

Incidence of and Risk Factors for COVID-Related Urgent Medical Visits Among US Patients Diagnosed With COVID-19 in the Outpatient Setting

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Disclosures

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Background

- Infection with SARS-CoV-2 can lead to hospitalization or death, and most patients are first diagnosed in the outpatient setting
- Clinical trials have demonstrated that early treatment with monoclonal antibodies targeted against SARS-CoV-2 is efficacious in reducing hospitalization and mortality risk¹
 - Treatment is most efficacious when provided early
- The uncertain natural history of COVID-19 in the outpatient setting presented challenges to healthcare providers needing to identify which patients would be at highest risk of severe disease
- Estimating the incidence of COVID-19-related urgent medical visits (i.e. ER/urgent care visits or hospitalizations) and identifying factors associated with these visits could inform patient management and resource allocation

Objective

- To characterize patients initially diagnosed with COVID-19 in the outpatient setting, and to estimate the 30-day incidence of and risk factors for subsequent COVID-19-related urgent medical visits

Data Source

- Optum® COVID-19 Electronic Health Records Dataset
 - A de-identified patient-level dataset was created to better understand COVID-19
 - Encompasses a network of healthcare provider organizations across the United States that cover >101 million patients annually
 - Data are primarily from integrated healthcare delivery networks

- Data include patients who were tested for SARS-CoV-2 or diagnosed with COVID-19
 - Includes data across continuum of care, such as:
 - Demographics, and medications prescribed and administered
 - Lab results, vital signs, and other observable measurements
 - Outpatient and inpatient data coded using diagnosis and procedure codes

Study Design and Population

- **Study design:** Retrospective cohort study
- **Study population**
 - Outpatient COVID-19 diagnosis (U07.1) or positive SARS-CoV-2 virus test between June 1, 2020, and December 9, 2020
 - First outpatient COVID-19 diagnosis or SARS-CoV-2 positive test date was selected as the index date
 - No prior COVID-19 diagnosis, other coronavirus infection diagnosis, or SARS-CoV-2 positive virus/antibody test prior to index date
 - Member of an integrated delivery network health system with ≥ 1 healthcare encounter within a 2-year period prior to the index date (i.e. the baseline period)
 - Age ≥ 18 years on index date

Outcomes and Risk Factors

- **Follow-up:** Patients were followed from the index date until the end of the study (December 9, 2020), the outcome, or death (whichever came first)
- **Outcomes:** COVID-19-related urgent medical visits up to 30 days after the index date
 - COVID-19-related urgent care, ER visit, or hospitalizations
 - Required a COVID-19 diagnosis during the encounter
 - COVID-19-related hospitalizations
 - Required a COVID-19 diagnosis as the primary or admitting diagnosis during the encounter
- **Risk factors:** Identified by the CDC and/or medical literature as increasing risk of severe COVID
 - **Demographics:** Age, sex, race/ethnicity, healthcare insurance type
 - **Situational:** Location of encounter (ER/urgent care vs not), geographic region, index month
 - **CDC categorization of BMI in kg/m²:** <18.5 (underweight), 18–24.9 (normal), 25–29.9 (overweight), 30–34.9 (class I obese), 35–39.9 (class II severely obese), and ≥40 (class III morbidly obese)
 - **Comorbidities:** Cancer, chronic kidney disease, chronic obstructive pulmonary disease, cardiovascular disease, autoimmune disease, obesity, diabetes (<7% vs ≥7%), sickle cell disease, chronic liver disease, asthma, hypertension, smoking status (current/former), pregnancy, depression, anxiety
 - **Previous healthcare resource utilization:** Baseline ER/urgent care visit or baseline hospitalization

Statistical Analysis

- Patient characteristics described on index date
 - Counts and frequencies reported for categorical variables, and mean and standard deviation reported for continuous variables
- Cumulative incidence function was used to estimate incidence and 95% CIs for 30-day urgent medical visits
- Competing risk regression models were used to derive unadjusted and adjusted hazard ratios and 95% CIs for risk factors for 30-day COVID-19-related urgent medical visits

Results

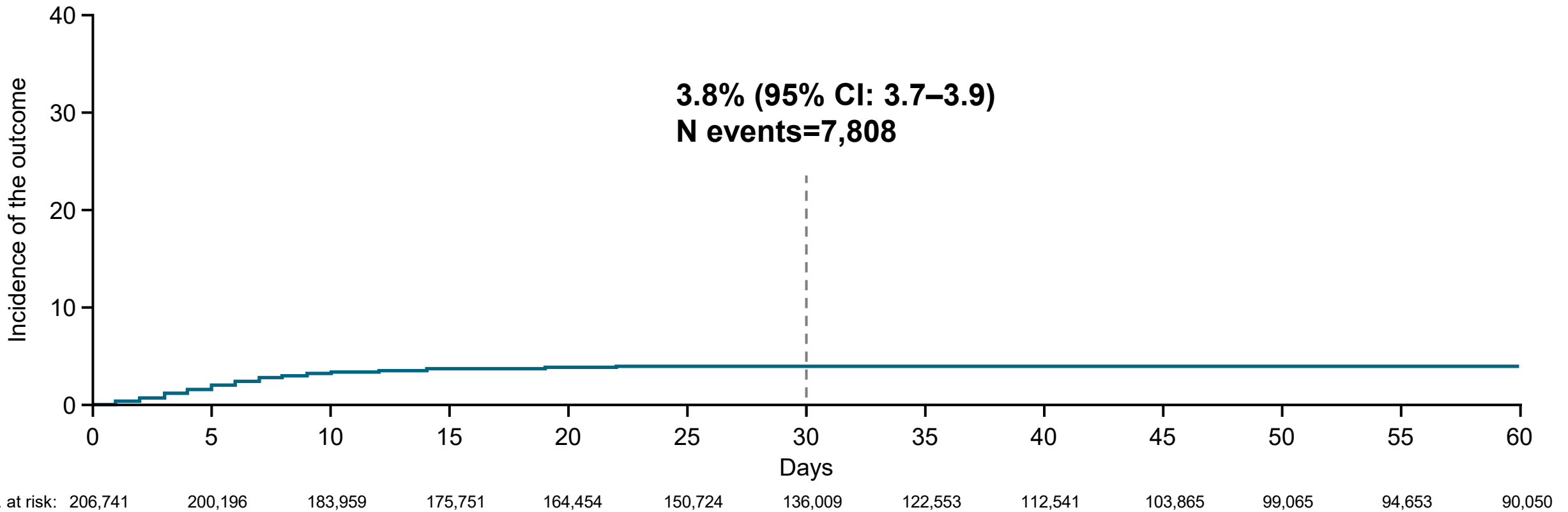
Baseline Characteristics of Patients Diagnosed with COVID-19 in the Outpatient Setting

Variable	N=206,741
Mean age (SD)	46.7 (17.8)
Women, n (%)	121,513 (58.8)
Race, n(%) [†]	
Non-Hispanic White	141,394 (77.5)
Hispanic	18,887 (10.3)
Non-Hispanic Black	18,601 (10.2)
Asian	3,622 (2.0)
Geographic region, n (%) [‡]	
Midwest	117,411 (58.7)
Northeast	38,681 (19.3)
South	30,315 (15.2)
West	13,506 (6.8)
Index month, n (%)	
June	16,161 (7.8)
July	28,631 (13.8)
August	21,484 (10.4)
September	20,263 (9.8)
October	32,461 (15.7)
November	74,856 (36.2)
December	12,885 (6.2)
ER or urgent care diagnosis, n (%)	27,736 (13.4)
Mean BMI (SD), kg/m ^{2§}	30.9 (8.7)
Cardiovascular disease, n (%)	20,167 (9.8)
Diabetes, n(%)	26,856 (13.0)
Hypertension, n (%)	62,482 (30.2)
Chronic obstructive pulmonary disease, n (%)	8835 (4.3)

[†]11.7% missing race/ethnicity [‡]3.3% Missing region; [§]20.2% missing BMI. BMI, body mass index; SD, standard deviation.

Cumulative Incidence of COVID-19-Related Hospitalizations Among Patients Diagnosed with COVID-19 in the Outpatient Setting

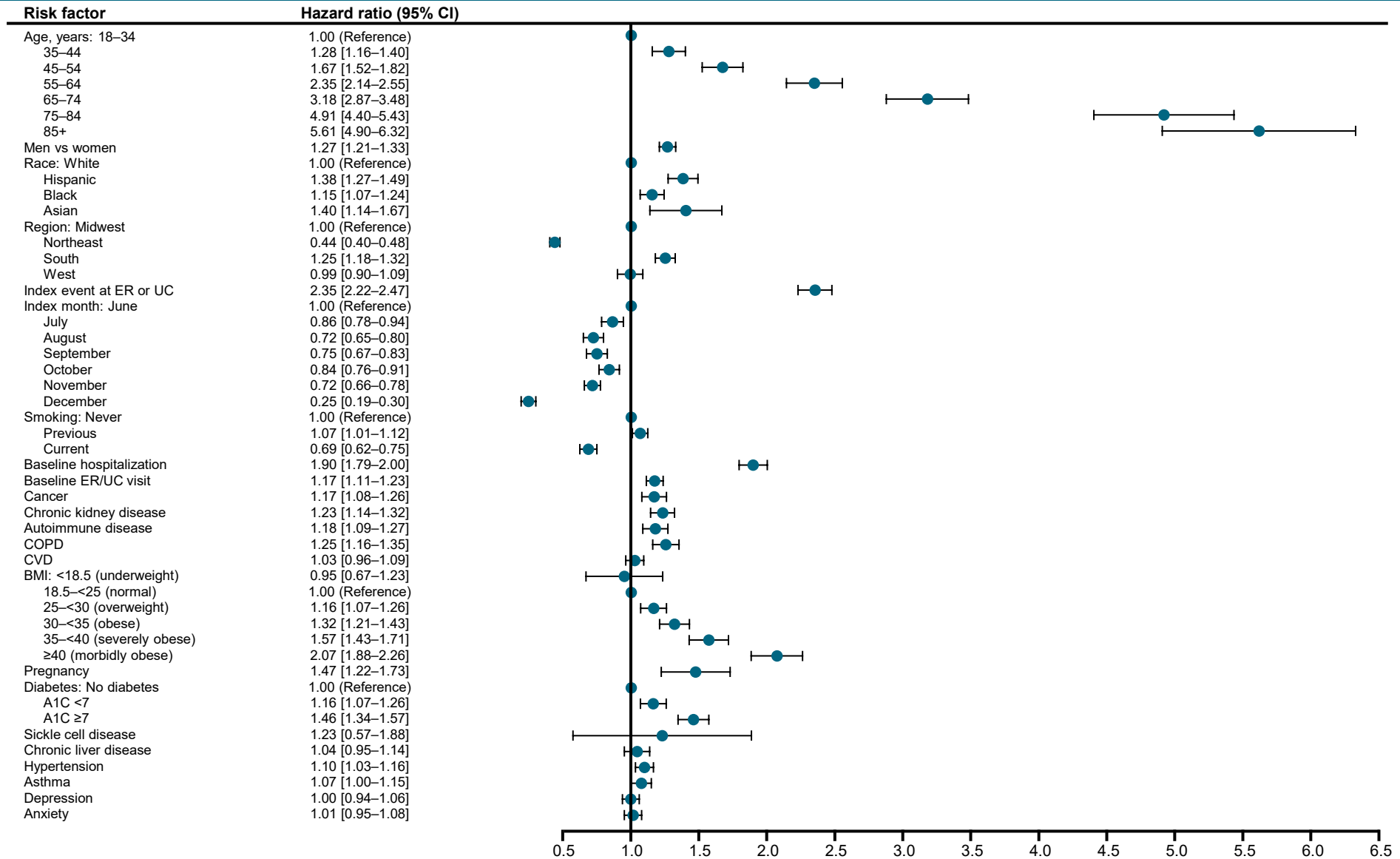
COVID-19-related hospitalization



30-Day Incidence of COVID-19-Related Hospitalizations Among Patients Diagnosed with COVID-19 in the Outpatient Setting, Stratified by Key Risk Factors

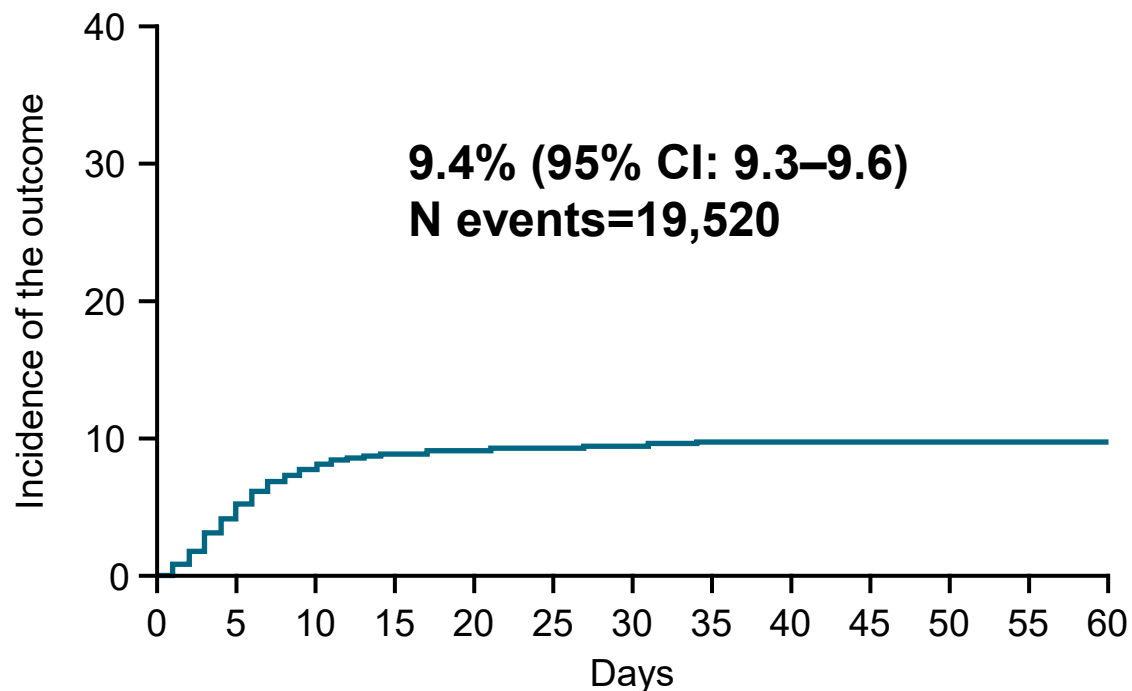
Risk factor	COVID-19-related hospitalization (95% CI)
Age, years	
18–34	1.6 (1.5–1.7)
35–44	2.2 (2.1–2.4)
45–54	3.1 (3.0–3.3)
55–64	4.6 (4.4–4.8)
65–74	7.0 (6.7–7.4)
75–84	12.1 (11.4–12.7)
≥85	13.0 (12.0–14.1)
Race	
Non-Hispanic Caucasian	3.9 (3.8–4.0)
Hispanic	4.3 (4.0–4.6)
Non-Hispanic Black	4.8 (4.5–5.1)
Asian	3.3 (2.8–3.9)
First diagnosed with COVID-19 in ER or urgent care setting	8.2 (7.9–8.6)
BMI, kg/m ²	
<18.5 (underweight)	3.2 (2.3–4.1)
18.5–<25 (normal weight)	2.5 (2.4–2.7)
25–<30 (overweight)	3.6 (3.4–3.8)
30–<35 (obese)	4.3 (4.1–4.5)
35–<40 (severely obese)	5.0 (4.7–5.3)
≥40 (morbidly obese)	6.2 (5.8–6.5)
Chronic kidney disease	12.6 (11.9–13.3)
Chronic obstructive pulmonary disease	11.7 (11.0–12.4)
Cardiovascular disease	10.0 (9.6–10.4)
Baseline hospitalization	7.3 (7.1–7.5)
Baseline ER/urgent care visit	5.7 (5.5–5.9)

Risk Factors for COVID-19-Related Hospitalizations within 30 Days of an Outpatient COVID-19 Diagnosis



Incidence of and Risk Factors for COVID-19-Related Urgent Medical Visits Among Patients Diagnosed with COVID-19 in the Outpatient Setting

COVID-19-related ER/urgent care visit or hospitalization



No. at risk: 206,741 194,977 175,148 166,215 155,144 141,960 127,901 115,110 105,615 97,441 92,953 88,798 84,454

- 30-day incidence of COVID-related urgent medical visits was $\geq 20\%$ in following patients:
 - Age ≥ 75 years
 - ER/UC setting of COVID diagnosis
 - Diagnosis of CKD
 - Diagnosis of COPD
- Strongest risk factors were:
 - Older age
 - Higher BMI
 - ER/UC as setting of COVID diagnosis
 - Prior baseline hospitalization
 - Pregnancy
- Most comorbidities not strong risk factors for outcomes

Limitations

- Data represent the COVID-19 outpatient experience up to December 2020
- Restricted to patients who were members of integrated healthcare delivery network
 - Does not ensure complete capture of all urgent medical visits
 - Under-representation of patients without insurance and in rural areas
- Data on symptoms, viral load, and virus variants were not reliably captured in the database
- Data are national but not nationally representative
 - Certain regions are underrepresented within the database (i.e. South and West)

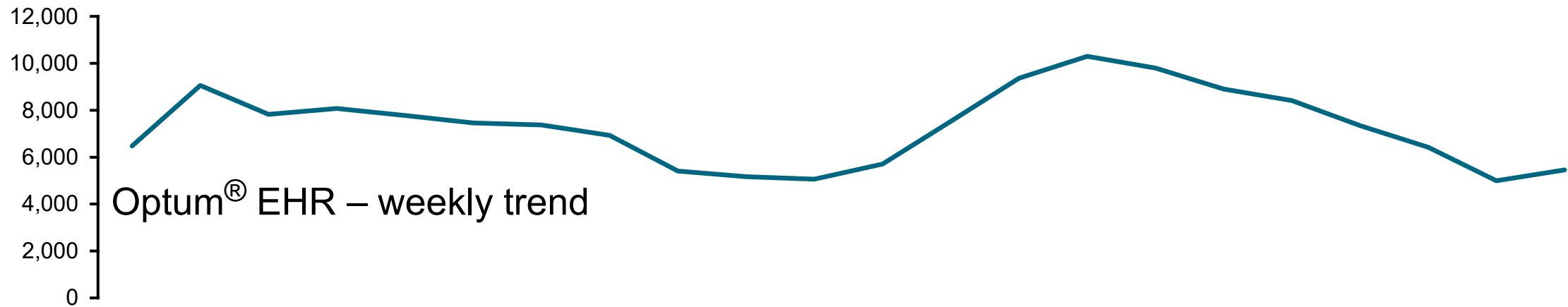
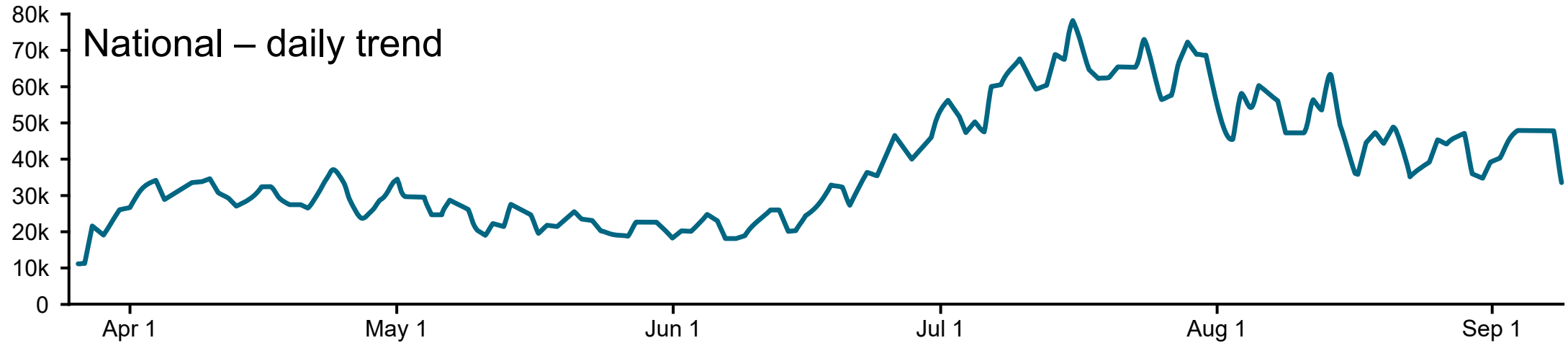
Conclusions

- Among patients diagnosed with COVID in the outpatient setting, incidence of 30-day COVID-19-related urgent medical visits was low
- Risk of 30-day COVID-19-related urgent medical visits was highest in the oldest patients and among patients with certain comorbidities
- Awareness of the risk factors associated with the highest risk of COVID-related urgent medical visits following an outpatient COVID-19 diagnosis may help healthcare providers intensify the clinical management of those patients at highest risk

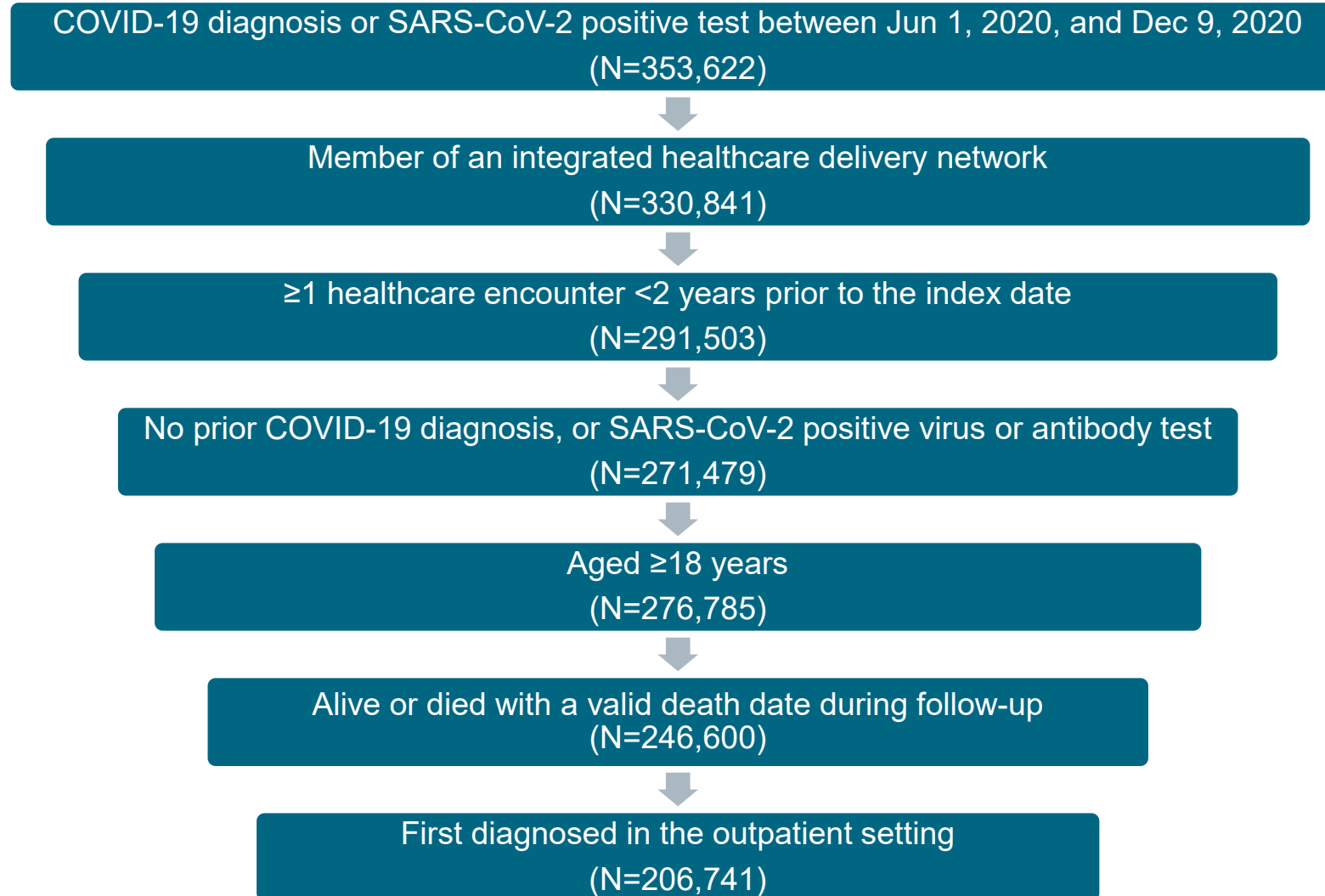
Thank you for your attention

Wei W, Sivapalasingam S, Mellis S, Geba GP, Jalbert JJ.
A Retrospective Study of COVID-19-related Urgent Medical Visits and
Hospitalizations After Outpatient COVID-19 Diagnosis in the U.S.
Adv Ther. 2021;38(6):3185–3202.

Number of Incident COVID-19 Cases Nationally versus the Optum COVID-19 EHR Database



Cohort Attrition



30-Day Incidence of COVID-19-Related Urgent Medical Visits Among Patients Diagnosed with COVID-19 in the Outpatient Setting, Stratified by Key Risk Factors

Risk factor	COVID-19-related hospitalization (95% CI)	COVID-19-related urgent medical visit (95% CI)
Age, years		
18–34	1.6 (1.5–1.7)	6.2 (6.0–6.4)
35–44	2.2 (2.1–2.4)	7.4 (7.1–7.7)
45–54	3.1 (3.0–3.3)	8.5 (8.2–8.8)
55–64	4.6 (4.4–4.8)	10.2 (9.9–10.5)
65–74	7.0 (6.7–7.4)	14.6 (14.1–15.1)
75–84	12.1 (11.4–12.7)	21.5 (20.7–22.3)
≥85	13.0 (12.0–14.1)	21.9 (20.6–23.2)
Race		
Non-Hispanic Caucasian	3.9 (3.8–4.0)	9.1 (9.0–9.3)
Hispanic	4.3 (4.0–4.6)	12.1 (11.6–12.6)
Non-Hispanic Black	4.8 (4.5–5.1)	13.5 (13.0–14.0)
Asian	3.3 (2.8–3.9)	7.5 (6.6–8.4)
First diagnosed with COVID-19 in ER or urgent care setting	8.2 (7.9–8.6)	20.5 (20.0–21.0)
BMI, kg/m ²		
<18.5 (underweight)	3.2 (2.3–4.1)	8.5 (7.1–10.0)
18.5–<25 (normal weight)	2.5 (2.4–2.7)	7.0 (6.7–7.3)
25–<30 (overweight)	3.6 (3.4–3.8)	9.1 (8.9–9.4)
30–<35 (obese)	4.3 (4.1–4.5)	10.8 (10.4–11.1)
35–<40 (severely obese)	5.0 (4.7–5.3)	12.2 (11.7–12.6)
≥40 (morbidly obese)	6.2 (5.8–6.5)	14.1 (13.6–14.6)
Chronic kidney disease	12.6 (11.9–13.3)	22.8 (21.9–23.6)
Chronic obstructive pulmonary disease	11.7 (11.0–12.4)	21.5 (20.6–22.4)
Cardiovascular disease	10.0 (9.6–10.4)	19.2 (18.7–19.8)
Baseline hospitalization	7.3 (7.1–7.5)	17.9 (17.6–18.3)
Baseline ER/urgent care visit	5.7 (5.5–5.9)	14.6 (14.3–14.8)

Patient Characteristics

Variable, n (%)	N=206,741
Smoking status [†]	
Never smoked	123,037 (65.2)
Previously smoked	46,310 (24.5)
Currently smoking	19,490 (10.3)
Cancer	9702 (4.7)
Chronic kidney disease	10,013 (4.8)
Autoimmune disease	12,768 (6.2)
Chronic obstructive pulmonary disease	8835 (4.3)
Cardiovascular disease	20,167 (9.8)
Diabetes	26,856 (13.0)
Controlled (A1c <7%) [‡]	9975 (37.1)
Uncontrolled (A1c ≥7%) [‡]	9949 (37.0)
Missing HbA1c value [‡]	6932 (25.8)
Sickle cell disease	279 (0.1)
Pregnancy	5015 (2.4)
Chronic liver disease	9057 (4.4)
Hypertension	62,482 (30.2)
Asthma	21,993 (10.6)
Depression	35,841 (17.3)
Anxiety	40,956 (19.8)
Prior hospitalization	56,673 (27.4)
Prior ER/UC visit	70,364 (34.0)

[†]8.7% missing smoking status. [‡]Proportion calculated among patients with diabetes.

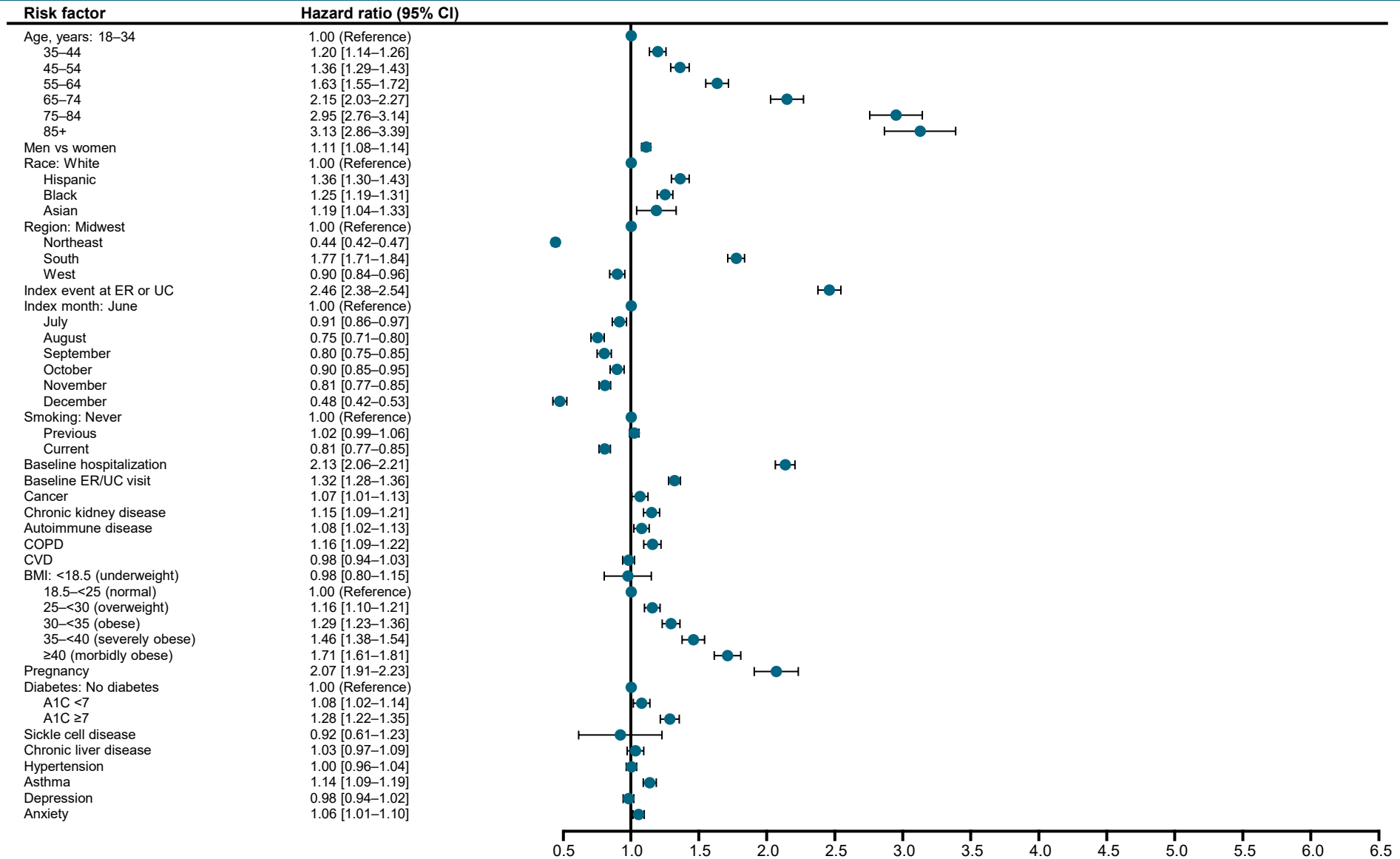
30-Day Incidence of COVID-19-Related Urgent Medical Visits Among Patients Diagnosed with COVID-19 in the Outpatient Setting, Stratified by Risk Factors

Risk factor	COVID-19-related urgent medical visit (95% CI)	COVID-19-related hospitalization (95% CI)
Chronic kidney disease	22.8 (21.9–23.6)	12.6 (11.9–13.3)
Chronic obstructive pulmonary disease	21.5 (20.6–22.4)	11.7 (11.0–12.4)
Cardiovascular disease	19.2 (18.7–19.8)	10.0 (9.6–10.4)
Diabetes with A1c ≥7%	18.3 (17.5–19.1)	9.5 (8.9–10.1)
Diabetes with A1c <7%	16.3 (15.5–17.0)	8.1 (7.6–8.7)
Pregnancy	15.8 (14.7–16.8)	3.1 (2.6–3.6)
Cancer	15.0 (14.3–15.8)	7.8 (7.3–8.4)
Hypertension	14.8 (14.5–15.1)	7.1 (6.9–7.3)
Chronic liver disease	14.5 (13.7–15.2)	6.4 (5.9–7.0)
Asthma	13.0 (12.6–13.5)	5.0 (4.7–5.3)
Autoimmune disease	12.6 (12.0–13.2)	5.8 (5.4–6.2)
Sickle cell disease	12.5 (8.9–16.7)	5.2 (2.9–8.2)
Depression	12.0 (11.7–12.4)	4.9 (4.7–5.1)
Anxiety	11.2 (10.9–11.5)	4.3 (4.1–4.5)
Number of risk factors	COVID-19-related urgent medical visit (95% CI)	COVID-19-related hospitalization (95% CI)
0	6.0 (5.9–6.2)	2.1 (2.0–2.2)
1	9.5 (9.2–9.7)	3.4 (3.3–3.5)
2–3	15.6 (15.2–16.0)	7.5 (7.2–7.7)
≥4	27.0 (25.8–28.1)	15.2 (14.3–16.2)

30-Day Incidence of COVID-19-Related Urgent Medical Visits Among Patients Diagnosed with COVID-19 in the Outpatient Setting, Stratified by Risk Factors

Risk factor	COVID-19-related urgent medical visit (95% CI)	COVID-19-related hospitalization (95% CI)
Region		
Midwest	9.5 (9.3–9.7)	4.1 (4.0–4.2)
Northeast	4.0 (3.8–4.2)	1.8 (1.6–1.9)
South	16.2 (15.8–16.6)	5.4 (5.1–5.6)
West	8.7 (8.2–9.2)	4.0 (3.7–4.4)
Index month, 2020		
June	10.2 (9.7–10.6)	4.2 (3.9–4.5)
July	10.9 (10.5–11.2)	4.1 (3.9–4.4)
August	8.4 (8.0–8.8)	3.5 (3.2–3.7)
September	8.8 (8.5–9.2)	3.7 (3.5–4.0)
October	10.6 (10.3–10.9)	4.6 (4.3–4.8)
November	9.0 (8.8–9.2)	3.7 (3.5–3.8)
December	N/A	N/A

Risk Factors for COVID-19-Related Urgent Care/ER Visit or Hospitalization within 30 Days of an Outpatient COVID-19 Diagnosis



UC, urgent care.