



Department  
of Health

# **COVID-19 Diagnoses, Hospitalizations and Mortality among Persons Living with and without Diagnosed HIV Infection in New York State**

James Tesoriero, Carol-Ann Swain, Eli Rosenberg  
on Behalf of PLWDH and COVID Research Team

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# Background

- NYS has been an epicenter for the United States (US) COVID-19 and HIV/AIDS epidemics, placing NYS in a unique position to speak to the intersection of these two epidemics:
  - SARS-CoV-2 had reached 7,288,166 diagnosed cases and 208,068 COVID-19 deaths in the US as of October 1, 2020
  - NYS had 455,068 diagnosed cases and leads the US in COVID-19 deaths at 33,159, more than twice any other state as of this same date
  - NYS, the epicenter of the HIV epidemic in the United States for decades, ranked second in the number of persons living with diagnosed HIV (PLWDH) and first in the rate per 100,000 population at the end of 2018

# Background

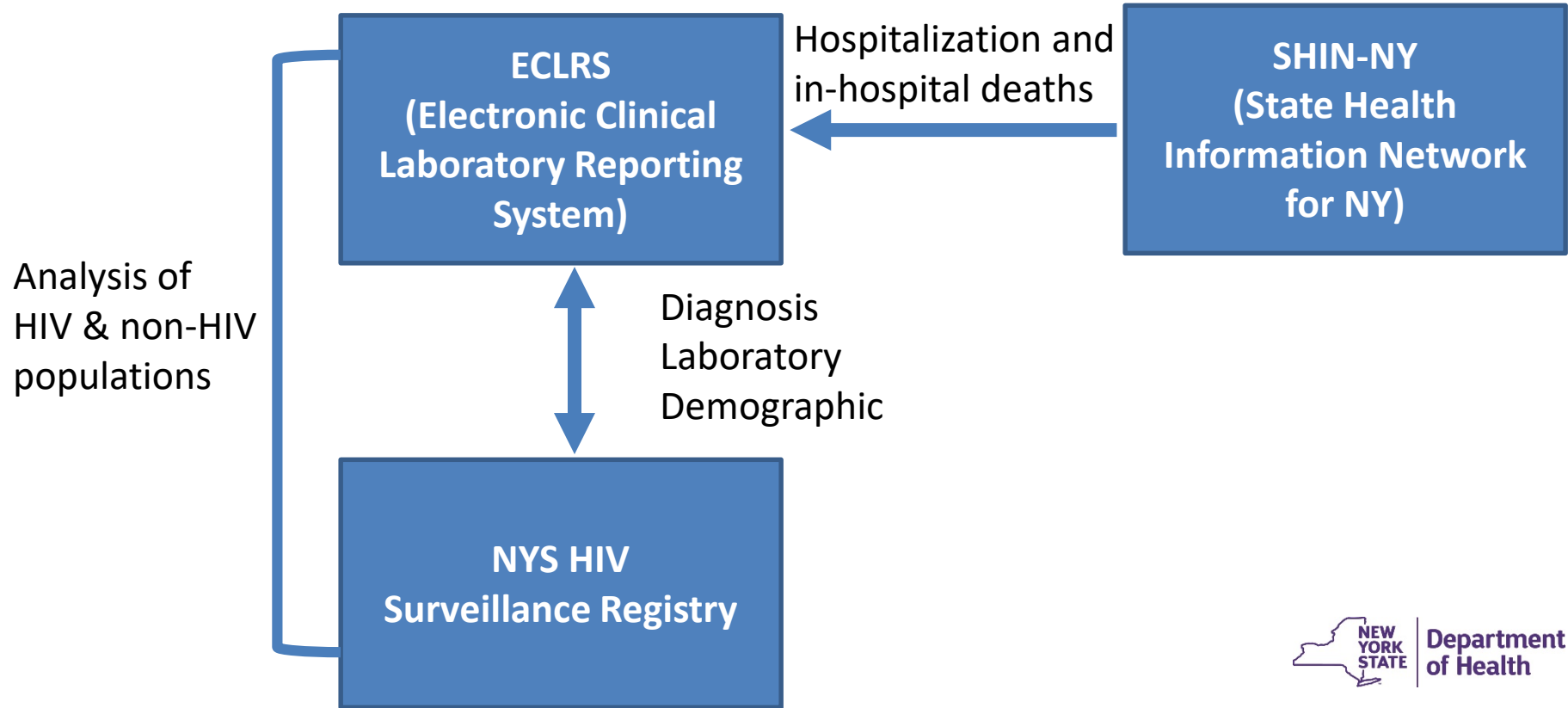
- Little evidence on the extent to which PLWDH are acquiring COVID-19, the severity of COVID illness experienced by PLWDH, or how these distributions compare to the non-HIV population
- Emerging literature suggests similar or even better COVID-19 clinical outcomes for PLWDH compared to the general population
  - majority of these studies are limited to hospitalized populations of PLWDH with COVID-19 and are based on a small number patients
- A few recent and larger and studies have found increased hospitalization and or mortality outcomes for PLWDH, there remain no population-based studies from US jurisdictions

# Study Purpose and Rationale

- Compare COVID-19 diagnosis, hospitalization and mortality rates for PLWDH in NYS to the non-PLWDH population
- To determine the factors associated with these outcomes among PLWDH

# Methods

# Data Source(s), Identification of Study Outcomes



# Methods

- People diagnosed with COVID-19 were identified from a NYS ECLRS file of all PCR confirmed SARS-CoV-2 infection reported to the New York State Department of Health (NYSDOH) through June 7, 2020
- The subset of individuals with HIV and diagnosed COVID-19 were identified by matching records from the ECLRS file of confirmed SARS-CoV-2 infection to the NYS HIV surveillance registry
  - Data were matched using a deterministic matching algorithm implemented using SAS DataFlux Data Management Studio 2.7



# Methods

- Hospitalizations were identified by matching the ELCRS file of confirmed SARS-CoV-2 infection to a datafile from the SHIN-NY, a public health information exchange network connecting NYS hospitals SHIN-NY
- An in-hospital death was defined as any individual hospitalized due to COVID-19 with a patient discharge status indicating death as defined by the HL7 v2.5 discharge disposition value set, or a discharge description that indicated the patient expired or was discharged to a funeral home

# Primary Study Outcomes

- Evaluated for PLWDH and for the non-PLWDH
  - COVID-19 diagnoses
  - COVID-19 hospitalizations
  - COVID-19 in-hospital deaths

# Statistical Analyses

For outcomes i.e., diagnoses, hospitalizations and in-hospital deaths we computed:

- Rates
- Standardized rate ratios
  - Sex and age within region for PLWDH vs. non-PLWDH
- Rates, unadjusted, and adjusted rate ratios
  - Adjusted rate ratios were adjusted for sex, age, region, race/ethnicity, HIV transmission risk, CD4 level and viral load suppression status for the within-PLWDH analysis

# Results

## PLWDH vs. non-PLWDH

# Demographic Distribution of PLWDH and non-PLWDH

## PLWDH

- Primarily male (71%)
- Resided primarily in NYC (78%)
- Individuals aged 40-<60 years were 50% of diagnosed pop.

## Non-PLWDH

- Similar male (48%)/female (52%) distribution
- Resided primarily in NYC (43%)
- Largest age category was aged <40 years (51%)

**COVID-19 diagnosis, hospitalizations, and in-hospital deaths per 1,000  
among persons living with and without diagnosed HIV infection  
New York State, March 1 – June 7, 2020**

	PLWDH		Non-PLWDH		
	n	Rate/1,000 pop	n	Rate/1,000 pop	Rate Ratio (95% CI)
<b>COVID-19 Dx</b>	2,988	27.65	375,260	19.40	1.43 (1.38-1.48)

\*PLWDH is at the end of 2019; non-PLWDH 2019 extracted from CDC bridged-race data

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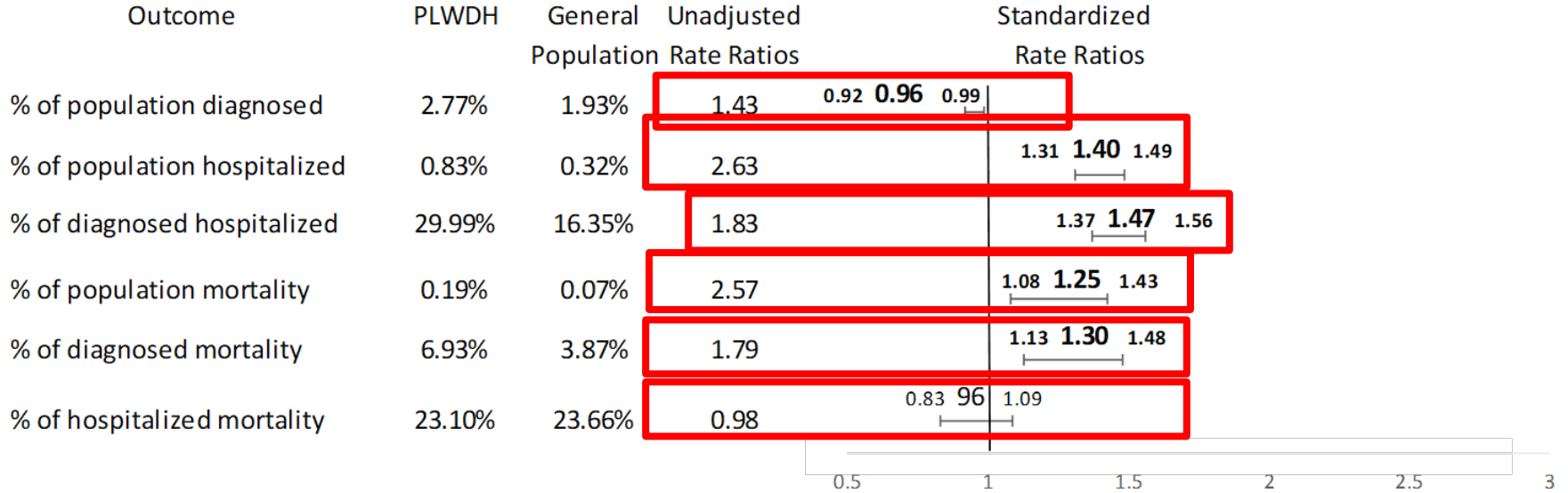
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<b>In-hospital death due to COVID-19</b>	207	1.92	14,522	0.75	2.55 (2.22-2.93)
<b>Total Population*</b>	108,062		19,345,499		

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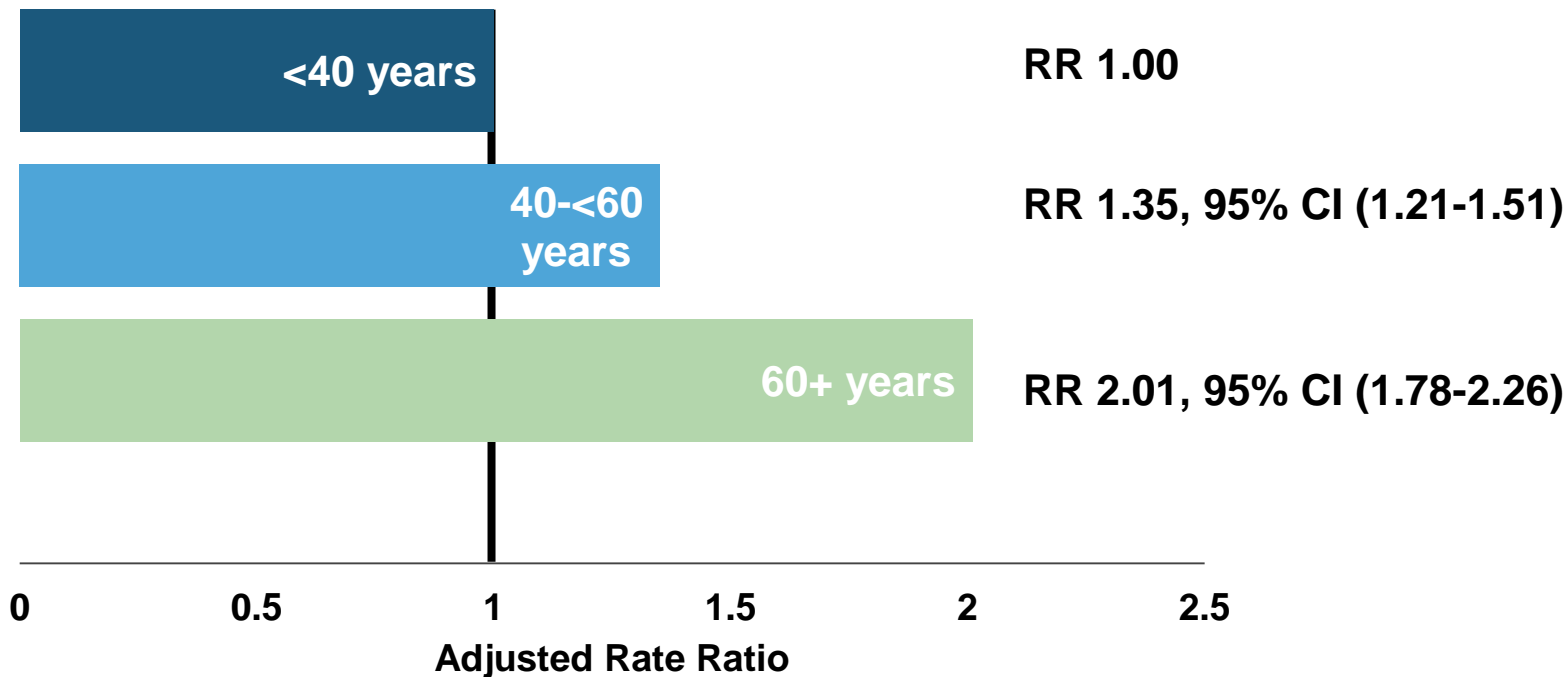


## Summary of COVID-19 Risk Associations Between PLWH and the General Population in NYS



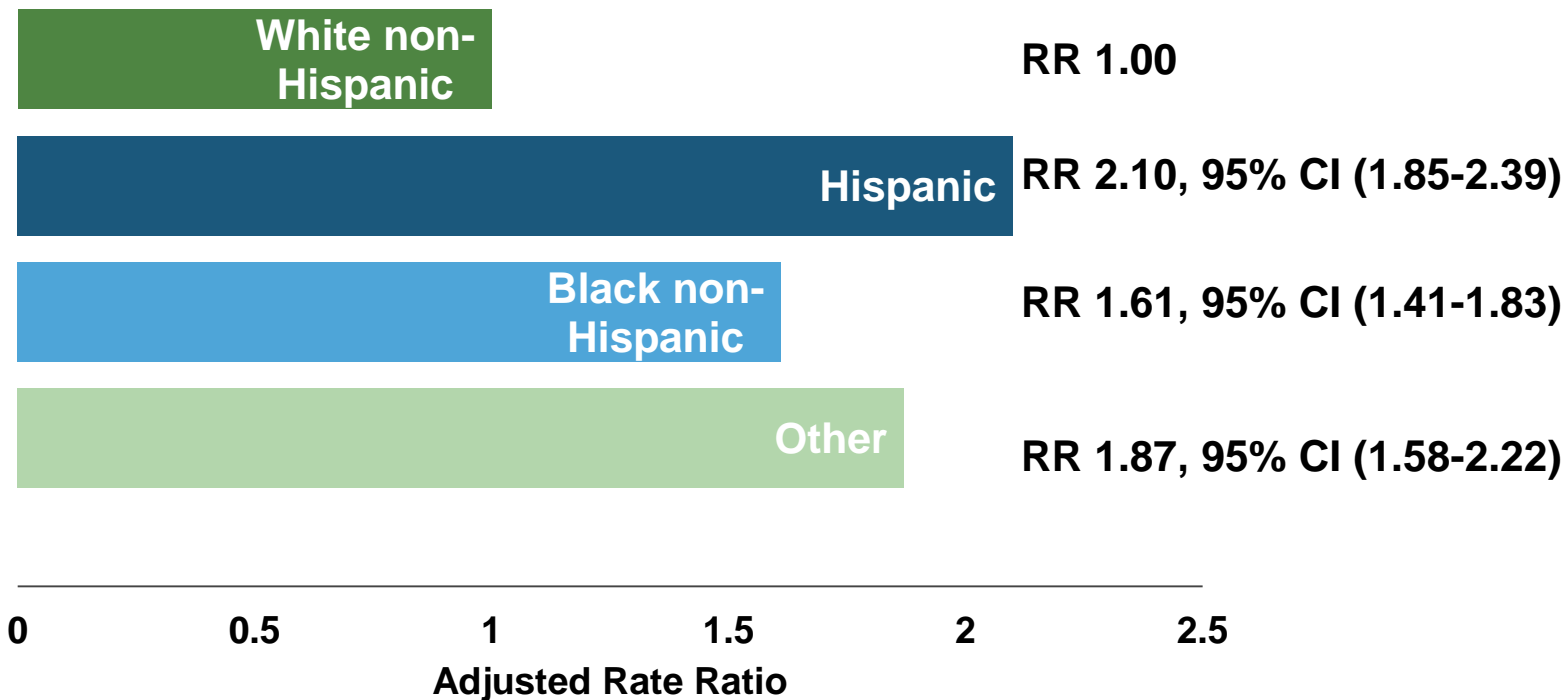
# COVID-19 Among PLWDH

# Predictors of COVID-19 diagnosis among persons living diagnosed HIV infection (PLWDH)



n=2,988 COVID-19 diagnoses among PLWDH  
model adjusted for age, region of residence, race/ethnicity, HIV Transmission risk, and Stage at last test before 03/01/2020, viral load at last test before 03/01/2020

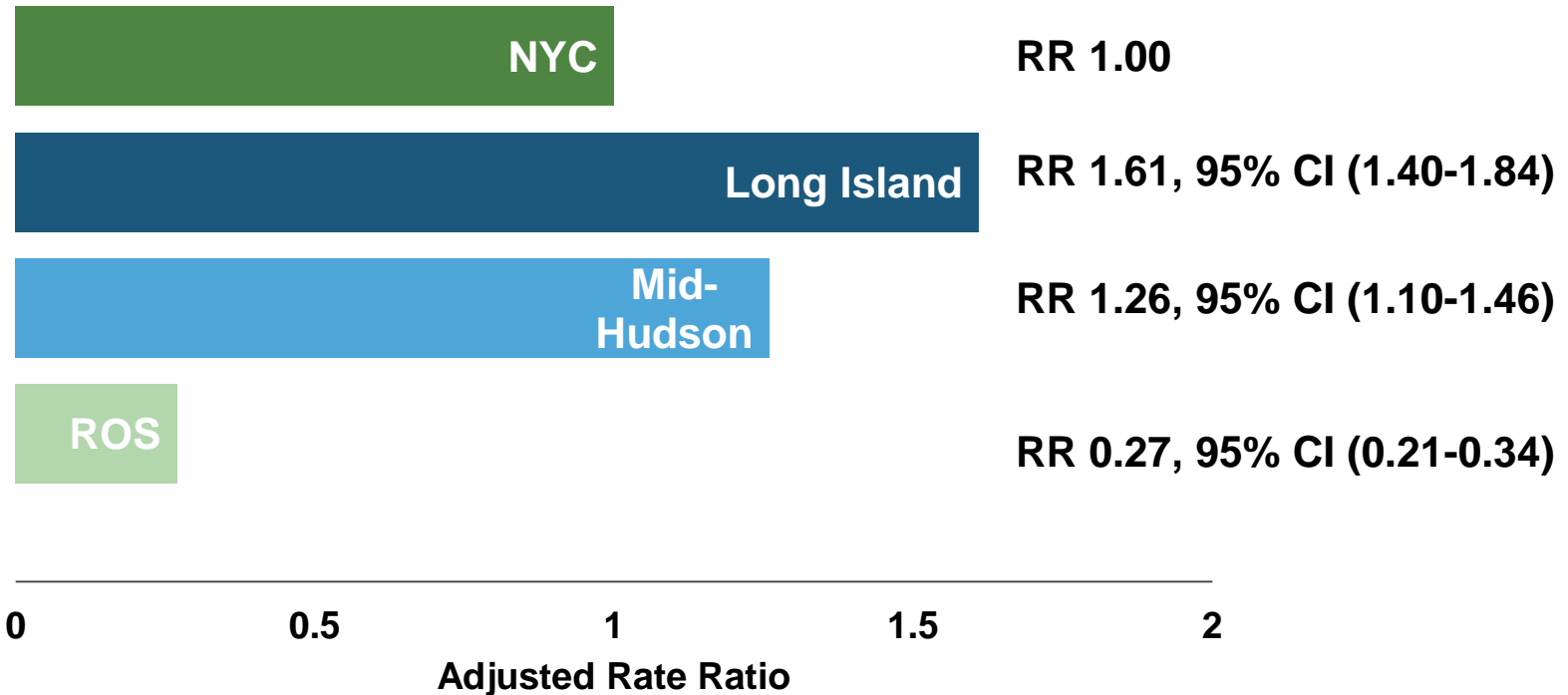
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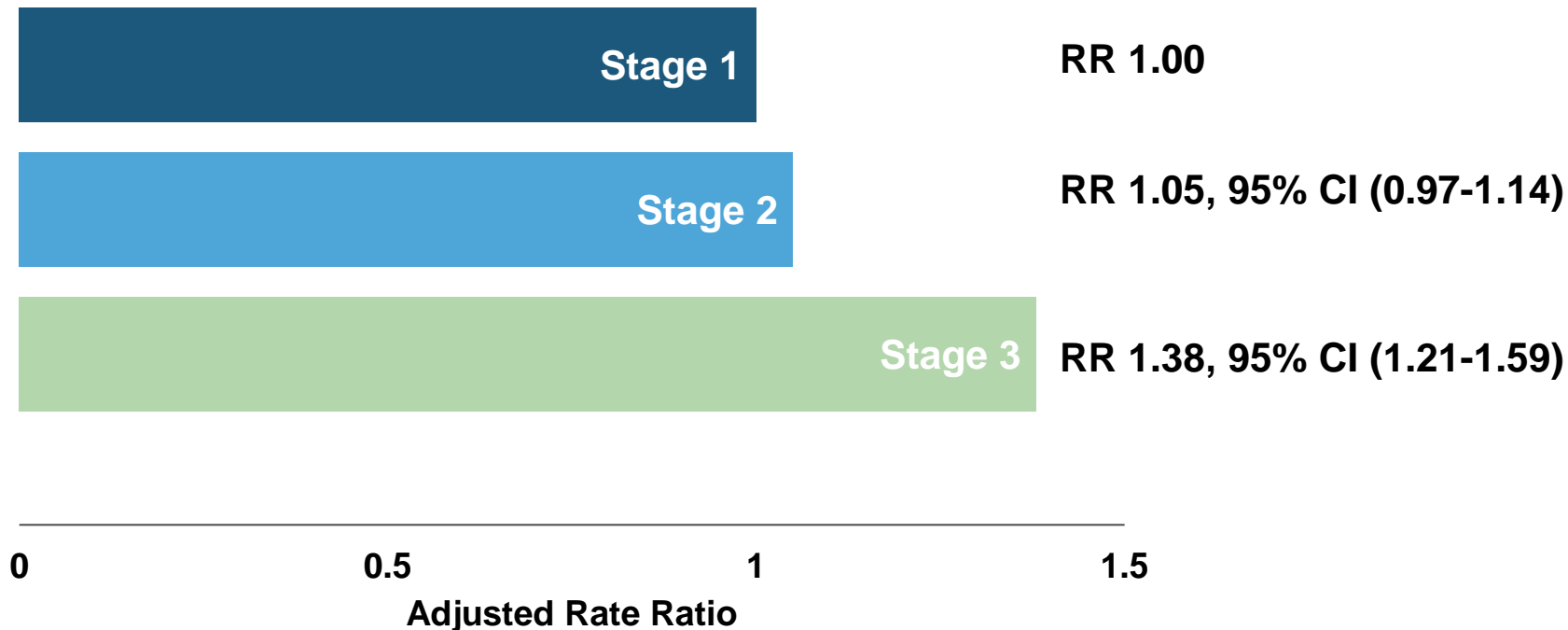
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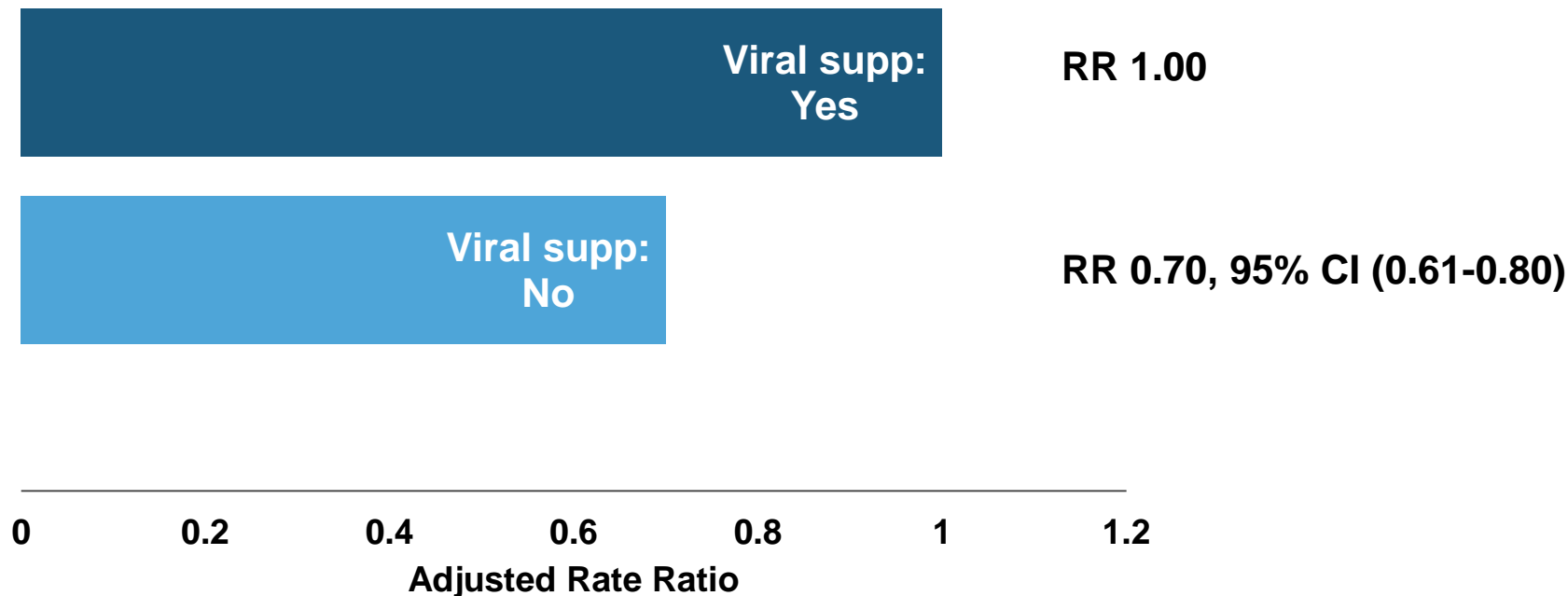


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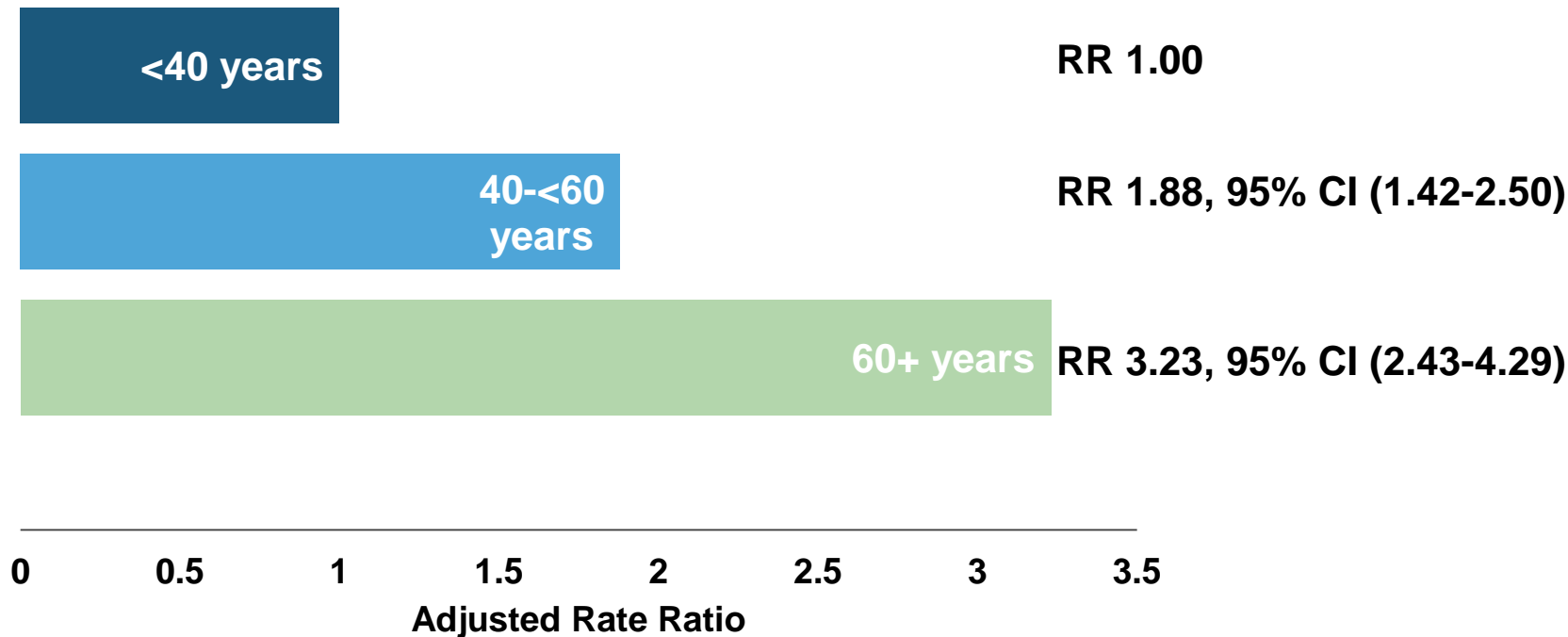
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# Hospitalizations Among PLWDH



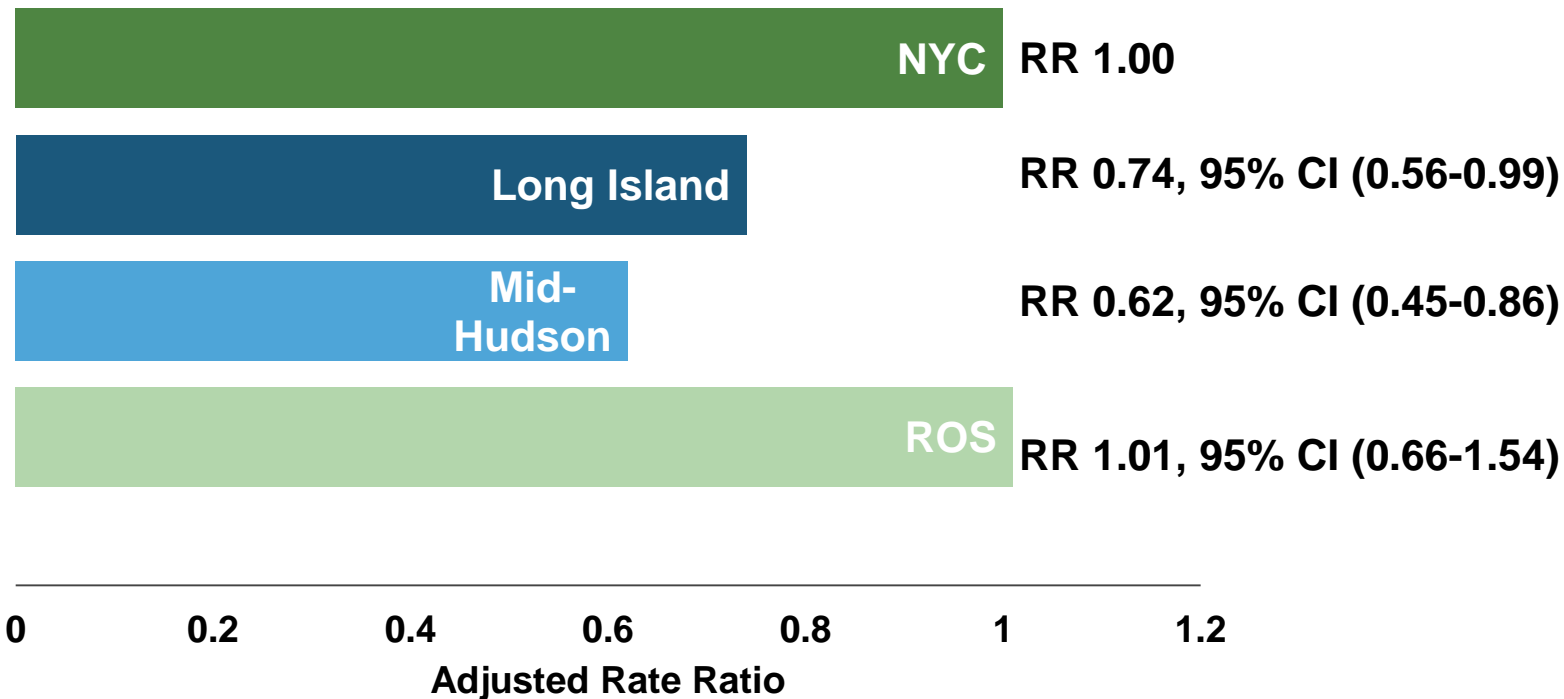
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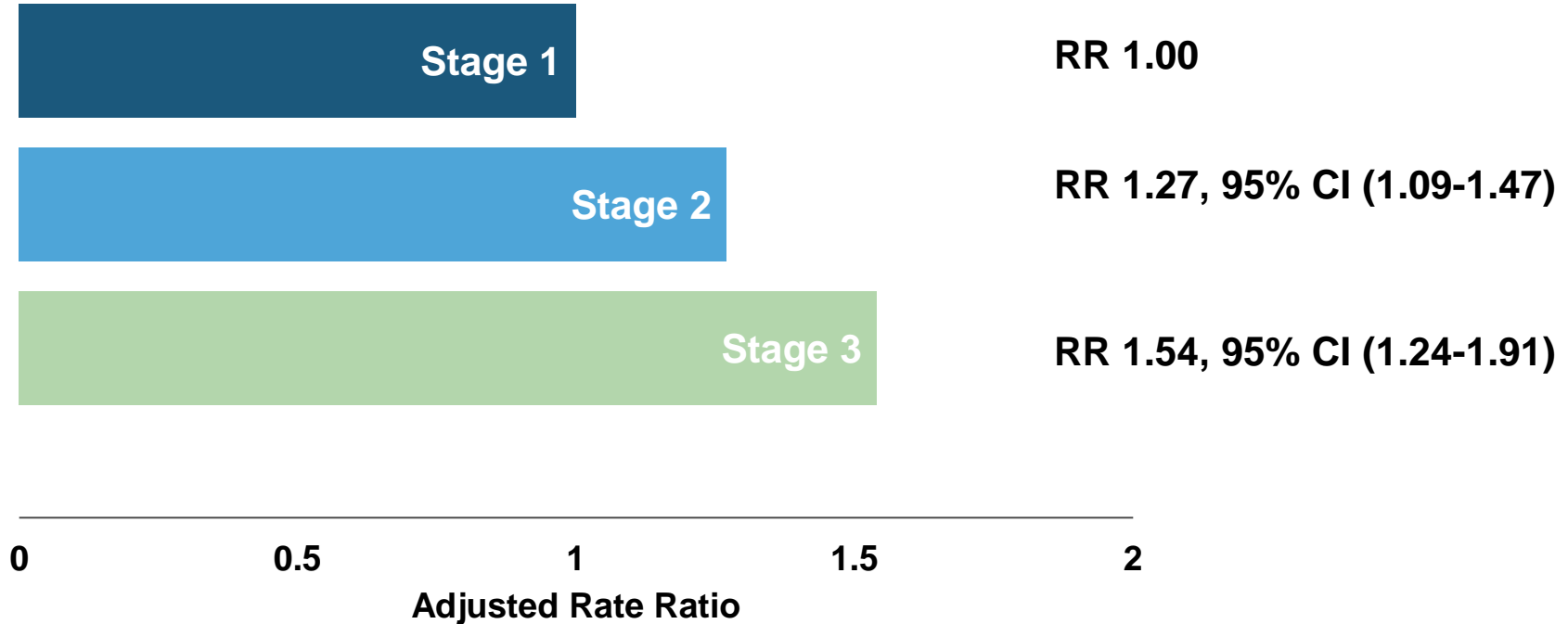
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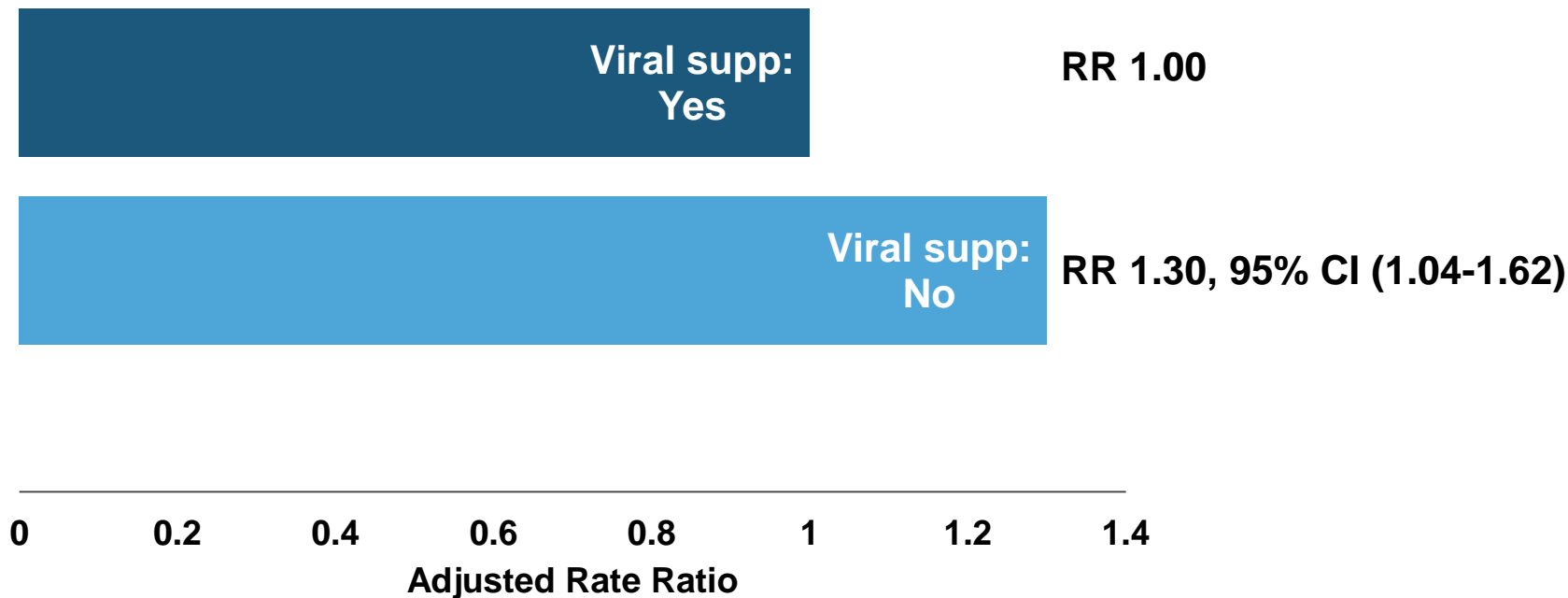


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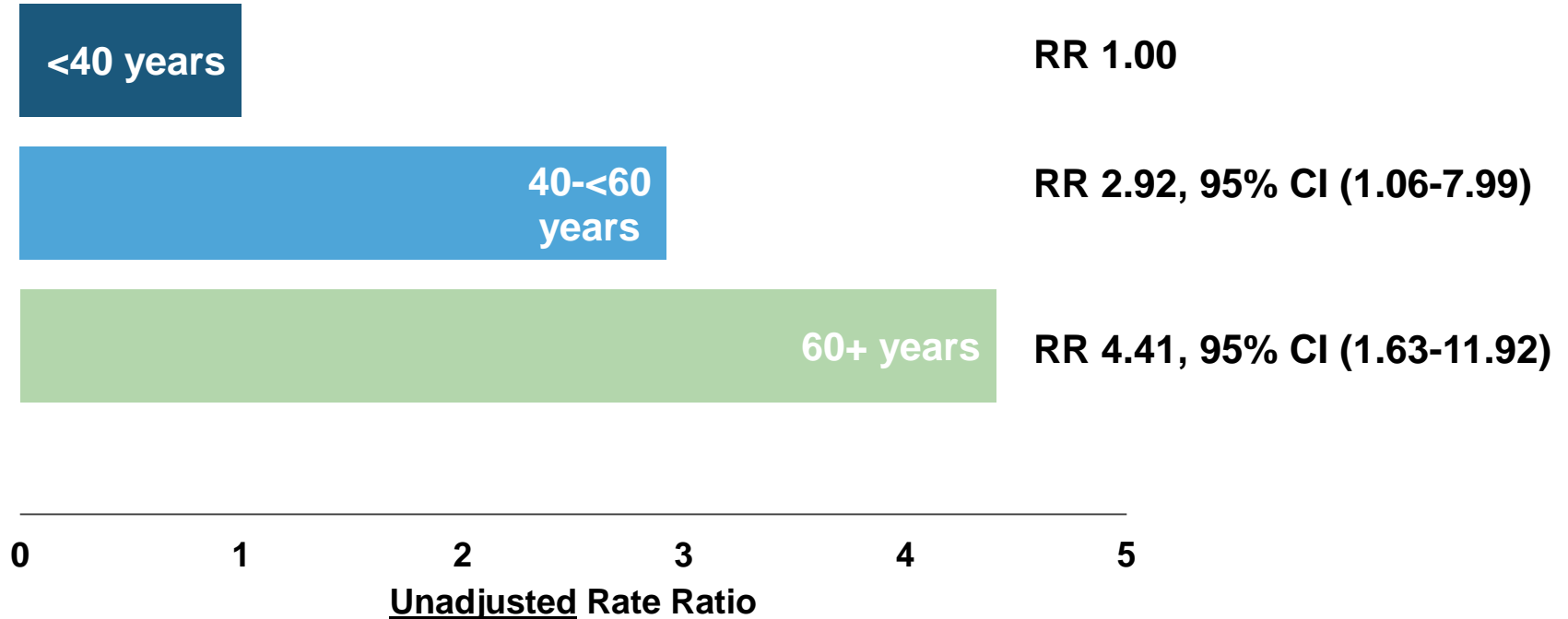
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# In-Hospital Deaths Among PLWDH

## Predictors estimate of in-hospital deaths among persons living diagnosed HIV infection (PLWDH)



N= 207 in hospital deaths among PLWDH

model adjusted for age, region of residence, race/ethnicity, HIV Transmission risk, and Stage at last test before 03/01/2020, viral load at last test before 03/01/2020

# Summary

- This is the first US population-level match of a state's HIV registry and COVID-19 diagnoses and hospitalizations
- Nearly 3,000 PLWDH in NYS had been diagnosed with COVID-19 **in the first 3 months** of the COVID-19 pandemic
- Nearly 900 PLWDH had been hospitalized
- Over 200 PLWDH had died
  - There were 1,758 deaths among PLWDH in all of 2018
  - 1 in 522 PLWDH, compared to 1 in 1,340 non-PLWDH

# Summary

- Controlling for age, sex, and region, PLWDH in NYS are diagnosed with COVID-19 at roughly the same rate as non-PLWDH, and once hospitalized have similar mortality rates
- However, PLWDH in NYS are hospitalized at a 40% higher rate than the general population, with low CD4 and high VL contributing factors to higher hospitalization among PLWDH
- Higher hospitalization ultimately drives a 25% higher overall mortality rate among PLWDH
- Our results indicate an observable gap in mortality for PLWDH due to a higher rate of severe disease requiring hospitalization



# Limitations

- This study begins with a COVID-19 diagnoses and not with SARS-CoV-2 infection
  - Differences in diagnosis propensity given infection among PLWDH or between PLWDH and the general population could alter the interpretation of study findings
  - A statewide seroprevalence study of over 15,000 New Yorkers estimated that that about 9% of COVID-19 cases through March 2020 had been diagnosed
    - Rosenberg ES, Tesoriero JM, Rosenthal EM, Chung R, Barranco MA, Styer LM, et al. Cumulative incidence and diagnosis of SARS-CoV-2 infection in New York. *Ann Epidemiol* 2020. <https://doi.org/10.1016/j.annepidem.2020.06.004>

# Limitations

- These analyses were limited to the demographic and laboratory data available in NYS's HIV surveillance and COVID-19 registries
  - This precluded more in-depth investigations into the role played by co-morbidities and underlying medical conditions, COVID-19 risk behaviors, and social determinants of health

# What's Next?

# PLWDH and COVID

## Medical Chart Abstraction Study

- Medical charts are being abstracted on all 896 PLWDH hospitalized for COVID-19 identified in this study, along with a matched control group of non-PLWDH
  - 2 controls per case
  - Matched on sex, age, admission date and facility
- Purpose is to better understand the HIV and non-HIV-specific factors associated with COVID-19 outcomes among PLWDH and non-PLWDH
- Status: Underway with data collection completed by 12/2020 and preliminary analyses available in January 2021.



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**Thank You**



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