Examining the Association Between A Modified Quan-Charlson Comorbidity Index (QCCI) and Viral Suppression: A Cross Sectional Analysis of DC Cohort Participants

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Background

PWH living in Washington, DC (as of December 2020) [1]

- N = 12,161
- Over 50% of PWH aged 50 years or over (53.2%)
- 78% of PWH identify as Black/African American and/or Hispanic/Latino

- People with HIV (PWH) are living longer with the advancement of effective antiretroviral therapy (ART)
- High prevalence of non-AIDS comorbidities among PWH
- The presence of comorbidities worsen health outcomes, including achievement of viral suppression (VS).

QUAN-CHARLSON COMORBIDITY INDEX (QCCI) [2]

- Validated measure used to estimate mortality risk based on diagnosis of selected comorbid diseases; adapted from the Charlson Comorbidity Index [3]

Objectives

1. To examine the association between comorbidity burden, measured using a modified Quan-Charlson Comorbidity Index (QCCI), and Viral Suppression (VS; HIV viral load <200 copies/mL) among a Cohort of PWH in Washington D.C.
2. To determine if race and ethnicity modifies this association.

Methods

DATA

Data from participant electronic health records (EHR) for adults enrolled in the DC Cohort, a multi-site prospective longitudinal observational study of PWH in Washington, DC at 14 participating clinical sites

INCLUSION CRITERIA:

Before January 1, 2018

- Enrolled in Cohort
- ≥ 18 years of age
- At least one documented viral load lab

OUTCOME

Viral Suppression –most recent viral load <200 copies/mL prior to January 1, 2018

MODIFIED QCCI COMPOSITE SCORES

- Diagnosis identified and categorized using ICD-9/10 codes reported in EHRs prior to January 1, 2018
- Weighted index for 11 chronic conditions assigned, ranging between one and six
  - One = lower individual risk of mortality
  - Six = high individual risk of mortality
- Composite score calculated by summing weighted scores for each participant (QCCI Range: 1 – 24)

ANALYSIS

- Descriptive distributions examined using Chi Square or Fisher's exact test (categorical) and Wilcoxon-Rank-Sum test (continuous)
- Wald Test used to test interaction between race/ethnicity and QCCI score.
- Univariable and multivariable analysis conducted to characterize the association between QCCI composite scores and VS.
- Logistic Regression models were used to estimate odds ratios (OR) and 95% confidence intervals presented.

Results

Table 1. Participant Characteristics (n=2471)

	Total sample N (%)	Viral Load Suppressed N (%)	Viral Load Unsuppressed N (%)	P-value
Total Sample	2471	2215 (89.6)	256 (10.4)	-
QCCI Score (median, IQR)	1.0 (0, 2.0)	0 (0, 1.5)	1.0 (0, 2.0)	**0.0253**
Sex				
Male	1825 (73.9)	1661 (75.0)	164 (64.1)	**0.0002**
Female	646 (26.1)	554 (25.0)	92 (35.9)	
Age				
18 – 54	1466 (59.3)	1290 (58.2)	176 (68.8)	**0.0012**
55+	1005 (40.7)	925 (41.8)	80 (31.2)	
Race/Ethnicity				
Hispanic	229 (9.3)	215 (9.7)	14 (5.5)	
NH – Black	1846 (74.7)	1625 (73.4)	221 (86.3)	**<.00001**
NH – White	290 (11.7)	279 (12.6)	11 (4.3)	
NH – Other [a]	106 (4.3)	96 (4.3)	10 (3.9)	
HIV Risk Factor for Transmission				
MSM	1054 (42.6)	977 (44.1)	77 (30.1)	**0.0003**
Heterosexual	756 (30.6)	659 (29.8)	97 (37.9)	
IDU	163 (6.6)	143 (6.5)	20 (7.8)	
Other/Unknown	498 (20.2)	436 (19.4)	62 (24.2)	
Insurance Status				
Private	843 (34.1)	790 (35.7)	53 (20.7)	
Public	1509 (61.1)	1324 (59.8)	185 (72.3)	**<0.0001**
Self-Pay	29 (1.2)	25 (1.1)	4 (1.6)	
Other	90 (3.6)	76 (3.4)	14 (5.4)	
Clinical Setting				
Community	1730 (70.0)	1554 (70.2)	176 (68.8)	0.6416
Hospital	741 (30.0)	661 (29.8)	80 (31.2)	

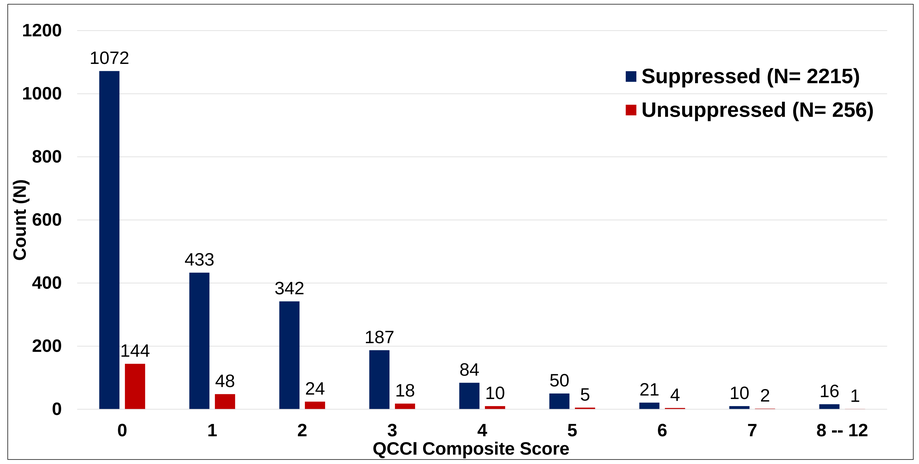
Abbreviations: QCCI Score: Quan-Charlson Comorbidity Score, IQR: Interquartile Range, NH-Black: Non-Hispanic Black, MSM: Men who have sex with men, HET: heterosexual, IDU: injection drug users
[a] NH-Other includes any race identified as unknown or other

Table 2. Unadjusted and Adjusted Odds Ratios for factors associated with being virally suppressed. (N= 2471)

	OR (95% CI)	aOR* (95% CI)
QCCI Score (OR (95% CI))	1.07 (0.98, 1.16)	1.06 (0.96, 1.17)
Sex (OR (95% CI))		
Male (Vs. Female)	**1.68 (1.28, 2.20)****	1.12 (0.81, 1.55)
Age [a] (OR (95% CI))	**0.63 (0.48, 0.83)****	**0.57 (0.42, 0.77)****
Race & Ethnicity (OR (95% CI))		
Hispanic	**2.09 (1.20, 3.65)****	**2.20 (1.25, 3.91)****
NH – White	**3.45 (1.86, 6.40)****	**2.28 (1.20, 4.33)****
NH – Other	1.30 (0.67, 2.54)	1.17 (0.59, 2.29)
NH – Black	Reference	Reference
HIV Risk Factor (OR (95% CI))		
Heterosexual	**0.53 (0.39, 0.72)****	0.69 (0.47, 1.0)
IDU	**0.56 (0.33, 0.94)****	**0.57 (0.32, 1.0)****
Other/Unknown	**0.54 (0.38, 0.77)****	0.69 (0.47, 1.01)
MSM	Reference	Reference
Insurance Status (OR (95% CI))		
Private	**2.09 (1.52, 2.86)****	**1.93 (1.39, 2.68)****
Other	0.76 (0.42, 1.37)	0.79 (0.42, 1.40)
Public	Reference	Reference
Clinical Setting (OR (95% CI))		
Community	1.069 (0.808, 1.413)	–
Hospital	Reference	
Interaction Terms (p-value)		
Hispanic & QCCI	0.734	
NH – White & QCCI	0.775	–
NH – Other & QCCI	0.915	
NH – Black & QCCI	Reference	

[a] Age: measured dichotomously comparing 18 – 54 years of age vs. 55+
***Adjusted model includes sex, age, race/ethnicity (NH = non-Hispanic), mode of transmission, insurance status**
**** p-value significant at 0.05 level**

Figure 1. Distribution of QCCI composite scores based on viral status (suppressed vs. unsuppressed) (N = 2471)



Summary

- Patients were predominantly virally suppressed (89.6%), identified as male (73.9%), N-H Black (74.7%), between 18-55 y/o (59.3%) and receiving care in a community-based clinical setting (70%). The median QCCI score was 1 (Range =1-12, IQR=0-2).
- The two groups (suppressed vs. unsuppressed) differed significantly with respect to sex, age, race/ethnicity, HIV risk of transmission and insurance status (p≤ 0.05).
- As QCCI score increases, the proportion of unsuppressed patients decreases.
- The association between QCCI score and VS was not statistically significant (aOR=1.06, 95% CI 0.96 – 1.17).
- Age, race/ethnicity, HIV risk factor and insurance status were all significantly associated with VS.
- Race/ethnicity was not found to be an effect modifier on the relationship between QCCI score and VS (p > 0.05).

Conclusions

- Although there was not a significant association between QCCI score and VS, our findings suggest that PWH can maintain VS despite complexity of having one or more comorbidities.
- The presence of non-QCCI comorbidities within the Cohort suggest that other factors may have a larger influence on HIV-related health outcomes.
- Emphasis on the need for more inclusive research using comprehensive indices such as the QCCI to measure the burden of comorbidities and their impact on HIV-related health outcomes.

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Additional Information

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