Trends in the distribution of VACS mortality risk score, viral suppression, and CD4 counts among patients receiving HIV care in King County, Washington who participated in the Medical Monitoring Project, 2008-2012

Background

The Veterans Aging Cohort Study (VACS) Index is a weighted score that indicates mortality risk among individuals with HIV. Several diverse clinical cohorts have validated that higher VACS scores are associated with increased mortality risk as well as hospitalization, neurocognitive impairment, and frailty.[1] The score incorporates data on age, sex, race, CD4+ T lymphocyte count, viral load, and indicators of organ system injury. Among Medical Monitoring Project (MMP) participants in King County, Washington, we aimed 1) to evaluate the performance of the VACS Index in predicting mortality, and 2) to assess whether there were changes in VACS scores across MMP cycles.

Methods

MMP is a supplemental HIV surveillance program that collects cross-sectional interview and medical record abstraction (MRA) data on a random sample of persons receiving HIV care. We linked King County participants in the 2008-2012 MMP cycles to core HIV surveillance records using a unique identifier, birth date, and gender. Through this linkage, we identified deaths that occurred after MMP participation. VACS Index scores were calculated using MRA data for each MMP participant. We calculated substitute values for missing data on CD4 count, viral load, hemoglobin, platelet count, AST, ALT, and creatinine using multiple imputation. We present results incorporating imputed data, which were similar to results from complete case analyses. The performance of the VACS Index in predicting mortality was evaluated using area under the curve (AUC) statistics and Cox proportional hazards models. For reference, an AUC of 1 represents a perfect test and 0.50 represents a meaningless test. Differences in mean VACS score by MMP cycle were examined using multivariate linear regression models that adjusted for age, sex, race, nativity, risk transmission category, years since HIV diagnosis, smoking, and injection drug use.

Results

The 2008-2012 King County MMP samples comprised 991 individuals, of whom 46 had died by March 31, 2014. The estimated mortality rate was 2.2 per 100 person-years. Median follow-up time for censored participants was 3.7 years (95% CI 3.6-4.3). The median VACS score was 16 (range 0-94). A 10-unit increase in VACS score was associated with a 60% increase in mortality risk (HR 1.60, 95% CI: 1.42-1.81, p <0.001). The AUC, which quantifies the ability of the VACS score to predict mortality, was 0.78 (95% CI: 0.77-0.80).

The distribution of VACS scores was similar across MMP cycles (**Figure 1, Panel A**). In multivariate analyses, MMP cycle was not associated with mean VACS score (p > 0.10). The percentage of participants with a CD4 count of 500+ cells/mm^3 and a suppressed VL (<500 copies/mL) increased from 42% to 58% and from 68% to 82%, respectively, between 2008 and 2012 (**Figure 1, Panel B**). In multivariate analyses, the association between MMP cycle and viral suppression and having a CD4 count of 500+ cells/mm^3 strengthened over time. Though this trend did not reach statistical significance in this sample of PLWH in King County, the trend has been confirmed to be statistically significant in analyses of the entire population of PLWH in King County.[2]

Conclusions

The VACS Index was predictive of mortality risk among adults receiving HIV care in King County. The performance of the VACS score was comparable to that reported for much larger clinical cohort studies.[1] Although we observed improvements in CD4 count and VL across MMP cycles, VACS scores remained stable over time. VACS does take into account shifts in the demographics and age of PLWH. The VACS Index may serve as a more nuanced and conservative indicator of health status than CD4 count and VL measures. Monitoring trends in the distribution of VACS scores in data representative of the underlying PLWH population may be useful for programs that seek to reduce morbidity and mortality risk among PLWH.

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References

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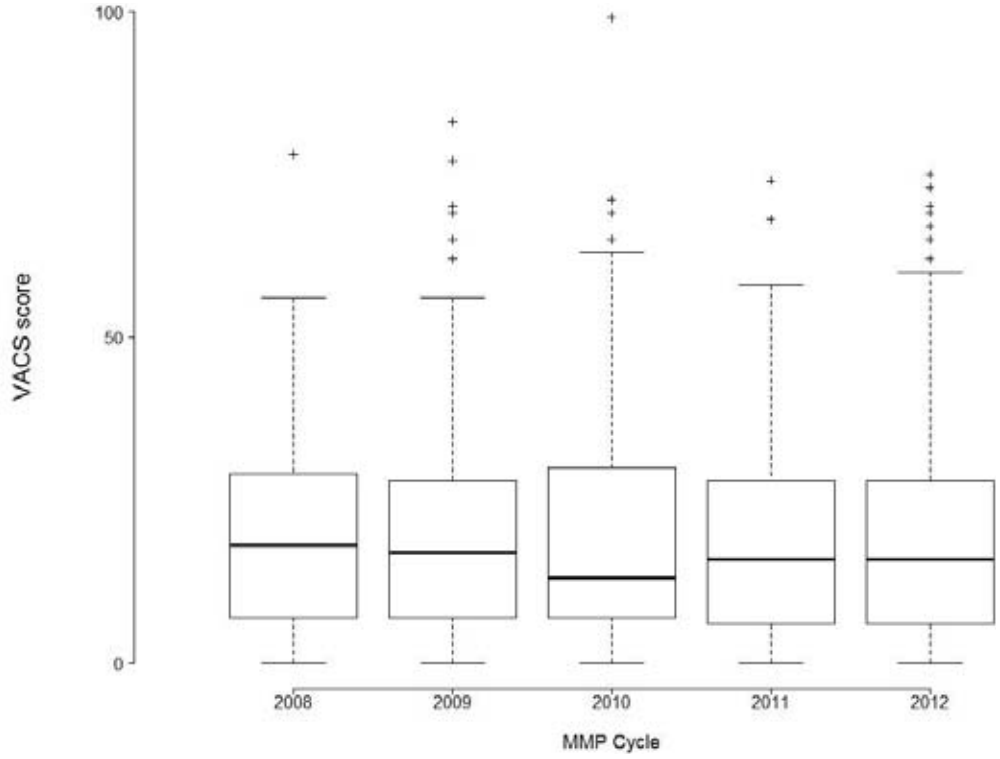
2. Buskin SE, et al. Increasing Viral Suppression and Declining HIV/AIDS and Mortality in the Era of Expanded Treatment. In: In Special Issue: Abstracts From the 2014 Conference on Retroviruses and Opportunistic Infections. Vol 22(e-1). Top Antivir Med; 2014:533.

Figure 1. Comparison of trends in the distribution of VACS mortality risk score (Panel A) and percentage virally suppressed and with CD4 counts ≥500 copies/mL (Panel B) among patients receiving HIV care in King County, Washington who participated in the Medical Monitoring Project, 2008-2012

Panel A



Panel B