

Potential Barriers

24/49 (48.98%) of patients reported feeling worried or uncomfortable at a medical visit because of any of the following: **health insurance status** (38.78%), **language** (20.41%), or **country of origin** (4.08%). No one responded "Yes" to worry at a medical visit because of gender or religion.

To investigate the impact of these potential barriers to accessing care, we performed a series of 2-sample independent t tests comparing 1) self-rated health and 2) frequency of medical visits in the past 12 months between the groups that answered Yes versus No to each barrier: worry about

health insurance status, worry about language, worry about country of origin. A statistically significant difference in frequency of medical visits in the past 12 months was found between those that worry about health insurance status (mean=2.5, SD=1.62) and those that did not report worry about health insurance status (mean=2.9, SD=1.42) (t=13.5 (p=0.0471)).

Self-reported health was lower amongst those that reported worrying about health insurance: 2.11 (SD=1.02) compared to 2.62 (SD=0.9) for those who did not. Additionally, frequency of medical visits in the past 12 months was also lower in those who worried about language (2.5, SD=1.35) and country of origin (2.5, SD=2.12), compared to those that did not ((2.81, SD=1.54) and (2.76, SD=1.49), respectively).

Table 2. Follow-Up Survey Results

Follow-Up Survey	n=49
comfort with triage screen *% (#/n)*	92 (45/49)
climate related migration *% (#/n)*	
Yes	10.20 (5/49)
No	75.51(37/49)
Unsure	14.29 (7/49)
Frequency of medial visits in past 12 months *mean (SD)*	2.71 (1.50)
0	8.16 (4/49)
1	20.41 (10/49)
2	8.16 (4/49)
3	12.24 (6/49)
4+	46.94 (23/49)
Where do you go for medical care? % (#/n)	
ED	83.67 (41/49)
PCP	36.73 (18/49)
UC	6.12 (3/49)
Daily Medication % (#/n)	
Yes	71.43 (35/49)
No	28.57 (14/49)
Self-Rated Health	2.43 (0.97) *mean(SD)*
1 (Poor)	18.37% (9/49)
2 (Fair)	32.65% (16/49)
3 (Good)	32.65% (16/49)
4+ (Very Good, Excellent)	16.33% (8/49)
Barriers (worry about…)	
country of origin	4.08 (2/49)
health insurance status	38.78 (19/49)
language	20.41 (10/49)
any of the 3 listed above	48.98 (24/49)

Table 2. ED=Emergency Department, PCP=Primary Care Provider, UC=Urgent Care.

Given climate migrants' lack of refugee status, we explored the relationship between those who reported climate or weather-related factors influencing their move to the U.S. and worry about health insurance, however there was no statistically significant result (Chi-squared=1.81, p=0.610).

Phase III: Chart Review

45/49 (91.84%) of patients consented to participate in chart review. 30/45 (66.67%) of patients were male; 15/45 (33.33%) were female. Age breakdown was as follows: 11/45 (24.44%) of patients were 18 - 44 years old, 28/45 (62.22%) were 45 – 64 years old, and 6/45 (13.33%) were 65 years or older. See Table 3 for chart review results.

Comparing our sample to Grady Hospital and state of Georgia population data (see Table 3), our sample of patients experiences statistically significant higher **uninsurance** (86.67%, $p<0.001$) compared to the general Grady patient population (average % uninsured of Dekalb and Fulton counties is 16.98%) and state of Georgia population (22.20%), **lack of regular primary care provider visits** (44.44%, $p<0.05$), and higher prevalence of **diabetes** (44.44%, $p<0.001$) and **myocardial infarction** (11.11%, $p<0.05$) (See Figure 3). Obesity and asthma were lower in our sample compared to the general Grady population and state of Georgia, although not statistically significant.

Other findings of chronic diseases/diagnoses in our patient sample include hypertension in 34.78% (8/23) of non-ESRD patients, CHF in 17.78% (8/45) patients, history of stroke in 4.44% (2/45) patients, cancer of any kind in 6.67% (3/45) patients, substance use disorder in 28.89% (13/45) patients—most commonly tobacco use in 12/13 of those patients—and any mental health disorder in 8.89% (4/45) of patients. Mean last recorded lab values for body mass index (BMI),

HbA1c, and lipid panel—important markers in evaluating metabolic status and chronic disease risk—are also included in Table 3.

Table 3. Demographics, Healthcare Access, and Health Status Indicators

*p<0.05, **p<0.01	*EMERI Study Sample (n=45)*	*Grady Hospital Patient Population*				*Georgia*	
		Dekalb		Fulton			
Demographics	% (#/n)	%	p-value	%	p-value	%	p-value
Sex *% (#/n)*							
male	66.67 (30)	47.41	*	48.47	*	48.71	*
female	33.33 (15)	52.59	*	51.33	*	51.29	*
Age							
18-44	24.44 (11)	41.7	*	42.4	*	38	p=0.085
45-64	62.22 (28)	24.9	**	24.4	**	25.5	**
18-64	86.67 (39)	65.35	*	66.42	*	62.75	*
65+	13.33 (6)	11.11	p=0.632	10.77	p=0.627	12.75	p=0.824
Access to Care % (#/n)							
% Uninsured	86.67 (39)	15.38	**	18.57	**	22.20	**
% Medicaid	4.44 (2)	19.70	*	18.30	*	19.60	*
% Without Regular PCP	44.44 (20)	27.00	*	30.00	*	NA	
Chronic Diseases / Lifetime Diagnoses							
Diabetes	44.44 (20)	8.5	**	8.3	**	11.15	**
Hx of Heart Attack (MI)	11.11 (5)	3.3	*	3.8	*	4.5	*
Obesity	17.78 (8)	26.1	p=0.271	24.8	p=0.359	31.7	p=0.0648
Asthma	6.67 (3)	10.9	p=0.477	9.3	p=0.796	8.3	p=1.00
Hypertension (non-HD pts only)	34.78 (8/23)						
CHF	17.78 (8/45)						
Stroke	4.44 (2/45)						
Cancer (any)	6.67 (3/45)						
Substance Use Disorder	28.89 (13/45)						
Mental Health (any)	8.89 (4/45)						
Last Recorded Value	mean (SD)						
BMI	27.19 (6.70)						
HbA1c	6.03 (1.0)						
Tchol	158.82 (39.68)						
LDL	86.77 (33.12)						
HDL	44.64 (9.11)						
TG	146.45 (94.0)						
undiagnosed HTN^{+}	46.67% (7/15)						

Table 3. Chart Review Data showing Demographics, Access to Care, and Chronic Diseases with Comparative analysis. $^{+}$Undiagnosed hypertension was assigned to patients with 2+ consecutive elevated blood pressure readings >130 systolic and >80 diastolic upon chart review. Data for comparative analysis sourced from the publicly available Grady Community Health Needs Assessments (GCHNA) 2016 and 2019. The GCHNA uses Dekalb and Fulton county data as proxy for the general Grady Hospital patient population. Data sourced from **2018 (GCHNA 2019)**: Demographics; % Uninsured Dekalb and Fulton Counties. **2016 (GCHNA 2019):** Diabetes, Obesity. **2014 (GCHNA 2016):** % Uninsured GA, % Medicaid, Hx of Heart Attack (MI), Asthma. **2012 (GCHNA 2016**): % without PCP (2,3).

22/45 (48.89%) patients in our sample access routine emergency HD, a life-saving treatment, through the ED (45). With significant differences in healthcare interactions between non-HD

patients and HD patients—who tend to come to the ED 2-3 times a week for HD treatment—we chose to report data on healthcare encounters, preventive screenings, and prescription medication for each group, HD and non-HD patients, separately (see Table 4). Due to small group sizes of each, statistical significance testing was limited.

Figure 3. **Disparities in healthcare access and health status**

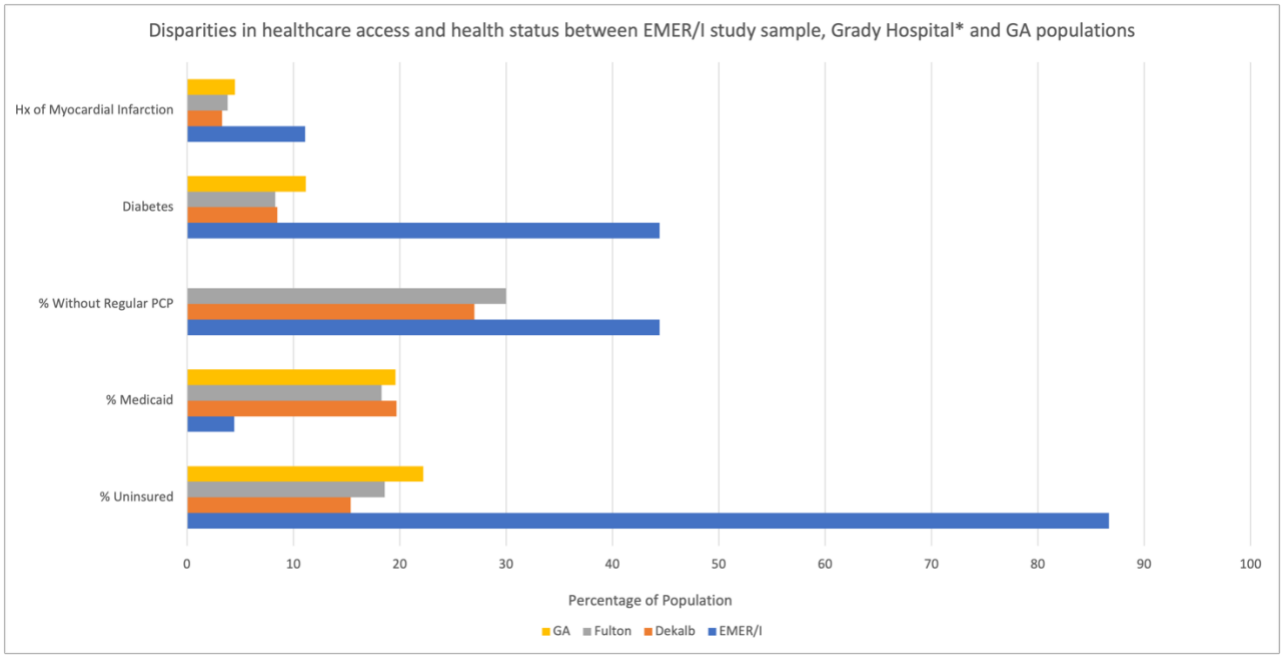

Figure 3. Statistically significant results from Table 3 demonstrating disparities in healthcare access and diabetes and history of myocardial infarction, *per GCHNA, Grady Hospital population represented as Dekalb and Fulton Counties.

Healthcare Encounters

Table 4 reports the following results by year: mean ED, PCP, specialist, and ED-HD (ED visits explicitly for routine HD) visits per person, as well as number of inpatient and ICU admission days, and a total count of each type of encounter per year for each sample cohort (see Table 4). Of note, there did not appear to be stark differences in healthcare encounters from 2019 (pre COVID-19 pandemic) to 2020 onward, with the exception being a decrease in mean specialist visits per person for the HD cohort.

Total ED encounters across the cohort of non-HD patients were 6 in 2019, 3 in 2020, 17 in 2021, and 36 thus far in 2022. Total ED encounters, *including* those for ED-HD, across the HD patients were dramatically higher: 939 in 2019, 1345 in 2020, 1675 in 2021, and 555 thus far in 2022.

The mean ESI triage score for the most recent ED visit was 3.3 (SD=0.56) and 3 (SD=0) in the non-HD and HD groups respectively, with the ESI score ranging from 1=most urgent to 5=least urgent.

Chief complaints of ED visits from all patients (excluding those where chief complaint was exclusively "hemodialysis") are visualized in Figure 4. The top ten most commonly reported chief complaints were: chest pain, headache, cough, fatigue, shortness of breath, abdominal pain, medication refill, weakness, back pain, and lightheaded.

Figure 4. **Patients' Chief Complaints in the ED**

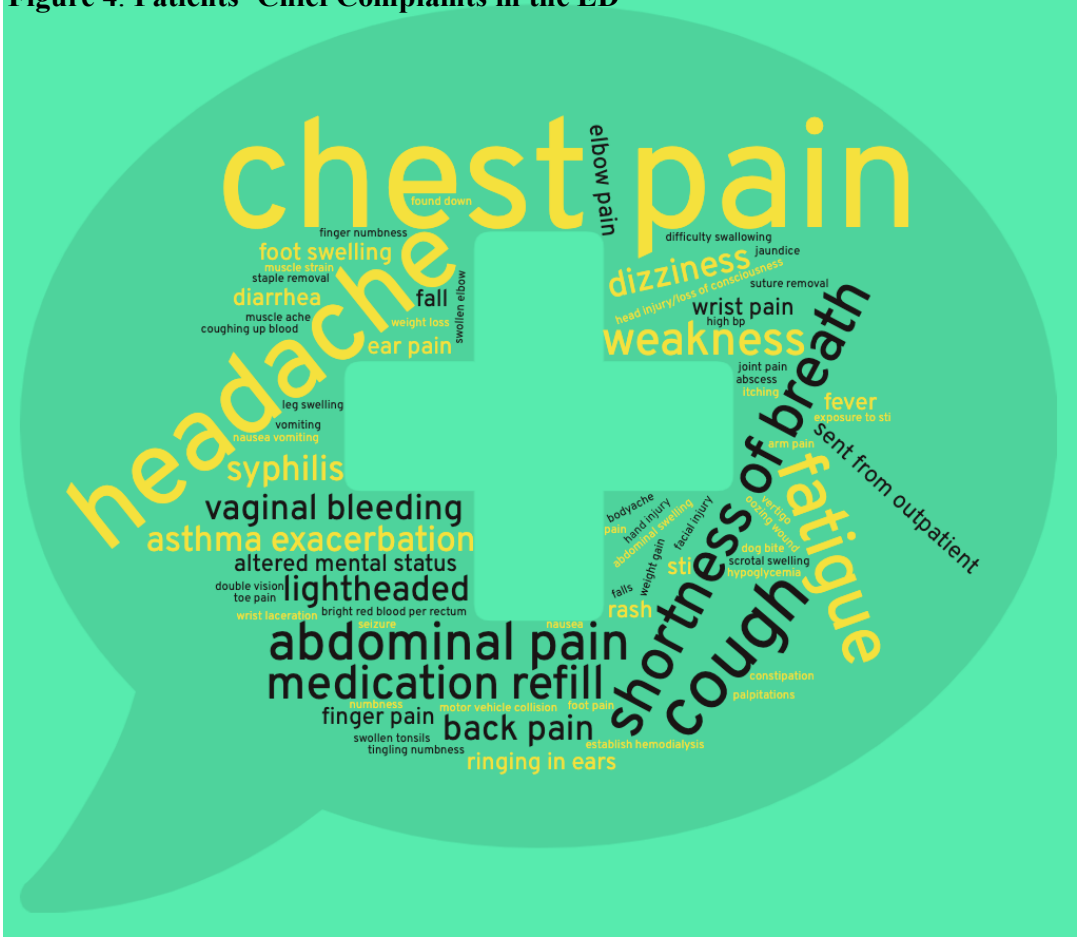

Figure 4. Patients' chief complaints, with text size of chief complaint correlating to frequency of reporting. Figure generated using wordclouds.com.

Age-Appropriate Preventive Screening

Screening for depression, tobacco use, diabetes, lipids, HIV, and Hepatitis C virus (HCV) was higher in the HD cohort. Overall, vaccination rates were lower for influenza compared to COVID-19, with a higher percentage of vaccinated people in the HD cohort. Due to the small number of females in the chart review to begin with, combined non-HD and HD results for female-specific preventive screening are presented in Table 4, with rates of mammograms, pap smears, and DEXA bone density scans of 26.6%, 58.33%, and 0% respectively.

Prescription Medication

About half of the non-HD patients and 100% of HD patients were prescribed medication. Interestingly, prescriber type was 36.36% ED, 37.37% specialist, 18.18% PCP, and 18.18% hospitalist/intensivist for non-HD patients. All HD patients were prescribed medication from a specialist in Nephrology.

Table 4. Healthcare encounters, preventive screenings, medication for non-HD/HD cohorts

	Non-HD (n=23)				HD (n=22)			
Healthcare Encounters								
mean per person (SD)	**2019**	**2020**	**2021**	**2022**	**2019**	**2020**	**2021**	**2022**
ED	1.5 (1)	3 (0)	2.43 (1.99)	1.57 (1.08)	1.75 (1.14)	2.08 (1.19)	3 (2.42)	1.56 (0.53)
PCP	4.25 (4.57)	3.25 (3.30)	3.86 (3.80)	1.25 (0.5)	3.22 (1.92)	3.33 (2.24)	2.77 (2.17)	1.45 (0.93)
ED: PCP ratio	0.4	0.9	0.6	1.3	0.5	0.6	1.1	1.1
ED HD					83.45 (33.85)	87.87 (33.95)	90.89 (22.43)	24.59 (8.63)
Specialist visits*	1.33 (0.58)	1.67 (0.58)	1.5 (0.71)	1.67 (0.52)	10.75 (3.49)	6.5 (4.44)	7.27 (5.37)	4.1 (2.60)
Hospital admit	2.5 (2.12)	0	3 (0)	6.2 (3.11)	15.44 (18.34)	7 (4.18)	14.67 (12.75)	5.5 (3.15)
ICU admit	0	0	0	18 (0)	19 (21.21)	0	6.67 (3.79)	0
ESI score most recent ED visit*				3.3 (0.56)				3 (0)
Total								
ED	6	3	17	36	21	27	39	14
PCP	17	13	27	5	29	30	36	16
ED:PCP ratio								
ED HD					918	1318	1636	541
Specialist visits	4	5	3	10	129	78	80	41
Hospital admit	5	0	3	31	139	84	176	33
ICU admit	0	0	0	18	38	0	20	0
Age Appropriate USPSTF Preventive Screenings[+]	% (#/n)				% (#/n)			
CRC	21.43 (3/14)				26.32 (5/19)			
Lung Ca if smoker	100 (3/3)				20 (1/5)			
Depression	30.43 (7/23)				59.09 (13/22)			
Tobacco Use	60.87 (14/23)				81.82 (18/22)			
Female Screenings *(Combined non-HD and HD)*								
mammogram/breast cancer		26.67% (4/15)						
pap smear/cervical cancer		58.33% (12)						
osteoporosis		0% (0/3)						
Diabetes*	58.33 (7/12)				94.74 (18/19)			
Lipids	50 (7/14)				63.16 (12/19)			
Statin CVD Prevention								
could not calc, but wanted to	53.33 (8/15)				50 (11/22)			
could calc, not on appropriate Rx action	6.67 (1/15)				0 (0/22)			
could calc, appropriate Rx action	40 (6/15)				50 (11/22)			
Infectious Disease								
HIV*	47.83 (11/23)				90.91 (20/22)			
HCV*	43.48 (10/23)				100 (22/22)			
C/G if 18-24	NA				0 (0/1)			
Vaccinations								
SARS-CoV-2 d1*	43.48 (10/23)				81.82 (18/22)			
SARS-CoV-2 d2	43.48 (10/23)				72.73 (16/22)			
SARS-CoV-2 booster	21.74 (5/23)				36.36 (8/22)			
Influenza 2019	4.35 (1/23)				27.27 (6/22)			
Influenza 2020*	8.70 (2/23)				68.18 (15/22)			
Influenza 2021*	4.35 (1/23)				40.91 (9/22)			
Influenza 2022	4.35 (1/23)				27.27 (6/22)			
Prescription Medication								
Yes*	47.83% (11/23)				100% (22/22)			
No	52.17% (12/23)				0			
Prescriber Type								
PCP	18.18% (2/11)				59.09% (13/22)			
Specialist*	27.27% (3/11)				100% (22/22)			
ED	36.36 (4/11)				9.09 (2/22)			
Hospitalist or Intensivist	18.18% (2/11)				27.27% (6/22)			

Table 4. Healthcare encounters, age-appropriate preventive screenings, and prescription medication data presented for HD and non-HD patients, 2019-2022. HD=Hemodialysis, non-HD=non-Hemodialysis, ED=Emergency Department, PCP=Primary Care Provider, ICU=intensive care unit. *indicates a statistically significant difference between groups was found, however given small group sizes, did not report. [+]See Appendix A for detailed information about USPSTF eligibility and screening recommendations—eligibility criteria varies, note different n in denominator in some places.

Discussion

Study Limitations

This pilot study has several limitations. First and foremost, our sample size is small, with 49 patients responding to our follow-survey and 45 patients included in our chart review, giving our study low power. Many subsequent analyses were limited due to sample size and imbalance of subgroups within our population, making many desirable comparisons (for example, between those speaking English vs Spanish vs other foreign language, or those with health insurance or not) untenable.

Additionally, due to the sensitivity of our study subject, participants, and our de-identified IRB protocols, we lacked the ability to control for age and health insurance status in the analysis of the follow-up survey results. In the same vein, we were not able to link survey responses to chart review data and therefore could not evaluate patient responses towards certain barriers (ex. worry about health insurance or language) and their corresponding health/healthcare encounter data from chart review.

Our sample was generated through convenience sampling, whereby one member of the study team was present at ambulatory ED triage at a variety of times of day/days of the week over the period of four weeks. Therefore, we only reached patients who presented to the ED to seek care, likely missing a large portion of our intended population of immigrants/refugees who may not have been able to come to the ED due to other barriers (travel, work/schedule constraints) or who may not have been "sick enough" to seek care. Additionally, by including only those patients presenting to ambulatory triage, we did not include very high acuity patients who skip ambulatory triage, patients presenting for trauma, psychiatric/mental health reasons, or those with altered mental status who cannot consent. Furthermore, the study team member was only

present at hours between 7am-7pm, excluding any patients who may have presented to the ED overnight.

Half of our sample was comprised of patients accessing the ED for emergency HD. This cohort of patients is a unique population whose experience with the healthcare system is different compared to non-HD users of the healthcare system. For example, most patients getting HD through the ED-HD pathway are in the ED 2-3 times a week, and may be more connected to care with PCPs and specialists, follow-up, and preventive health services. Unfortunately, we did not have group sizes large enough to meaningfully compare in this study. It should be noted that this patient cohort, the ED-HD cohort, is a unique program specific to Grady that provides 'routine' dialysis through the ED and is comprised of patients who are typically ineligible for health insurance (of which many are foreign born populations).

During the chart review process, we utilized the Care Everywhere feature in the EPIC EMR to ascertain patient encounters at other hospital systems outside of Grady Hospital. However, smaller community clinics, free clinics, or out of state encounters may not have been captured.

The COVID-19 pandemic impacted patient health and medical encounters during the period of our chart review data collection. We included data from 2019 (pre-pandemic), 2020, 2021, and 2022-present, however patterns of ED, PCP , and specialist visits, as well as inpatient and ICU admissions may have been altered during pandemic years.

Lastly, our pilot study did not include a formal assessment of feasibility or triage nurse opinion of conducting the triage screen. On average, the 3 question triage screen took <1 minute to complete with native English speakers, and <3 minutes to complete with non-native English speakers (not including the start up time to secure language interpretation services).

Climate migration

To our knowledge, this study is the first in the southeastern U.S. to attempt quantification of climate related migration in the ED setting. Our results showed that 10.20% of study subjects reported climate or weather-related factors influencing their migration to the USA, with Mexico, Honduras, El Salvador, and Puerto Rico represented. While awareness and discussion of climate migration and climate refugees has grown significantly in the past decade, many climate drivers outside of natural disasters are slower, long-term processes such as desertification, salinization of agricultural lands, and food insecurity. Unsurprisingly, patients in our sample responded yes to climate migration dating back to 2001. However, there may be a great challenge (and for purposes outside of academic research, ultimately questions of utility) in recognizing climate drivers as the most proximal cause of migration amongst the many factors that may influence migration to the U.S.; we may not have been able to best discern this from the questions we asked in the follow-up survey. Perhaps, different methods such as a focus group or in-depth interviews would lead to improved understanding of our study population's experience with climate migration.

Inequities in Health and Healthcare Access

Our pilot data provides a snapshot of demographics, health status, and utilization patterns of immigrants and refugees accessing the Grady ED. Our data contributes evidence towards the disparities in health and healthcare access for the refugee and immigrant population in Atlanta, GA. Our sample population disproportionately had diabetes, myocardial infarction, and lacked health insurance compared with the general Grady and Georgia populations.

We identified potential barriers to seeking healthcare including health insurance status, language, and country of origin, based on their relationship with mean frequency of medical visits and

mean self-rated health reported by participants. However, further study with a larger sample size is required to ascertain more robust findings.

To better assess patient use of the ED for ambulatory-sensitive conditions, Brandenberger et al. (2020) used International Classification of Diseases (ICD) codes to evaluate ambulatory sensitive conditions (46,47). Further expansion of our pilot study could include calculation of ED: PCP score utilizing only ED visits for ambulatory sensitive conditions within a larger cohort, excluding HD patients due to their unique interactions with the healthcare system. This would allow us to discern how and when patients utilize the ED versus a PCP for similar ambulatory sensitive conditions, which we were unable to meaningfully assess in our study.

In general, from the qualitative comments gathered from our sample, patients indicated they would have gone to a PCP if they could have (ie if they had health insurance), or that they used to go to a PCP when they had health insurance. For these patients, the ED serves as the access point for medical visits of any kind. Interestingly, few patients reported seeking care at an UC, and no patients reported going to a free clinic in the community.

Our pilot data demonstrated the significant volume of ED visits for emergency HD by the population of sick, largely uninsured patients receiving routine, life-saving HD treatment at Grady for end stage renal disease, a phenomenon more commonly found in immigrant populations working in agriculture, landscaping, and construction (48,49). Each of these encounters for ED-HD treatment requires resources from the ED and results in unnecessary costs to the hospital system (45,49). This study provides further evidence to support universal health coverage or other means by which patients can more appropriately receive scheduled outpatient HD treatment. With higher frequency healthcare encounters, it appears patients receiving regular

HD treatments tended to have more interactions with PCP and outpatient specialists and received more preventive care in the form of Grady protocolized ED-based screenings for HIV and HCV. Still, there is much room for improvement with regards to preventive health screenings in our study population: from identifying modifiable lifestyle risk factors for cardiovascular and chronic diseases, to evidence-based screening for cancer, to improving mental health care for a known vulnerable and marginalized community.

Future Directions

We are planning for the triage screen piloted in this study to be embedded into the EPIC EMR in the Grady ED. Next steps also need to include identifying linguistically and culturally appropriate hospital and hospital-to-community based interventions to improve health outcomes. These might include community resource mapping based on zip code data collected from our chart review, or expanding the triage screen, follow up survey, and chart review protocol to one of the better-known free clinics in the Atlanta area, the Clarkston Community Health Center (CCHC). CCHC provides primary and preventive services to a largely immigrant and undocumented patient population and may be an important ally and partner in our efforts to better understand and reduce health disparities for immigrants.

Many hospital systems have integrated medical-legal services to aid immigrant and refugee patients, while others house international primary care clinics designed to serve unique patient populations in their communities (43). The EMER/I study provides important evidence specific to refugees and immigrants accessing care at Grady that may support the exploration of similarly aimed initiatives within the Grady Hospital context: for example, the reinstatement of a refugee clinic, Grady-supported community health workers, expansion of bilingual Spanish/English

hospital infrastructure and greater language interpretation services throughout the hospital and for research endeavors.

Given the large body of research predicting an increase in the global population of forcibly displaced persons, health systems must anticipate and plan for migration and larger populations of immigrant and refugee patients (50,51). The grave reality of climate change and its contribution to global migration as both a threat multiplier as well as a direct driver only intensifies the need for preparedness (14,50,51). The Emergency Department, often the first access point to the healthcare system, is uniquely positioned to lead initiatives and system-level changes designed to provide high quality, accessible healthcare for a growing population of immigrants and refugees.

Conclusion

Based on our pilot data, implementing a universal ED triage screen to identify immigrants and refugees is a critical first step to address the inequities of health and healthcare access experienced by this vulnerable patient population. Ultimately, once refugee and immigrant patients are identified in the EMR, we may better link and refer to primary and preventive care services and community-based organizations that may benefit this population. Evidence form this pilot study supports the development of hospital-based interventions to improve health outcomes of vulnerable immigrant populations. With the significant influx of climate migrants as a result of global climate change, emergency departments and hospital systems must prepare and improve systems to provide high quality, accessible healthcare to this growing patient population.

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Appendix

Appendix A.

We utilized USPSTF grade A (The USPSTF recommends the service. There is high certainty that the net benefit is substantial) and grade B (The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial) recommendations to inform data collection during chart review (42). In addition, items were included per Grady Hospital protocol (tobacco screening, HIV screening).

Preventive Screening	WHO	WHEN	Specific to EMER/I Chart Review (2019-2022)
Colorectal Cancer (CRC)	adults 45-75 years. See the USPSTF "Practice Considerations" for more information	See the USPSTF "Practice Considerations" for more information	per USPSTF recommendation
Lung cancer- low dose CT scan	adults 50-80 w/ 20 pack-year history, current smoker, OR former smoker who quit whithin the past 15 years	annually until 15 years post smoking cessation	documented within chart review period
Tobacco use	adults		ever documented
Depression	adults	yearly	documented within 2021-2022
Breast cancer- mammogram	women 50-74 years	bienniel	per USPSTF recommendation
Cervical cancer- pap smear	women 21-65 years	every three years- cytology alone; OR every five ye	per USPSTF recommendation
Osteoporosis- bone scan	women 65+, or hi risk <65		per USPSTF recommendation
STI: C/G (Chlamydia/Gonorrhea)	adults 18-24; adults hi risk 25+ years		adults 18-24 years, documented within chart review period
HIV (Human Immunodeficiency Virus)	adults 15-65 years	every patient visiting the ED	documented within chart review period
HCV (Hepatitis C Virus)	adults 18-79 years	ever documented	ever documented
prediabetes/T2DM (HbA1c)	asymptomatic overweight/obese adults 35-70 years		documented within chart review period
Statin use for primary CVD (cardiovascular disease) prevention: would want to calculate 10-year ASCVD (atherosclerotic cardiovascular disease) risk for preventive statin therapy eligibility (deemed as adults 40-75 years with 1+ risk factor: dyslipidemia, diabetes, hypertension, smoking, 10 year ASCVD risk >10%)	adults 40-75 w/ 1 of the following: overweight/obesity, DM, HTN, smoking		based off patient risk factors, marked Yes or No would want to calculate (and further details if could calculate, or if already prescribed statin)
Lipids (Total Cholesterol-Tchol, HDL, LDL, Triglycerides (TG))	Identification of dyslipidemia and calculation of 10-year CVD event risk requires universal lipids screening in adults aged 40 to 75 years. See the USPSTF "Clinical Considerations" section for more information		documented within chart review period