Supplementary Materials
Supplementary Figure 1. Flow Diagram of Study Sample

N3C COVID-19 positive from 1/1/2020-5/21/2021
N=1,635,167

Remove patients age<10 years old
N=162,869

Age ≥ 18 years old at time of COVID-19 positive result
N=1,449,528

Exclude Patients with inadequate site-level data (missing hospitalization, invasive ventilation, and mortality outcomes)
N=2,615

Final total number for the analysis
N=1,446,913
### Supplementary Table S-1. Key Variables and Concept Definitions

| Variable | Concepts and Logic |
|----------|--------------------|
| **Key Exposures** | |
| COVID-19 definition | **Concept Set Names (latest codeset ID) with Description:**  
N3C Covid diagnosis (35486128)  
*Description: Corresponds to ICD10CM Code: U07.1 (condition). Includes 1 Concept (Disease caused by 2019-nCoV - Concept Id: 840539006).*  
ATLAS SARS-CoV-2 rt-PCR and AG (651620200)  
*Description: Includes 55 Concepts (Measurements), characterizing a positive PCR or Antigen test.*  
Atlas #818 [N3C] CovidAntibody retry (45478367)  
*Description: Includes 24 Concepts (Measurements), characterizing a positive Antibody test.*  
ResultsPos (400691529)  
*Description: Includes 6 Concepts, collecting all the affirmative measurement results*  
**Logic:**  
Patient record must be associated with a “N3C Covid diagnosis”  
OR  
have at least one of the covid measurement concepts (“ATLAS SARS-CoV-2 rt-PCR and AG” or “[N3C] CovidAntibody retry”) AND a positive result (“ResultsPos”) |
| HIV infection | **Concept Set Names (latest codeset ID):**  
HIV drugs (331061593)  
hiv infection (382527336)  
*cs_isc_hiv_labs_procedures (684826767)*  
**PrEP Concept IDs and Names:**  
35606583 emtricitabine 100 MG / tenofovir disoproxil fumarate 150 MG Oral Tablet [Truvada]  
1710316 emtricitabine 200 MG / tenofovir disoproxil fumarate 300 MG Oral Tablet [Truvada]  
35606591 emtricitabine 167 MG / tenofovir disoproxil fumarate 250 MG Oral Tablet [Truvada]  
35604225 emtricitabine 200 MG / tenofovir alafenamide 25 MG Oral Tablet  
35606585 emtricitabine 133 MG / tenofovir disoproxil fumarate 200 MG Oral Tablet  
35606581 emtricitabine 100 MG / tenofovir disoproxil fumarate 150 MG Oral Tablet  
1703093 emtricitabine 200 MG / tenofovir disoproxil fumarate 300 MG Oral Tablet  
35604229 emtricitabine 200 MG / tenofovir alafenamide 25 MG Oral Tablet [Descovy]  
**Logic:**  
Included in cohort if patient is associated with at least one of the concept sets listed in either the condition, procedures, or drugs tables. Patients only on PrEP were excluded. |
| Solid organ transplant definition | **Concept Set Names (latest codeset ID):**  
[N3C] [ISC] Kidney Transplant Rejection (25243076)  
[N3C] [ISC] Heart Transplant Rejection (610701999)  
[N3C] [ISC] Liver Transplant Rejection (184979218) |
### Outcomes

| Emergency Department visit | Visit Concept IDs and Names: |
|---------------------------|-----------------------------|
|                           | 262 Emergency Room and Inpatient Visit |
|                           | 9203 Emergency Room Visit |

**Logic:**
No concept sets were used in this definition. Includes patients with a visit start date between 14 days prior to the earliest covid diagnosis to 45 days after covid diagnosis that are also associated with one of the listed visit concept IDs.

| Hospitalization | Visit Concept IDs and Names: |
|-----------------|-----------------------------|
|                 | 262 Emergency Room and Inpatient Visit |
|                 | 8717 Inpatient Hospital |
|                 | 9201 Inpatient Visit |
|                 | 581379 Inpatient Critical Care Facility |

**Logic:**
No concept sets were used in this definition. Includes patients with a visit start date between 14 days prior to the earliest covid diagnosis to 45 days after covid diagnosis that are also associated with one of the listed visit concept IDs.

| Invasive ventilation | Concept Set Names (latest codeset ID): |
|----------------------|----------------------------------------|
|                      | Invasive Mechanical Ventilation 2OCT20 (179437741) |

**Logic:**
Includes patients associated with any procedure codes in the concept sets listed that had a procedure date on or after the earliest covid diagnosis.

| ECMO | Concept Set Names (latest codeset ID): |
|------|----------------------------------------|
|      | Kostka - ECMO (415149730) |

**Logic:**
Includes patients associated with any procedure codes in the concept sets listed that had a procedure date on or after the earliest covid diagnosis.

| Death | Logic: |
|-------|--------|
|       |        |
No concepts or concept sets were used. Patients were flagged as deceased if a valid entry with a date was included in the death table, which is part of the OMOP data model used in the Enclave.

### Comorbid Conditions

| Condition                                      | Concept Set Names (latest codeset ID):                                      | Logic:                                                                 |
|------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Severe cardiovascular event                    | Charlson - CHF (359043664)                                                 | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| (Congestive heart failure and myocardial infarction) | Charlson - MI (259495957)                                                  |                                                                       |
| Peripheral vascular diseases                    | Charlson - PVD (376881697)                                                 | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Stroke                                          | Charlson - Stroke (652711186)                                               | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Dementia                                        | Charlson - Dementia (78746470)                                              | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Pulmonary Diseases                              | Charlson - Pulmonary (514953976)                                            | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Rheumatic Diseases                              | Charlson - Rheumatic (765004404)                                            | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Peptic ulcer diseases                           | Charlson - PUD (510748896)                                                 | Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Liver diseases (mild and severe liver diseases) | **Concept Set Names (latest codeset ID):**  
Charlson - LiverMild (494981955)  
Charlson - LiverSevere (248333963)  
**Logic:**  
Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Diabetes mellitus (diabetes mellitus and diabetes mellitus with complications) | **Concept Set Names (latest codeset ID):**  
Charlson - DM (719585646)  
Charlson - DMcx (403438288)  
**Logic:**  
Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Renal diseases | **Concept Set Names (latest codeset ID):**  
Charlson - Renal (220495690)  
**Logic:**  
Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
| Cancer (metastatic and non-metastatic) | **Concept Set Names (latest codeset ID):**  
Charlson - Cancer (535274723)  
Charlson - Mets (378462283)  
**Logic:**  
Includes patients associated with any condition codes in the concept sets listed with an occurrence date before the earliest covid diagnosis. |
### Supplementary Table S-2. Invasive Mechanical Ventilation Use among COVID-19 Patients Admitted to Emergency Department or Hospital by Immunosuppression group.

| Immunosuppression group | Crude estimates | Adjusted estimates A | Adjusted estimates B |
|-------------------------|----------------|----------------------|----------------------|
|                         | OR (95% CI)    | P-value              | OR (95% CI)          | P-value              | OR (95% CI)          | P-value              |
| HIV- & SOT- (N = 403,847)|              |                      |                      |                      |                      |                      |
| PWH (N = 2,611)         | 1.85 (1.62-2.11) | <0.01                | 1.66 (1.46-1.90)     | <0.01                | 1.62 (1.42-1.85)     | <0.01                |
| SOT (N = 6,671)         | 3.26 (3.05-3.49) | <0.01                | 2.86 (2.67-3.07)     | <0.01                | 2.29 (2.13-2.47)     | <0.01                |
| HIV+ & SOT+ (N = 163)   | 3.63 (2.41-5.45) | <0.01                | 2.88 (1.9-4.36)      | <0.01                | 2.10 (1.38-3.19)     | <0.01                |

Model A adjusted for age, sex, race and ethnicity (Black non-Hispanic, white Hispanic, white non-Hispanic, others), smoking status, and study site.
Model B adjusted for age, sex, race and ethnicity (Black non-Hispanic, white Hispanic, white non-Hispanic, others), smoking status, study site, severe liver disease, diabetes, cancer, renal disease, and number of comorbidities (0, 1, 2, ≥3).
HIV- & SOT-: people without HIV or solid organ transplant; PWH: people with HIV; SOT: solid organ transplant patient; HIV+ & SOT+: PWH had solid organ transplant; OR: odds ratio; 95% CI: 95% confidence interval.
### Supplementary Table S-3. Characteristics of People with HIV by Their Laboratory Data Availability

|                     | PWH with CD4 cell count data | PWH with HIV viral load data | all PWH* |
|---------------------|-----------------------------|-----------------------------|---------|
| N                   | N = 3,660                   | N = 1,424                   | N = 8,537 |
| age, median (IQR)   | 52 (39-60)                  | 52 (39-60)                  | 50 (37-59) |
| Age ≥ 60, N (%)     | 946 (25.8)                  | 385 (27)                    | 2,087 (24.4) |
| female sex, N (%)   | 871 (23.8)                  | 307 (21.6)                  | 2,361 (27.7) |
| race and ethnicity, N (%) |                 |                             |         |
| White non-Hispanic  | 1117 (30.5)                 | 1,117 (30.5)                | 2,982 (34.9) |
| Black non-Hispanic  | 1200 (32.8)                 | 405 (28.4)                  | 2,830 (33.1) |
| Hispanic            | 421 (11.5)                  | 229 (16.1)                  | 681 (9.4) |
| Others              | 922 (25.2)                  | 274 (19.2)                  | 1,985 (23.3) |
| smoking status, N (%)|                             |                             |         |
| current or former   | 1985 (23.3)                 | 430 (30.2)                  | 2,198 (25.7) |
| non-smoker          | 2,198 (25.7)                | 994 (69.8)                  | 6,413 (75.1) |
| unknown             | 35 (1)                      | <20                         | 74 (0.9) |
| number of comorbidities, N (%) |            |                             |         |
| 0                   | 1572 (43)                   | 576 (40.4)                  | 4,269 (50) |
| 1                   | 1,047 (28.6)                | 442 (31)                    | 2,099 (24.6) |
| 2                   | 533 (14.6)                  | 225 (15.8)                  | 1,077 (12.6) |
| ≥ 3                 | 508 (13.9)                  | 181 (12.7)                  | 1,092 (12.8) |

Note: N3C policy does not allow reporting of cells with less than 20 patients, indicated as “<20”.
PWH=people with HIV

*All PWH included people with HIV alone and people with HIV and solid organ transplant.